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Ref: Response to request for review "24MW power generation from coking waste heat generated in the clean-type heat-recovery coke ovens at Shanxi Province Gaoping City Sanjia Coking Co., Ltd. in China" with the Reference Number 1710

15 August 2008

UNFCCC Secretariat
Martin-Luther-King-Strasse 8
D-53153 Bonn
Germany

Attention: CDM Executive Board

Dear Sir or Madam,

We were informed that our project "*CDM: 24MW power generation from coking waste heat generated in the clean-type heat-recovery coke ovens at Shanxi Province Gaoping City Sanjia Coking Co., Ltd. in China*" (reference number 1710) was requested for review by CDM Executive Board. As required by the Executive Board and on behalf of the project participants, we would like to answer the questions and clarify the issues raised in the requests for review as follows:

Issue 1:
"Considering that the investment being made is in the power sector, further substantiation that the benchmark reflects the risk profile of this project activity is required."

The benchmark internal rate of return (IRR) used for this project is taken from page 204 of the *Economic Assessment Methods and Parameters for Project Construction* (3rd Edition, 2006), hereafter referred to as "Economic Assessment Methods". This reference is used by Chinese authorities for assessing the financial viability of potential new projects. According to regulation No.6 in Chapter 4 of Annex II of the "Economic Assessment Methods", only when the IRR of a project exceeds the sectoral benchmark IRR, will the proposed project be considered financially feasible.

The “Economic Assessment Methods” states that when a project owner invests in a project with key characteristics of another sector rather than its own core business, and has little experience of these characteristics and the project risk, the sectoral benchmark IRR of its own core business will be applied.[1] Although this project is a power generation project, given that the core investment focus of the project owner is the coking industry, the sectoral benchmark of the coking industry is adopted (12% IRR). This is a conservative assumption, since the project owner has little experience in power generation adding significant risk to the investment decision. The project owner would therefore expect at least the same returns as they would normally expect from an investment in their core business.

Confirmation that these guidelines are followed for this kind of project can be found in *The Statement on Loan Application Review of Projects in Coking Industry