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	IS-CMS-MUC/RZ Rachel Zhang	+49 89 5791-3038 rachel.zhang@tuev-sued.de	+49 89 5791-2756	2010-01-20	1 of 10

Dear Sirs or Madams,

Please find below the response to the review formulated for the CDM project "Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project" with the registration number 2851. In case you have any further inquiries please let us know as we kindly assist you.

Best regards

Rachel Zhang  
Carbon Management Service

Annexes:

1. TÜV SÜD Information Reference List
2. List of registered Waste Heat Recovery Projects

Appendices:

- Extracts from World Bank report no.: 38641-CN on "*Energy Efficiency Financing Project*"
- Extracts from International Finance Corporation Report on "*Energy Efficiency Improvement Potential & Opportunities in China's Cement Industry*"
- Bank loan approval from Agricultural Bank of China

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- FSR of the WHR project listing an IRR of 33.73%
- FSR approval of the WHR project listing an IRR of 33.73%
- CFB retrofit project FSR\_2002
- CFB retrofit project FSR approval\_2002

## **Response to the CDM Executive Board**

### **Request 1:**

The DOE shall further substantiate how it has validated the barrier analysis.

AND

### **Request 2:**

The DOE shall further clarify the suitability of the benchmark in accordance with paragraph 13 of the Guidance on the Assessment of Investment Analysis, in particular, whether the applied WACC has been used for similar projects with similar risks, developed by the same company.

AND

### **Request 3:**

The DOE is requested to further explain how it has validated: (i) the suitability of the tariff (400 RMB/kWh) used in the investment analysis; (ii) the suitability of the investment cost as it has indicated that the purchase contracts refer to two different projects; (iii) the operational hours for the cement production and electricity generation; (iv) the annual power supply (33,900 MWh); and (v) whether demand/capacity charges have to be considered as savings in the investment analysis or not.

AND

### **Request 4:**

The DOE is requested to further validate the common practice analysis, in particular the essential difference between the project activity and the 11 projects under construction (PDD page 31-33).

AND

### **Request 5:**

The DOE shall further substantiate that the waste heat utilized in the project activity would be released into the atmosphere in the absence of the project activity in line with the ACM0012 v3.1.

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## **Response by TÜV SÜD:**

### **Issue 1:**

The investment barrier has been used to demonstrate the hurdles to the implementation of the proposed CDM activity.

It is further noted that the demonstrated barrier complies with most recent guidance, the "Guidelines for objective demonstration and assessment of barriers" EB50, Annex13.

According to report from the World Bank (IRL 63) and International Finance Cooperation (IRL 27) there exist several obstacles for financing of energy efficiency projects.

Enclosed to this document, extracts of these reports will be uploaded. Nevertheless the audit team wants to list a few of them in the response to this RfR.

- "Commercial banks impose higher guarantee requirements on the financing of energy efficiency projects. It is hard for Cement enterprises to produce the assets meeting these guarantee requirements"
- "Construction of new production capacity already requires loans from banks and lead enterprises to have high ratios of debts to assets. Therefore they encounter difficulty to finance further energy efficiency projects."
- The Chinese government has issued restrictions on bank lending to industries with production overcapacity such as the cement industry (IRL 30).

The investor company, Tangshan Jidong Cement Co. Ltd., is a listed Company, its' largest shareholder being the Jidong Group, which is a public entity. The company is generally considered creditworthy. Thus it is concluded that EB50, Annex 13 Guideline 1 is complied with.

Compliance with Guideline 6 (EB50, Annex13) is demonstrated in this particular project with reference to the bank loan which was issued with indication to the additional finance of the project due to CDM. (IRL 10) This shows that CDM has played a major role in the approval decision by the bank. The loan approval is enclosed to this document.

TÜV SÜD wants to clarify that the barriers mentioned in the PDD are referring to energy efficiency projects in general – and are not restricted to the Cement Sector.

### **World Bank Report:**

- *The project development objective is to improve the energy efficiency of medium and large-sized industrial enterprises in China,...* (World Bank 2008, page 4)
- *"Chinese banks have considered lending for energy conservation projects to be risky"* (WB2008 report page 2)
- *"...these characteristics lead to the perception that energy conservation projects are technically risky and financially unattractive, especially when compared with capacity expansion"* (WB2008 page 2)

These statements refer to energy efficiency projects in all industrial sectors in China.

### **International Finance Cooperation:**



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- *“The Program will organize and provide...to directly support implementation of energy efficiency (EE) projects.” (IFC 2006, page 1)*
- *“Commercial banks impose higher guarantee requirements on the financing of energy efficiency projects.” (IFC 2006 Page 38)*

These statements refer to energy efficiency projects in the Cement Sector.

The above statements show that the barriers are specific to energy efficiency projects, including those at cement plants, and not specific to only the cement sector as a whole.

The result of this assessment clearly shows that the barrier presented in the PDD can be considered real.

This barrier would prevent the project activity but would not prevent the baseline of the project.



## **Issue 2:**

The project entity has invested in a Waste Heat recovery project in 2001 with a capacity of about 10 MW (IRL 25). The project had an IRR of 33.73% which clearly crossed the benchmark of 15.58 %. Due to steam constraints the project had to implement an additional coal based boiler one year after the implementation of the WHR project. This implementation caused the IRR to decrease to 24.88 % (IRL 65). Nevertheless the benchmark of 15.58% has still been crossed and hence Jidong invested in the project.

In 2002 the Chinese energy sector has been liberalized leading to a changing relation between investment, operational costs and revenues. The similar has been observed in Europe, when the energy sector has been liberalized in the 90s of the last century.

Based on our country expertise and as it is confirmed in the response from PP the frame conditions for investments in this sector significantly changed since 2001 and cannot be compared with the frame conditions at the moment of taking the decision for the later projects, which is the reason for the difference in the values of IRR.

Hence the requirement of paragraph 13 of the Guidance on the Assessment of Investment Analysis version 03, in particular, application of WACC for similar projects with similar risks, developed by the same company has been met by the proposed project activity.

TÜV SÜD further has checked on the investment portfolio of Jidong over the last years. Investments in the core business (e.g. clinker lines and grinding mills) have all crossed the internal benchmark (with an average IRR of 24.23%). This shows that the benchmark has consistently been applied within the company.

Furthermore Jidong invests in 5 other similar cement WHR projects. These projects would not be implemented without CDM revenues, which helped to increase the IRR to a level above the benchmark. These 5 projects are the following:

- Tangshan Jidong Cement Guye District 12MW Cement Waste Heat Recovery Project
- Tangshan Jidong Cement Matoushan Matishan 25MW Cement Waste Heat Recovery Project
- Tangshan Jidong Cement Guye District 8 MW Cement Waste Heat Recovery Project
- Tangshan Jidong Cement Fengrun District 12MW Cement Waste Heat Recovery Project
- Jidong Cement Panshi Co., Ltd. 15 MW Cement Waste heat Recovery Project

Four of them are in the process of being registered by the EB, and the fifth one has been registered by the EB already (UNFCCC reg. no. 2701).

In total there are 6 Waste Heat recovery projects which have been implemented by the project owner, one in 2001 and 5 additional ones in 2006 which have overcome the investment hurdle due to additional finance through CDM.

...

### **Issue 3:**

TÜV SÜD has checked the data applied in the PDD and IRR analysis with the Feasibility Study of Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project (IRL 6). All parameters listed in the FSR have been taken as input values. The FSR has been completed by an independent and certified design institute in July 2007, which is before the investment decision in October 2007 (IRL 13). The time between the FSR issuance and the starting date of the project activity are only 4 months. The FSR has been approved by the government (IRL 7). Hence the DOE confirms that the values have been valid and applicable at the time of the investment decision.

Furthermore the DOE cross checked the input values:

#### **(i) Tariff:**

The electricity tariff has been cross checked with the officially publish tariff of "the Department of Commerce of Jilin Province". The values are nearly the same (0.400 RMB/kWh (excluding VAT) assumed in IRR calculation, 0.431 RMB/kWh (including VAT) officially approved tariff from Jilin province).

Furthermore the electricity tariff has been checked with the "Notice on the adjustment for the tariff of Northeast China Power Grid", Fagaijiage [2006] No.1231 (IRL 55). The electricity tariff paid by industrial facilities for purchasing electricity from the grid in 2006 is 0.482 RMB/kWh (including VAT).

According to the Notice on the issues of the different tariff and the policies of the charge for the captive power plant" (Fagaidian [2004] No. 159), a waste heat recovery project needs to pay a "capacity charge fee" in order to ensure the grid maintains the equivalent capacity access to the captive facility.

This fee is dependent on transformer capacity at the project site (IRL 56).

The project has a nominal capacity of 5400 kW considering the power factor of 0.8 phi, the transformer reserve capacity is 6750 kVA (5400/0,8 phi ). This leads to a reserve capacity charge of 128,250 RMB/month (=6759 kVA\*19RMB/kVA/month=128,250 RMB/month) and a price of 0.03192 RMB/kWh ((128,500 RMB/month) /(5400kW\*31days/month\*24h/day))

The captive capacity charge fee is excluded from the baseline price, as these costs would not appear in the absence of the proposed project activity. Hence the actual price saved by the Cement plant is:  $(0.482 \text{ RMB/kWh} - 0.03192 \text{ RMB/kWh}) / 1.17\% \text{ VAT} = 0.3846 \text{ RMB/kWh}$ . This is slightly lower than the value assumed in the FSR and used in the IRR calculation. Hence the audit team confirms that the tariff applied in the IRR calculation is reasonable and conservative. The tariff assumed in the IRR calculation is slightly higher, which is conservative.

#### **(ii) Investment Costs:**

The total investment has been compared with the Reference document on Best Available Techniques in the Cement and Lime Industries (2007 draft, latest version European Commission; IRL 53). According to this document the investment costs of Waste Heat Recovery Projects in Cement plants should be around 0.8~1.2 million €.

The proposed project has an installed capacity of 6 MW, hence the investment costs should be around 4.8~7.2 million €, while the project calculates with 5.5 million € (~55 million RMB).

The reference document shows that the assumed total investment is at the lower end, leading to a conservative approach.

Hence the audit team concludes that the assumed price is reasonable and appropriate.



The total investment has furthermore been compared with the audited financial report of an independent certified third party, Tangshan Hongli Certified Public Accountants Co., Ltd. (IRL 54).

The actual costs are slightly higher (63,811,557 RMB) than the assumed costs in the FSR (55,279,800 RMB).

This confirms that the applied values have been reasonable and even conservative.

### **(iii) Operational hours for the cement production and electricity generation**

The operation of the Cement Production has been checked by the audit team by reviewing the following documents:

- Annual Clinker Production Records from Jidong Cement Jilin Co., Ltd. (2005, 2006)

These are the most recent historical data available before the investment decision of the proposed project activity. Hence the audit team considers them as appropriate.

The annual clinker production has been 718,577 t (2005) and 750,056 t (2006). By assuming a operation of 2500 t/d this leads to average operational hours of 7,049 hours.

The proposed project assumes an electricity generation of 36,940 MWh, assuming a rated capacity of 5.4 MW (official rated capacity of the turbines by the equipment manufacturer, IRL 31) this leads to operational hours of 6,840 hours.

Considering operational stops for maintenance and emergency the audit team considers this value appropriate and in line with the operational hours of the clinker production line.

Furthermore the project has been operating for 1 1/3 years. The audit team has checked the power generation and supply from September 2008 ~December 2009 (IRL 60).

The actual power generation in 2009 has been 34,157,430 kWh, equal to 6326 hours. This is slightly lower than the value assumed in the FSR and proves that the assumptions in the FSR have been reasonable and even conservative.

### **(iv) The annual power supply (33,900 MWh)**

The FSR assumes an annual power generation of 36,940 MWh. After deduction of auxiliary power consumption (8% of total generated electricity), line losses etc. the expected net annual supply to cement production facility is 33,980 MWh. Based on our sectoral experience TÜV SÜD confirms that an assumption of 8 % losses is reasonable.

Furthermore the theoretical available electrical power supply has been calculated by the project participant based on the available waste heat in the clinker production line (see fcap calculation submitted in the request for registration). Based on the available heat, the potential maximum electrical power supply has been calculated. This theoretical maximum electricity output is calculated based on design specifications of the equipment provided by the equipment supplier, a standard load factor of 0.8, and standard losses & auxiliary consumption (together 8%), which are all reasonable and have all been validated by TÜV SÜD.

The calculated potential maximum net power supply is 39,220 MWh. This value has been used as  $Q_{OE,BL}$  in the fcap calculation.

As stated above the project is already operating since September 2008. In 2009 the project generated 34,157,430 kWh. After deduction of auxiliary consumption, line losses etc. 30,522,993 kWh net power has been supplied to the Cement Plant.

The power supply is slightly lower than assumed in the FSR, proving that the assumptions have been reasonable and even conservative in regard to the IRR calculation.

**(v) Whether demand/capacity charges have to be considered as savings in the investment analysis or not.**

The demand/ capacity charge paid by the cement company is depended on the transformer capacity connected to the grid (IRL 55, 56). The transformer capacity will not be changed due to the implementation of the proposed Waste Heat Recovery Projects.

The electricity demand of the Cement plant will not change due to the implementation of the proposed waste heat recovery. In case of maintenance work on the WHR project the electricity supply by the grid company needs to be guaranteed. Hence the charge paid by the Cement Company will remain the same.

According to regulations issued by the National Development and Reform commission of China (IRL 58), a company installing a captive power station has to pay a "captive reserve capacity charge" fee. This can be considered as additional cost for the proposed projects activity. These costs have been accounted for in the IRR calculation in the PDD uploaded for registration<sup>1</sup>. This is considered appropriate by the audit team.

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<sup>1</sup> A detailed explanation of this charge has been given in the response to question 3.i



## **Issue 4**

According to the Tool for the Demonstration and Assessment of Additionality (Version 05.2) “*an analysis of any other activities that are operational and that are similar to the proposed project activity*” needs to be prepared.

To fulfill these criteria, the common practice analysis of the proposed project activity considers all waste heat recovery projects (with the purpose of electricity generation) in the Cement Sector have been considered as similar.

Furthermore the tool states that projects are considered similar if they are in the “*.. same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment...*”

The Northeast China grid has been identified as the “*comparable environment*”.

The Chinese power grid is divided into several power grids. This separation is based on differences in natural resources, geographical location, economic situation, grid structure, infrastructure, demand and supply (maximum load), seasonal characteristics, and power dispatching policies in general.

Hence the Northeast China grid can be considered appropriate for the common practice analysis.

The North East Power Grid comprises of the three provinces Jilin, Liaoning and Heilongjiang. The 11 projects under construction, as is listed in table B.6.a of the PDD uploaded for registration, are not located in the North East China grid and hence have been excluded from the common practice analysis.

The projects listed in table B.6.b of the PDD uploaded for registration are located in the same grid and hence need to be included into the common practice analysis.

In this context the audit team has reviewed the project “under design”.

- Jidong Cement Co., Ltd is the proposed project itself
- Jilin Yatai Cement Co., Ltd is applying for CDM<sup>2</sup>
- Liaoning Fushan Cement Co., Ltd. there is no public information available on the project, hence it is assumed that it is still under design
- Jilin Jinyuan Cement Co., Ltd. is applying for CDM<sup>3</sup>

Hence it can be confirmed that the proposed CDM activity is not a common practice in the defined region.

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<sup>2</sup> <http://cdm.unfccc.int/Projects/Validation/DB/NOY86ABC4H7ZF67CESJRFM3ACR2XSF/view.html>

<sup>3</sup> <http://cdm.unfccc.int/Projects/Validation/DB/4UKYE2K16UATEZ3DF0Q2B9QCS95AL1/view.html>

### **Issue 5**

The proposed project activity is a Type -1 project, as it will utilize all waste heat generated by the cement facility for electricity generation.

For this type the methodology ACM0012 version 3.1 suggests the following possibilities to demonstrate the release of waste heat in the absence of the project activity.

- (i) By direct measurements
- (ii) Providing an energy balance of the relevant sections of the plant
- (iii) Energy bills (electricity, fossil fuel)
- (iv) Process plant manufacturer's original design specifications and layout diagrams
- (v) On site checks conducted by the DOE prior to project implementation

The release of waste heat has been demonstrated by possibility (v).  
This is in line with the methodology.

**Please find below the answers of the project participant.**

**1. The DOE shall further substantiate how it has validated the barrier analysis.**

Although the Request for Review is directed to the DOE, the project participant is more than happy to contribute to the clarification of the issue raised by the EB.

Following uploading the PDD of the project activity requesting registration, the EB has approved the “*guidance for objective demonstration and assessment of barriers, version 01*” during the 50<sup>th</sup> EB meeting. This guideline requires the provision of information on the nature of the company, organization and its ownership, and financial information. Additionally, this guidance requires that the barrier is overcome by means of additional revenues from the sale of CERs.

The proposed project activity faced prohibitive difficulties in attracting financing, difficulties that were overcome through the prospects of CER revenues.

The investment barrier can be demonstrated by the fact that the bank loan was approved with specific reference to the availability of additional revenues to the project through CDM in the approval decision by the bank. We will upload together with this response the approval letter from the bank, which specifically mentions CDM as a reason to provide the bank loan. Therefore, in accordance with the above mentioned guidance, it is clear that additional CERs were crucial for securing financing (i.e. the bank considered CER revenues when approving to provide a bank loan).

There are several reasons for the lack of financing available for energy efficiency projects in China, and for WHR projects in the cement industry in China in particular. In the PDD uploaded requesting registration, we mentioned the government has placed restrictions on bank lending to industries with production overcapacity such as the cement industry.<sup>1</sup> At present, banks have already reduced bank lending to the cement industry resulting in cement companies experiencing significant difficulties in obtaining bank loans and credit.<sup>2</sup> It is one of the reasons for the slow implementation of Energy Efficiency in the cement industry in China. The World Bank, Asian Development Bank (ADB) and the International Finance Cooperation (IFC) (who can be considered experienced and professional entities on the subject area) offer detailed arguments why financing of energy efficiency projects in the cement sector, in developing countries, encounters prohibitive barriers. This fact is clearly brought forward in the relevant reports from the World Bank, IFC, and ADB – as is emphasized by the following quotes from these reports:

**World Bank<sup>3</sup>**

- “The project development objective is to improve the energy efficiency of medium and large-sized industrial enterprises in China,...” (World Bank 2008, p.4)
- “There are three key barriers which have impeded the development of the lending market for medium and large-sized industrial energy conservation investments, despite its large potential.” (World Bank 2008, p.2)

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<sup>1</sup> The cement industry is defined as an “over-growing” industry by the Chinese government and the Chinese central bank (the People’s Bank of China), and treated with a restriction on bank lending:  
<http://www.shqzw.gov.cn/gb/qzw/xxzh/mrjj/jrsc/userobject1ai19192.html>

<sup>2</sup> State Council (2006), Announcement of the State Council on Structural Adjustments in Industries with Production Overcapacity, Guo Fa [2006] Document No. 11.

<sup>3</sup> “Project Appraisal Document on a Proposed Loan in the Amount of US\$200 Million and a Proposed Grant from the Global Environment Facility Trust Fund in the Amount of US\$13.5 Million to the People’s Republic of China in Support of the Energy Efficiency Financing Project.” World Bank, 21 April 2008.

#### **International Finance Corporation <sup>4</sup>**

- *“The Program will organize and provide...to directly support implementation of energy efficiency (EE) projects.” (IFC 2006, p.1)*
- *“Despite government policies in favor of EE, market barriers still limit the use of EE equipment.” (IFC 2006, p.1)*

#### **Asian Development Bank <sup>5</sup>**

- *“The lack of technical competence among commercial banks to make a technical assessment of energy efficiency projects is a key bottleneck.” (ADB 2007, p.5)*
- *“...the main reasons why financially viable energy efficiency projects fail to attract commercial bank loans in the PRC are summarized as follows:” (ADB 2007, p.3)*

The above quotes illustrate that these documents are concerned with energy efficiency projects in general, as opposed to the cement sector specifically. Furthermore, the above documents are considered to be credible evidence by both the Guidelines for the Objective Demonstration and Assessment of Barriers as well as the Tool for the Demonstration and Assessment of Additionality – which both deem “*relevant (sectoral) studies or surveys (e.g. market surveys, technology studies, etc.) undertaken by universities, research institutions, industry associations, companies, bilateral/multilateral institutions, etc.*” to constitute credible evidence.

Additionally, we would like to point out (as described in the PDD requesting registration) that the project activity received a Bank Loan with specific reference to and based on the consideration of additional CER revenues. The Bank specified that the proposed project developed as CDM projects and signed emission reductions purchases agreement is one of the key considerations of the bank loan commitment. Therefore, the project activity, with the help of CDM, managed to overcome prohibitive financing barriers for its energy efficiency projects, as described by the Worldbank, IFC, and ADB.

The Bank Loan approval based on CDM consideration, combined with the research from the World Bank, IFC, and the ADB, evidence and clarifies that there is a prohibitive financing barrier preventing the project from implementation without support of additional CER revenues, which were the basis for implementation of the project.

#### **2. *The DOE shall further clarify the suitability of the benchmark in accordance with paragraph 13 of the Guidance on the Assessment of Investment Analysis, in particular, whether the applied WACC has been used for similar projects with similar risks, developed by the same company.***

Although the Request for Review is directed to the DOE, the project participant is more than happy to contribute to the clarification of the issue raised by the EB.

#### **Introduction**

The “*Guidance on the Assessment of Investment Analysis*” allows, under certain conditions, the use of a Company Internal Benchmark to analyze a proposed CDM project activity, including its

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<sup>4</sup> “Project Executive Summary for the China Utility-Based Energy Efficiency Finance Program (CHUEE).” International Finance Corporation. 13 February 2006.

<sup>5</sup> “Proposed Credit Guarantee – People’s Republic of China: Energy Efficiency Multi-project Financing Program.” Asian Development Bank. November 2007.

decision making practices. In the absence of a company internal benchmark, the main alternative in China would be to compare a proposed project activity to an industry or market standard. The “*Methods and Parameters for Financial Evaluation of Construction projects*” (3<sup>rd</sup> Edition) provides a benchmark for investments in cement by public entities. This policy document clearly states on page 195 to 199 that the given benchmark is not always applicable to private investors and that private investors can determine their own benchmark (WACC is specified as an appropriate model). Additionally, the guidelines in this policy document are applicable to government approvals of projects, and not to internal approvals by the company management. There is nothing to suggest that the benchmark used for internal approval should be the same as the benchmark for government approval. We suggest that the above mentioned industry benchmark (applicable to government approval purposes, and applicable to public entities) should not be considered as the defacto and only applicable standard on which to judge the suitability of investment decisions made by a private cement company in China. A proposed project also has to comply with the internal company standards and follow the internal decision making process in order to be approved.

The paragraph 13 of the “*Guidance on the Assessment of Investment Analysis*” (Version 2.1) provide guidance from the EB on the use of a Company Internal Benchmark. In the PDD we have clarified that the proposed project activity confirms to these requirements.<sup>6</sup> In its request for review the EB asked to clarify in “*particular, whether applied WACC has been used for similar projects with similar risks, developed by the same company*”.

Paragraph 13 of the “*Guidance on the Assessment of Investment Analysis*” (Version 2.1) that the EB refers to states that the WACC can be applied if it can be demonstrated that it has “*been used for similar projects with similar risks, developed by the same company or, if the company is brand new, would have been used for similar projects in the same sector in the country/region*”.

#### **Application of WACC for similar projects**

Paragraph 13 of the Guidance on the Assessment of Investment Analysis (version 2.1), requires a comparison of the IRR of similar projects with similar risks, developed by the same company to the Company Internal Benchmark (i.e. the WACC).

As a cement producer, projects implemented by the project entity include:

- **Core activity projects** (clinker lines and grinding mills): In the PDD requesting registration we have shown that all implemented “core activity projects” (i.e. clinker production lines and grinding mills) are consistently implemented with an IRR above the Company Benchmark (and with an average IRR of 24.23%). This has been evidenced by means of all FSRs of these projects. Additionally, we argue based on documentation of the World Bank, International Finance Corporation, and Asian Development Banks (see references in our response below to question 3), that the project entity has a natural and strategic preference for these type of projects (compared to Energy efficiency projects) and that therefore it is conservative to compare the project activity to these “core activity” projects
- **One early WHR project in 2001**: The project entity implemented in 2001 a low temperature WHR project with an installed capacity of slightly below 10MW. This project

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<sup>6</sup> Should the EB indicate that additional clarification, besides clarification on the “application of WACC for similar projects with similar risks, developed by the same company” (mentioned in this request for review, and addressed below) is required, the Project Participant would be happy to provide.

was in fact implemented at that time, as has been evidenced to the DOE. And the project IRR of this early WHR project was 33.73% in its FSR (reason for this high IRR is the low cost at that time<sup>7</sup>). Evidences will be uploaded together with this response.<sup>8</sup> This indicates that one similar project was implemented at an early stage with an IRR above the company internal benchmark, confirming the Company Internal Benchmark.<sup>9</sup>

To conclude, the project entity did implement a similar WHR project with an IRR above the WACC, confirming the Company Internal benchmark.

- Other current WHR projects: Besides the proposed project activity, the project entity has also implemented 5 other similar cement WHR projects. These projects were implemented based on the prospects of CDM revenues, which increased the IRR to a level above the benchmark. These 5 projects are almost identical to the proposed project activity and include:
  - Ø Tangshan Jidong Cement Guye District 12MW Cement Waste Heat Recovery Project<sup>10</sup>
  - Ø Tangshan Jidong Cement Guye District 8 MW Cement Waste Heat Recovery Project<sup>11</sup>
  - Ø Tangshan Jidong Cement Fengrun District 12MW Cement Waste Heat Recovery Project<sup>12</sup>
  - Ø Tangshan Jidong Cement Matoushan Matishan 25 MW Cement Waste Heat Recovery Project<sup>13</sup>
  - Ø Jidong Cement Panshi Co., Ltd 15 MW Cement Waste Heat Recovery Project<sup>14</sup>These projects have been implemented based on the prospects of CDM. Four of them are in the process of being registered by the EB, and the fifth one has been registered by the EB already. With CER revenues, the IRR of these projects is above the company benchmark which is why the project entity could implement these projects. Without CDM revenues, the IRRs of these projects would be below the company internal benchmark and these projects would not have been implemented.

Analysis of the project entity's past behavior shows that all core activities have been implemented with a financial return above the company benchmark. It further shows that one early WHR project (in 2001), was implemented with a financial return above the company benchmark. Finally, there are 5 other WHR projects implemented by the project entity based on CDM consideration (4 in the process of registration, and one already registered by the EB) which

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<sup>7</sup> Note that this project was implemented at a very early stage, when costs in China were considerably lower. The lower costs in 2001 imply that the unit investment cost was 5,047 RMB/kW for the 2001 WHR project, but 6,438 RMB/kW for the proposed project activity. At the same time the tariff did not significantly increase. This explains why this earlier WHR project could be implemented with a high IRR at that time.

<sup>8</sup> We will upload, together with this response, the FSR of the WHR project listing an IRR of 33.73%, together with the government approval (i.e. *JiJiZiYuan [2001] No.375, issued by the Provincial Development and Planning Committee*) of this early WHR project, both mentioning the project will be based purely on WHR.

<sup>9</sup> One year later, in 2002, the project entity decided to retrofit some of its on-site coal fired heat boilers (inefficient boilers). Most of the heat from these boilers will be used for on-site heating purposes, and a minor share of the heat from these coal fired boilers is provided to the existing early WHR project to ensure a reliable and stable supply of heat and increase efficiency of the WHR project.

We will upload, together with this response, the 2002 FSR of this coal fired boiler retrofit, together with the government approval (i.e. *Shijingmaozizi (2002) No.50, issued by the Economic and Trade Committee of Tangshan City*) of this project in 2002. These documents clearly show that this project was implemented as "coal fired boiler retrofit" after the above mentioned WHR was already implemented and existing, these documents clarify that "this project is implemented to increase overall efficiency onsite of the industrial facility, and partly to ensure a more stable heat supply to the existing WHR project".

Finally, please also note that replacement of the coal-fired heat boilers itself was done at an IRR of 24.88% according to its FSR (which is above the Company Internal Benchmark).

<sup>10</sup> Project is **registered** by the EB, with UNFCCC reference number 2701

<sup>11</sup> UNFCCC reference number 2731

<sup>12</sup> UNFCCC reference number 2733

<sup>13</sup> UNFCCC reference number 2587

<sup>14</sup> UNFCCC reference number 2780

helped to increase the financial returns to a level above the company benchmark. We therefore conclude the Company Internal Benchmark has been consistently applied by the project company to similar projects with similar risks, developed by the same company.

3. ***The DOE is requested to further explain how it has validated: (i) the suitability of the tariff (400 RMB/kWh) used in the investment analysis; (ii) the suitability of the investment cost as it has indicated that the purchase contracts refer to two different projects; (iii) the operational hours for the cement production and electricity generation; (iv) the annual power supply (33,900 MWh); and (v) whether demand/capacity charges have to be considered as savings in the investment analysis or not.***

The IRR calculation of the proposed project activity in the PDD uploaded requesting registration is based on the parameters listed in the Feasibility Study Report (FSR), without exemption. The FSR has been approved by the appropriate government,<sup>15</sup> and was completed and issued by an independent and certified 3<sup>rd</sup> party design institute which is qualified to compile design reports for the cement industry.<sup>16</sup> The FSR (including the parameters listed therein which are used as input values in the investment analysis) can therefore be considered an independent assessment of the proposed project activity, which was subsequently approved by the government. The FSR (source for all input values) was completed and issued in July 2007, before the investment decision. Therefore, in accordance with paragraph 54 (c) of EB 38, all input values were “valid and applicable at the time of the investment decision”.

Below we will clarify that:

- I. The tariff (400 RMB/MWh) used in the investment analysis is suitable as it was crosschecked with the official notices for the tariff from the government and against the actual avoided cost;
- II. The investment cost is suitable and appropriate as it was crosschecked by the contracted values and audited value, the Norm from the European Commission and the comparison of other registered similar projects.
- III. The operational hours for the cement production and electricity generation is appropriate as the operational hours from the cement production facility are based on actual measurements, and the operational hours of the WHR project estimated by the certified design institute. Additionally, this value has been crosschecked against the actual first year operation of the WHR project, and against the average of all similar projects;
- IV. The annual power supply (33,900MWh) is reasonable as it was estimated by the certified design institute based on official losses and efficiency rates provided by the equipment supplier, and additionally the net power supply has been confirmed against the actual first year of operation of the WHR project;

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<sup>15</sup> The FSR has been implicitly approved when the General Project Approval was obtained (October 2007), issued by the “Approved by Provincial Economic Committee of Jilin Province”.

<sup>16</sup> The FSR was completed and issued by the “Hebei Province Building Material Industry Design & Research Institute”. This entity is It has obtained a “A grade of Engineering Consultation Certificate in cement industry, cement products, and inorganic - non metallic material”, issued by the “National Development and Reform Commission” of the Peoples Republic of China.

- V. The demand/capacity charges cannot be avoided and have to be paid in any case by the cement production facility to the grid company according to the national notice and also confirmed in the power purchase contract between Jidong cement Jilin Co., ltd and Jilin Electricity Power Grid company.

(i) **The suitability of the tariff (400 RMB/MWh) used in the investment analysis**

The avoided Net power price of 0.40 RMB/kWh (i.e. after deduction of VAT) used as input value for the financial calculation of the project activity is taken from the FSR, as are all other input values for the IRR calculation. This power price was referred by the independent and certified Design Institute who completed the FSR in July 2007 was based on the actual official avoided power cost, which can be crosschecked with the official published guidances from the government at the time of the investment decision.

The avoided electricity cost consists of two elements:

- **Electricity purchase tariff** – In accordance with the “*Notice on the adjustment for the tariff of Northeast China Power Grid*”, *Fagaijiage [2006] No.1231*<sup>17</sup>, issued by the National Development and Reform Commission (NDRC) in June 2006, the electricity tariff that industrial facilities such as the cement production facility where the WHR project is implemented have to pay to purchase electricity from the grid is 0.482 RMB/kWh (before deduction of VAT). Therefore, by implementing the WHR project, the cement production facility can avoid paying this cost.
- **Reserve capacity charge for captive power plant** - In accordance with the “*Notice on the issues of the different tariff and the policies of the charge for the captive power plant*” (*Fagaidian [2004] No. 159*), issued by National Development and Reform Commission (NDRC) and State Electricity Regulatory Commission (SERC) of China<sup>18</sup> in September 2004, industrial facility where the captive power plant is implemented should pay the reserve capacity charge related to the tariff to the grid company, in order to ensure the grid maintains the equivalent capacity access to the captive facility. Based on the national notice, the reserve capacity charge pricing for industrial facilities with a captive power station will be defined by referring to the compulsory charging rate by the provincial grid, i.e. the Northeast China Power Grid in the . The cement plant (Jidong Jilin) pays the reserve capacity charge for its captive power station to the grid, and pays this in accordance with national notice and the applicable regulations in the Northeast China Power Grid.<sup>19</sup> The payment for the reserve capacity charge is determined as 0.03192RMB/kWh.<sup>20</sup> These cost would not have to be paid in case the project would not implement the captive WHR power station.

<sup>17</sup> The notice is published at the website of NDRC in June 2006:

[http://www.sdpc.gov.cn/zcfb/zcfbtz/tz2006/t20060630\\_75078.htm](http://www.sdpc.gov.cn/zcfb/zcfbtz/tz2006/t20060630_75078.htm);

Jilin Provincial Development and Reform Commission also issued a notice based on the NDRC's notice, *Jifagaijiagezi [2006] No.798*, on 10 July 2006, <http://www.price.jilin.net.cn/lclient/show.jsp?id=4426>

<sup>18</sup> Data source: [http://www.ndrc.gov.cn/cyfb/zcfbtz/t20060526\\_70947.htm](http://www.ndrc.gov.cn/cyfb/zcfbtz/t20060526_70947.htm)

<sup>19</sup> *The implementation for the NDRC's notice on the adjustment for the tariff of Northeast China Power Grid*, *Jifagaijiagezi [2006] No. 798*, issued by Jilin Provincial Development and Reform Commission on 10 July 2006

<sup>20</sup> As the proposed WHR power plant has a 5400kW nominal capacity with 0.8• power factor, therefore the capacity is in turn as 6750kVA, which leads to the reserve capacity charge as 128,250RMB/month (6750kVA\*19RMB/kVA/month). The reserve capacity charge related to the tariff is determined as 0.03192RMB/KWh (128,250/5400kW\*31days\*24h).



By considering the electricity tariff the industrial facility would pay for purchase of electricity in case the WHR would not be implemented (i.e. 0.482RMB/kWh), in combination with the reserve capacity charge related to the tariff that the project has to pay due to implementation of the WHR project (i.e. 0.03192), we conclude that the tariff of the implementation of the WHR is Net 0.3846RMB/kWh  $((0.482 \text{ RMB/kWh} - 0.03192 \text{ RMB/kWh})/1+17\% \text{ VAT})$ , which is slightly lower than net 0.4RMB/kWh estimated in the FSR by the certified and independent design institute. We therefore conclude that the tariff used as input value for the IRR calculation in the PDD is reasonable and conservative as it is higher than the avoided power cost in accordance with the regulations, and therefore leads to an overestimation of the IRR.

**(ii) The suitability of the investment cost as it has indicated that the purchase contracts refer to two different projects**

The EB requested to clarify in particular the investment cost. Below we will provide several arguments as to why the investment cost estimated by the licensed and qualified design institute is reasonable and appropriate. Firstly, we will compare the estimated investment cost to the total contracted amount by adding the values in the legally and financially binding contracts for construction and equipment. Secondly, we will in accordance with paragraph 54(c) of EB38, “crosscheck that the input values from the FSR are valid and applicable”, by comparing the total investment cost to the norm listed by the European Commission and by comparing the total investment cost of the proposed project activity to the investment costs of Chinese Cement WHR projects that are registered to date.

The conclusion will be clear: the estimated investment cost are reasonable compared to the total contracted investment cost, compared to the norm listed by the European Commission, and compared to the average of all registered similar projects to date.

**1) Contracted value and audited value:**

As the project has completed its construction activity, all the legally and financially binding contracts related to the total investment cost (such as contracts for equipment purchase, construction activities) are available and hence it is appropriate to compare these contracts to the estimated cost of the proposed WHR project. We have compared the estimated investment cost of the proposed project in the FSR (i.e. 55,279,800 RMB), which has been used in the IRR calculation, to the contracted values from the full contracts of the project. All the evidences (contracts) have been provided to the DOE. In total, the contracted value is 63,066,050 RMB which demonstrates the actual investment cost is higher than the estimated investment in the FSR. Therefore, we can conclude that an estimated IRR based on this estimated investment cost from the FSR (as is done in the PDD uploaded requesting registration) is *conservative*, as it overestimates the IRR compared to a IRR based on the actual contracted total value for investment cost.

Furthermore, the total investment cost can be also crosschecked by the audited report which was audited by the certified third party, i.e. Tangshan Hongli Certified Public Accountants Co.,ltd. in December 2009. According to the audit report, the total investment cost of the project activity was 63,811,557.03RMB, which is also more than the estimated total investment cost in the FSR.

## 2) Norm by European Commission:

We can also compare the estimated investment cost "*Reference document on Best Available Techniques in the Cement and Lime Industries*" (2007 draft, latest version), issued by the European Commission. According to this reference document, investment cost of WHR power plants in the cement industry should be around to the 0.8 – 1.2 million EUR/MW.<sup>21</sup> The investment cost of the proposed project activity is 55,279,800 RMB, and its installed nominal design capacity is 5.4MW.<sup>22</sup> Therefore the unit investment cost of the proposed project is 10.237 million RMB, which is around 1.04 million EUR, within the range quoted by the European Commission.<sup>23</sup> As the estimated figure is within the range quoted by the European Commission, we can conclude that an estimated IRR based on this figure is *valid and applicable*.

## 3) Other registered similar projects:

Additional to above, we have compared the investment cost of the proposed project in the FSR (i.e. 55,279,800 RMB) to similar registered projects listed in Annex 1. The projects are plotted in a scatter graph with their Investment costs in million RMB on the (y)-axis and the installed electric capacity in MWe on the (x)-axis. These projects are the basis of the regression analysis. The investment costs were predicted based on the average mean of the Investment cost per total installed capacity and the standard deviation. The regression formula has been defined as:

$$\text{Inv (million RMB)} = 7.721 \text{ Cap (MWe)} - 2.689$$

The correlation coefficient of  $R^2$  of 0.979 indicates a high correlation between the capacity and investment costs. The standard error of 12.49 has been calculated based on the difference between the predicted (theoretical) values and the investment costs listed in the PDDs.

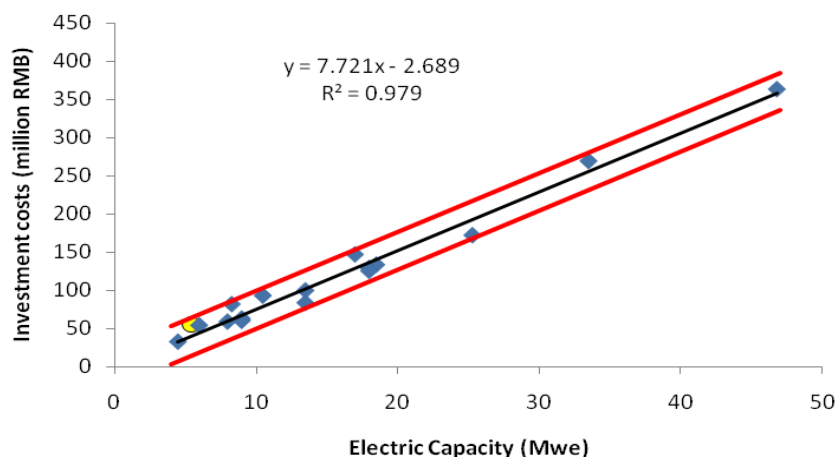
The figure below depicts a regression analysis assuming a linear relationship between the investment costs in RMB and installed capacity in MW for similar cement WHR projects. The proposed project activity (yellow dot) is well within 2 standard errors (indicated with red lines) from the black trend line, which means that the estimated Investment cost of the project activity is similar to the investment cost of similar projects. Hence, we can conclude our “crosscheck”, such as the contracted values, in accordance paragraph 54(c), EB38, that an IRR calculation based on the Investment costs of the FSR which we have conducted is conservative as low investment cost will result in an overestimation of the IRR.

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<sup>21</sup> See page 108: [http://ftp.jrc.es/eippcb/doc/clp\\_d1\\_0907.pdf](http://ftp.jrc.es/eippcb/doc/clp_d1_0907.pdf)

<sup>22</sup> This is the official nominal capacity of the installed power generation units, as also evidenced by the technical specifications provided by the equipment manufacturer, i.e. Anhui Conch Kawasaki Engineering Co., Ltd. Also note that FSR (page 13, 17, 19) mention the official design capacity is 5.4MW.

<sup>23</sup> Latest exchange rate of 9.7787RMB/EUR is used:  
<http://finance.yahoo.com/currency-converter/#from=EUR;to=CNY;amt=1>



**(iii) The operational hours for the cement production and electricity generation**

The FSR, approved by the appropriate government and issued by an independent and certified 3<sup>rd</sup> party design institute which is qualified to compile design reports for the cement industry, illustrates that the project is to utilize waste heat from the 2500t/d cement production line for generating electric power.

In the PDD, the data we used was based on the historical data from the most three years of the 2500t/d cement production line, which is the most available and applicable data, before the investment decision of the project activity for the fcap calculation. Based on the Annual Clinker Production Report, the annual actual clinker production is 718,577 tons and 750,056 tons in the year 2005 and 2006<sup>24</sup>, which leads to an average annual operational hours for the cement production is 7,049 hours.

In the FSR of the proposed WHR project, the design institute estimated annual electricity generation of the proposed project activity is 36,940 MWh, and the rated Capacity is 5.4 MW.<sup>25</sup> Based on these values, the annual operational hours of the proposed WHR project for electricity generation is 6,840 hours.

**1) Comparison to actual operation:**

The project activity has started operation in September 2008 and has had a full year operation, therefore it is possible to crosscheck the estimated annual electricity generation from the FSR (i.e. 36,940 MWh) to the actual electricity generation during the full year of operations. In fact, based on the WHR annual power generation/supply report, the actual annul power generation of the project in 2009 is 34,157 MWh which is slightly lower than the estimated power generation in the FSR. This in turn means that the actual annual hours during the first year operations was (34,157MWh / 5.4MW =) 6,325 hours, which is lower than the estimated operating hours from the FSR used in the IRR calculation in the PDD uploaded requesting registration. Hence we can

<sup>24</sup> The clinker production line only started in the mid of 2004 and was operated for half year in 2004, which is conservative as it reduces fcap.

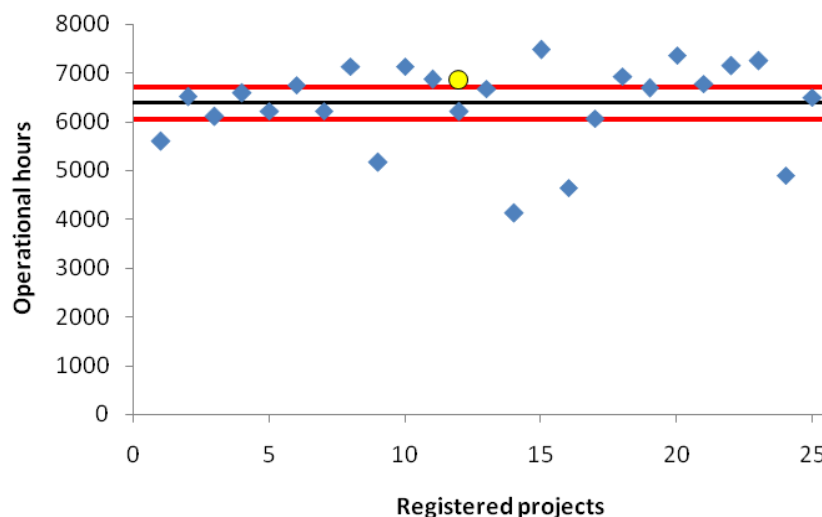
<sup>25</sup> This is the official rated/nominal capacity of the turbines, as also evidenced by the technical specifications provided by the equipment manufacturer, i.e. Anhui Conch Kawasaki Engineering Co., Ltd. Also note that FSR (page 13, 17, 19) mention the official design rated capacity is 5.4MW.

conclude that our IRR calculation base on the high estimates is *conservative* as this high estimated power generation will result in an overestimated IRR.

## 2) Comparison to other projects:

Additional to the arguments provided above, we have compared the annual operational hours of the proposed project activity in the FSR (i.e 6,840 hours) to similar registered projects listed in Annex 1. The operational hours of the proposed project activity is above the average of 6,379 operational hours of similar registered projects.

The figure below depicts a scatter plot the operational hours on the vertical axis and each similar project on the horizontal axis. Please note that the location of the project along the horizontal axis is random. The proposed project activity is above the 95% confidence level; hence we can conclude the operational hours are conservative in comparison to similar projects since more operational hours will result in an overestimation of the IRR.



Hence, we can conclude that our “crosscheck” in accordance 54(c), EB38, the annual operational hours for the cement production and electricity generation is reasonable and conservative based on the actual history data and crosschecked the other similar projects.

## (iv) The annual power supply (33,900 MWh)

The amount of electricity (i.e. theoretical electricity generation) that can be generated based on the available energy contained in the waste heat in the clinker production lines. The amount of available heat per unit of clinker production has been provided by a certified design institute and is therefore an accurate estimate for available waste heat that will be available to the proposed project activity. The available energy in the waste heat from the clinker lines of the proposed project activity is 231,519 kJ/ ton clinker. This can be multiplied by the average projected clinker production of the clinker lines (i.e. 662,879 tons clinker annually<sup>26</sup>) and after deducting losses

<sup>26</sup> As recorded historical data from the most three years before the investment decision of the project activity.

taking place before electricity generation,<sup>27</sup> this can be converted from kJ to kWh,<sup>28</sup> to calculate the potential maximum electricity generation. In the Fcap calculation (see also Tables B8, B9, and B10 in the PDD) the theoretical available electrical power supply has been calculated based on the available waste heat in the clinker production line. Based on the available heat, the potential maximum electrical power supply has been calculated as 39,220MWh annually.

1) Design specifications from Anhui Conch Kawasaki Engineering Co., Ltd.:

As explained in more detail in the explanation on Fcap, preceding and proceeding tables B.8, B9, and B.10 in the PDD, this theoretical maximum electricity output is calculated based on design specifications of the equipment provided by the equipment supplier (i.e. *Anhui Conch Kawasaki Engineering Co., Ltd.*), a standard load factor of 0.80•, and standard losses & auxiliary consumption (together 8%), which are all reasonable, provided by the equipment provider, and have all been evidenced to the DOE.

2) Comparison to actual operation:

As also mentioned above, the project activity has operated for one and half year, and it is therefore feasible to compare the estimated annual net power supply from the FSR (i.e. 33,980MWh) to actual net power supply during the first full year of operations. As recorded in the annual operational sheet, the power supply in 2009 is 30,522 MWh which is slightly lower than the estimated power supply in the FSR. Therefore we conclude that the estimated power supply in the FSR is reasonable and conservative since the actual power supply is lower and result in a higher IRR in the PDD.

(v) Whether demand/capacity charges have to be considered as savings in the investment analysis or not

The cement production facility has to pay the same amount of electricity demand/capacity charge in any case, as the WHR does not change total electricity demand/capacity of cement plant. In other words, the grid company will charge the cement production facility based on the total electricity demand/capacity of the cement production facilities, irrespective of the fact whether or not a part of this total demand can be supplied by a captive station (note as described above under section 3.i, that the WHR project in fact has to pay an additional charge, i.e. the “reserve capacity change for captive power plants”).

1) National regulation for the demand/capacity charge:

According to the “Notice for the Tariff Reform Implementing Procedures” (Fagaijiage [2005] No. 514)<sup>29</sup> issued by National Development and Reform Commission of China (NDRC) in March of 2005, the demand/capacity charge for the industrial or commercial electricity demands/users (such as the cement production facility where the project is implemented) should be agreed upon with the grid in the principle of Two-Tiered grid electricity pricing. The Two-Tiered grid

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<sup>27</sup> Losses are all taken from official technical design specifications as provided by the equipment manufacturer, i.e. Anhui Conch Kawasaki Engineering Co., Ltd. These losses include heat transmission pipe losses, boiler losses, and turbine and generator efficiency rates. For detailed values provided by the equipment manufacturer, please refer to the tab “Fcap calculation” (field D39 to D45)” in the uploaded Fcap calculation sheet.

<sup>28</sup> Using the standard conversion coefficient of 3,600 Kj/kWh.

<sup>29</sup> Fagaijiage [2005:514] issued by National Development and Reform Commission on 28 March 2005

electricity pricing is composed by two parts: an electricity consumption charge and an additional compulsory charge. The industrial facility should pay the electricity consumption charge according to the purchased electricity in kWh, and also pay the compulsory charge based on either demand capacity or transformer capacity to the grid:

1. A industrial facility who has a grid connection though a transformer station with a transformer capacity (capacity charge) above 100kVA can pay based on the capacity;
2. A payment can be made for a demand capacity (demand charge) above 100kW based on the maximum demand capacity connecting to the grid.

These charges have to be made, regardless of whether or not the industrial facility implements a captive power station or not.

2) Additional evidences for the demand/capacity charge:

In addition to the regulations as described above, we would like to mention that we have submitted one project specific statement as the evidence to this response:

1. Statement from the “*The Jilin Power Grid Company*” to the cement production facility, stating that in accordance with the “*Notice for the Tariff Reform Implementing Procedures*” *Fagaijiage [2005] No. 514*, the demand/capacity charge for the cement production facility is based on the transformer capacity connecting to the grid, and that this cannot be decreased due to the existence of a captive station. Therefore they conclude that this particular charge is not influenced by the fact that there is or is not a captive power station.

In accordance with the above, the FSR of the project activity, and the IRR calculation in the PDD uploaded requesting registration, both do not consider these charges avoided cost for the CDM project activity, as these charges cannot be avoided and have to be paid in any case by the cement production facility to the grid company.

**4. *The DOE is requested to further validate the common practice analysis, in particular the essential difference between the project activity and the 11 projects under construction (PDD page 31-33).***

According to the Tool for the Demonstration and Assessment of Additionality (Version 05.2), it is necessary to provide an analysis of “any other activities that are operational and that are similar to the proposed project activity”. Furthermore, projects are considered similar if they are in the “...same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment...”. On the basis of the preceding it is to be described whether and to what extent similar activities have already diffused in the relevant region.

Common options for the supply of electric power to cement production facilities in China are: 1) Power sourced from the public electricity grid; and 2) Power supplied by onsite, captive coal-fired power plants (in the case of older existing cement production facilities). Therefore, and in accordance with the Tool for the Demonstration and Assessment of Additionality, activities similar to the project activity are considered to be any operational project at a cement production facility that utilizes waste heat from either the pre-heater stage or the clinker cooling stage for the generation of electric power. Furthermore, we have identified the region as the Northeast China

Grid as this is the “comparable environment” specified by the Additionality Tool – as is expounded on below.

The Chinese power grid is divided into several large, regional power grids. This separation is based on differences in natural resources, geographical location, level of economic development, grid structure, infrastructure, demand and supply (maximum load), seasonal characteristics, and power dispatching policies in general.<sup>30</sup> Regional grids are generally comprised of several provincial grids. The provincial grids within each regional grid all face similar conditions and each regional grid is limited in its capacity to export power to other regional grids.<sup>31</sup> In addition, the regional grids could be considered large enough for the common practice analysis since the total area of Northeast China Power Grid is more than  $80.84 \times 10^4 \text{ km}^2$  which is even larger than two countries of French and UK. Therefore, the regional power grids constitute a comparable environment based on the aforementioned factors.

For projects that import electricity from the grid (such as cement production facilities), the decision to implement a captive WHR power station to replace electricity imports is influenced by the regional grid these projects are located in. As the provincial grids within each regional grid all share certain characteristics with one another, the regional grid a project is located in determines factors such as stability, availability and reliability of power imports from the grid.

The 11 projects under construction, as is listed in table B.6.a of the PDD uploaded requesting registration, are not located in the same power grid of the proposed projects activity (the project activity is located in Jilin province, which together with Heilongjiang and Liaoning makes up the “North East Power Grid”).

In addition, we have further analyzed the two projects “under design” in the B.6.b in the PDD. The third project in the table is also seeking for the supports from CDM and has been under validation<sup>32</sup>. The fourth project may be still under design since there is not any public information available for this proposed WHR project.

Therefore, we conclude that all these 11 projects under construction are not located in the same region and therefore are implemented in a significantly different market environment as explained above. Therefore, it is reasonable to exclude these projects from the Northeast China Power Grid due to a geographic difference for the common practice analysis.

**5. *The DOE shall further substantiate that the waste heat utilized in the project activity would be released into the atmosphere in the absence of the project activity in line with the ACM0012 v3.1.***

In order to recovery the waste heat, it is necessary to install the specific waste energy recovery boilers/equipment for a proposed purpose, such as power generation. In this case, the PO should apply for an official approval from the local government for installing the WHR boilers/equipments. Before the proposed WHR project activity, however, the government had never approved any applications for installing WHR boilers/equipments/projects for recovering the waste heat from its 2500t/d cement project line according to the clarification letter from the

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<sup>30</sup> Data source: 2007 ChinaElectricPowerYearBook-P41

<sup>31</sup> Data source: <http://www.china5e.com/power/powernews.aspx?newsid=e9e34778-d28a-4b7c-8a83-bf039ee65f00&classid=%u7535%u529b>

<sup>32</sup> The Jilin Yatai Cement Co.,Ltd is also seeking for the supports from CDM, the uploaded PDD for the validation could be checked by:  
<http://cdm.unfccc.int/Projects/Validation/DB/NOY86ABC4H7ZF67CESJRFM3ACR2XSF/view.html>

local government. The official clarification letter clarifies that “*Before Jilin Provincial Economic Committee issued the approval to Jidong Cement Jilin Co., Ltd. 6000KW waste heat recovery project in October 2007, none of any equipment/boilers or projects had been installed at either the AQC stage or the SP stage of the 2500t/d clinker production line of the cement plant. The waste heat was vented into the air after dedust treatment*”. The evidence will be provided for the further clarification.

Therefore we conclude that no waste heat recovery boilers installed and the waste heat was released into the atmosphere before the project activity.




## Annex 1


The following table depicts all registered cement waste heat recovery CDM projects in China. Please note that the numbers are rounded. In order to crosscheck the operational hours of the proposed project activity, we have compared them to the operational hours of all projects in the list. In order to crosscheck the O&M cost and the Investment cost, we have compared to projects 1 to 16, as project number 17 is replacing a captive coal-fired power station registered based on a marginal cost comparison, and projects 18 to 27 perform a barrier analysis in the PDD and therefore input values for the IRR are not provided and have not been crosschecked by the DOE during validation and the EB during registration.

ID	Ref.	Title	Province / State/Region	MW	Investment RMB million	Full time hours
CDM1806	1427	Low-temperature waste heat recovery for electricity generation project of Anhui Huaibei Mining (Group) Cement Co. Ltd.	Anhui	5	32.37	5593
CDM1494	1674	Waste Heat Recovery and Utilisation for Power Generation Project of Jiande Conch Cement Company Limited	Zhejiang	8	81.63	6510
CDM1984	1696	Power Generation by Waste Heat Recovery Project of Xinjiang Tianshan Cement Co. Ltd. in Urumqi City, Xinjiang Autonomous Region, P. R. China.	Xinjiang	6	53.89	6107
CDM2214	1450	8MW pure low temperature waste heat recovery (WHR) for power generation in SDIC Hainan Cement Co., Ltd	Hainan	8	58.76	6591
CDM2238	1622	Huanghe Tongli WHR Project	Henan	9	62.73	6216
CDM2231	1624	Pingyuan Tongli WHR Project	Henan	9	61.14	6756
CDM2236	1623	Yulong Tongli WHR Project	Henan	9	59.86	6216
CDM1496	1673	Waste Heat Recovery and Utilisation for Power Generation Project of Huaining Conch Cement Company Limited	Anhui	18	128.985	7130
CDM2334	1659	13.5MW WHR1 Project in Hunan Niuli Cement Co.	Hunan	14	83.52	5167
CDM1495	1672	Waste Heat Recovery and Utilisation for Power Generation Project of Digang Conch Cement Company Limited	Anhui	19	133.45	7138
CDM1856	1402	BBMG Cement WHR for 10.5 MW power generation project in Beijing	Beijing	11	92.859	6873
CDM2233	1619	Yuhe Tongli WHR Project	Henan	18	125.32	6215
CDM1892	1309	Jiangsu Qingshi Cement Plant's Low Temperature Waste Heat Power Generation Project	Jiangsu	14	99.62	6673
CDM1492	1676	Waste Heat Recovery and Utilisation for Power Generation Project of Zongyang Conch Cement Company Limited	Anhui	34	269.5688	4119


CDM2720	1874	25.3MW WHR Project of Zhejiang Leomax Group	Zhejiang & Anhui	25	172.15	7479
CDM1493	1675	Waste Heat Recovery and Utilisation for Power Generation Project of Tongling Conch Cement Company Limited	Anhui	47	363.86	4650
CDM2034	1730	Inner Mongolia Wulanchabu Volan Cement Waste Heat Recovery Project	Inner Mongolia	17	146.941	6068
CDM1064	1225	30 MW WHR Project of Hongshi Group	Zhejiang	30		6933
CDM1531	1878	Zhonglian Julong Cement Waste Heat Recovery as Power Project	Jiangsu	17		6691
CDM1440	1643	Liaoyuan Jingang Cement Waste Heat Recovery as Power Project	Jilin	13		7360
CDM0491	366	Taishan Cement Works Waste Heat Recovery and Utilisation (NM79)	Shandong	13		6780
CDM1086	898	Ningguo Cement Plant 9100KW Waste Heat Recovery and Utilisation for Power Generation Project of Anhui Conch Cement Co. Ltd	Anhui	9		7154
CDM1065	1038	6.5MW WHR Project in Huasheng Tianya Cement Co., Ltd	Hainan	7		7253
CDM1107	1046	Gansu Qilianshan Cement 6000kW Waste Heat Recovery Project	Gansu	6		4900
CDM2261	1353	Hebei Quzhai Cement 9000kW Waste Heat Recovery Project	Hebei	9		6500
CDM2367	1714	Baofeng County Waste Heat Recovery for Power Generation	Henan	8		6557
CDM2369	1723	Henan Xichuan Waste Heat Recovery for Power Generation	Henan	9		6611
		Jidong		5.4	55.2798	6840.740741

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1	18/01/2008	PDD "Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project", Version 02	Chief Representative of CVDT consulting	PDD for GSP
2	06/07/2007	Consolidated baseline methodology for GHG emission reductions for waste gas or waste heat or waste pressure based on energy system ,ACM0012 ,Version 01.	UNFCCC	
3	19/10/2007	Tool to Calculate the Emission Factor for an Electricity System, Version 01	UNFCCC	
4	28/01/2008	Participant list of on-site interviews	TÜV SÜD	
5	28/01/2008	<p>On-site interviews conducted by TÜV SÜD. Validation team: Mr. Zhang Jiming                      TÜV SÜD China, Beijing Branch Mr. Li Ruifeng                        TÜV SÜD China, Beijing Branch Mr. Du Baohai                        TÜV SÜD China, Beijing Branch Interviewed persons:</p> <p>Ms. Liu Wei                      Hebei Tangshan Jidong Cement Co., Ltd.  Mr. Zhao Yonghong              Gansu tonghe consulting Co., Ltd. Mr. Meskes                      Chief Representative of CVDT consulting Mr. Zou Yongzhi                  Jidong Cement Jilin Co., Ltd Mr. Jiang Fuhua                  Jidong Cement Jilin Co., Ltd Mr. Zhang Xiuquan                Jidong Cement Jilin Co., Ltd</p>	TÜV SÜD	
6	Jul.2007	Feasibility Study Report for CDM project "Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project".	Hebei construction and material industry design institute	IRR input data source
7	30/10/2007	Approval of Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project	Provincial economic committee of jilin	

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			province	
8	Jul.2007	EIA Report for CDM project "Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project"	State environmental Protection Bureau	
9	Oct.2007	Approval of EIA Report for CDM project "Jidong Cement Jilin Co., Ltd 6 MW Cement Waste Heat Recovery Project"	Environmental Protection Bureau of Jilin	
10	07/08/2007	The Bank loan promise (2007-08)	China Agriculture bank Tangshan branch bank, 219,750,000RMB	
11	16/02/2007	Tool for the demonstration and assessment of additionality version 03.	UNFCCC	
12	Sept.2006	Selling price table of Jilin Province electricity grid	Department of Commerce of Jilin Province	
13	09/10/2007	Equipment purchasing contract	Anhui Hailuo Chuanqi Engineering Co.,ltd	Including AQC boiler, PH boiler, turbines and generators
14	13/11/2007	Questionnaire for stakeholders' comments with 17 persons signature	Jidong Cement Jilin Co., Ltd	
15	Dec.2006	CERs purchase agreement	Tangshan Jidong Cement Co., Ltd., and Climate Change Capital Carbon Managed Account Limited ,Climate Change Capital Carbon Fund II s.à.r.l.IXIS	

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16	August 2006	CDM resolution board meeting minutes	Tangshan Jidong Cement Co., Ltd.	
17	16/08/2007	Resolution of the 20th Meeting of the 2nd Board of Directors of Jidong Cement Jilin Co., Ltd.	Jidong Cement Jilin Co., Ltd	
18	01/10/2007	Construction Start contract	Jidong Cement Jilin Co., Ltd	
19		The business license of Jidong Cement Jilin Co., Ltd	Hebei Industry and Commerce Administration	
20		Internal Income Stat. Analysis of Tangshan Jidong Cement Group for Investment Construction Project, 10 projects has the IRR from 19.49% to 49.74%,	Tangshan JiDong Cement Group	
21	Jul.2008	Chinese LoA	China NDRC	
22	18/01/2008	Excel IRR calculation file	Chief Representative of CVDT consulting	
23	May 2006	Overview on Cement WHR Projects in China	Tianjing Cement Institute	
24	Aug.2007	Overview of waste-heat utilization projects at cement plants in northeast china grid as of August 2007	Tianjing Cement Institute	
25		FSR of Boading Huadian Electric Power Design & Research Institute Co., Ltd	Huadian Electric Power Design & Research Institute Co., Ltd	Jidong Cement Co., Ltd. WHR Demonstration Project
26		Announcement of the State Council on Structural Adjustments in Industries with Production Overcapacities		
27	Aug.2007	Energy Efficiency Improvement Potential & Opportunities in China's	International Finance	

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		Cement Industry, General Report	Corporation	
28	09/10/2008	Restriction on bank lending for over-growing industries	State Owned Assets Supervision and Administration Commission of Shanghai Municipal Government	
29	05/06/2007	CDM commission contract	Climate Change Capital and Casper van der Tack	
30	21/08/2007	Letter of Exclusivity	Climate Change Capital and Tangshan Jidong Cement Co., Limited	
31	24/10/2007	Demonstration of efficiency of main equipment in the WHR projects of Tangshan Jidong Cement Co., Ltd.,	Anhui Conch Kawasaki Engineering Co., Ltd	
32	21/01/2009	Cement WHR power generation system	Luoyang Mining Machinery Engineering Design Institute	
33	30/12/2008	Education Added Expenses and Local Education Added Expenses	Jilin Local Taxation Bureau	
34	May.2007	Regulations on Collecting and Using Local Education Added Expenses in Jilin Province	Jilin Local Taxation Bureau	
35	30/12/2008	Notice of Jilin Provincial Office of the State Administration of Taxation on Printing and Issuing "the Rules on Collecting City Maintenance &	Jilin Local Taxation Bureau	


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		Construction Tax in Jilin Province"		
36	28/01/2007	the "Ninth Session of the Fifth Board meeting"	Tangshan Jidong Cement Co., Limited	
37		WACC calculation	Bloomberg	
38	01/07/2008	Consolidated baseline and monitoring methodology for GHG emission reductions from waste energy recovery projects (ACM0012 vers.3.1)	Unfccc	
39	26/08/2008	Tool for the demonstration and assessment of additionality version 5.2	Unfccc	
40		National major construction project Beijing Cement Plant		
41	12/04/2006	Extract from 2006 Broker Report for Jidong,	United Securities	
42	11/04/2006	Extract from 2006 Broker Report for Jidong,	GF Securities	
43	08/08/2006	Extract from 2006 Broker Report for Jidong,	Haitong	
44	10/08/2006	Extract from 2006 Broker Report for Jidong,	Guotai Junan Securities	
45	2005	Financial Report for Jidong		
46		WACC calculation	Wharton Financing School	
47	30/06/.2006	Jidong share price	Google Finance	Historical Prices
48	2006	Announcement of the State Council on Structural Adjustments in Industries with Production Overcapacity, Guo Fa [2006] Document No. 11	State Council (2006)	
49		Dividend paid by Jidong per share ( <a href="http://www.cninfo.com.cn/gszx/fhpg_fh000401.html">http://www.cninfo.com.cn/gszx/fhpg_fh000401.html</a> )		
50	09/06/2009	British LoA	Department for Environment Food and Rural Affairs) for	


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			Cliamte Change capital Fund II S.a.r.l. („C4F2)	
51	09/06/2009	British LoA	Department for Environment Food an Rural Affairs) for Cliamte Change capital Carbon Managed Account Limited (C4MA)	
52	04-06-2009	MoC	CCC and Jidong Cement Jilin Co., Ltd	
53		Reference Document on Best Available Techniques (BAT) in the Cement and Lime Manufacturing Industries"	Integrated Pollution Provention and Control	
54	22/12/2009	Financial audited report for Jidong Jilin Waste Heat Recovery project	Tangshan Hongli Certified Public Accountants Co., ltd.	
55	03/2005	Notice for the Tariff Reform Implementing Procedures Fagaijiage [2005] No. 514	National Development and Reform Commission	
56	10/07/2006	Jilin Development and Reform Commission on implementing the Notice on the adjustment of tar5iff of Northeast China Power Grid issued by NDRC Jifagaijiagezi [2006] No. 798	Jilin Development and Reform Commission	
57		Notice on the issues of the different tariff and the policies of the	National	



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		charge for the captive power plant", issued by National Development and Reform Commission(NDRC) and State Electricity Regulatory Commission (SERC) of China	Development and Reform Commission	
58	2004	Information on the further implementation of differential pricing and Captive Power Plant charging policy-related issues [2004] No. 159	National Development and Reform Commission, State Electricity Regulatory Commission	
59		Annual Clinker Production 2005~2006	Jidong Cement Jilin Co., Ltd.	
60		Annual Power generation and supply 2008~2009	Jidong Cement Jilin Co.,Ltd. Waste Heat Recovery Power Generation Annual power generation report__2008	
61		Statement on Waste Heat Recovery of Jidong Cement Jilin Co., Ltd. 2500t/d Clinker Production Line	Jilin Municipal Bureau of Industry and Information	
62		Power capacity and transformer capacity- Staement from Design Institute		
63	21/04/2008	Wordlbank Report No.: 38641-CN		project appraisal document on

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Ref. No.	Issuance and/or submission date(dd/mm/yyyy)	Title/Type of Document	Author/Editor/Issuer	Additional Information (Relevance in CDM Context)
				a proposed loan in the amount of US\$200 million and a proposed grant from the global environment facility trust fund in the amount of US\$13.5 million to the people's republic of china in support of the energy efficient project, Transport, Energy and Mining Sector Unit sustainable development department east asia and pacific
64	09/05/2001	Approval by Hebei Development and Planning Committee on the Feasibility Study Report of Waste –Heat Power Generation Project of Tangshan Jidong Cement Co.,Ltd, JiJiZiYuan[2001]No.375	The Development and Planning Committee of Hebei Province	Proof for similar projects
65		Feasibility Study Report: Tangshan Jidong Cement Co., Ltd. 92t/h Circulating Fluidized Bed Boilers Project	Baoding Huadian Electric Power Design & Research Institute Co., Ltd.	
66	22/02/2002	FSR approval of Tangshan Jidong Cement Co., Ltd. 92t/h Circulating Fluidized Bed Boilers Project Shijingmaozizi (2002) No.50	Economic and Trade Committee of Tangshan City	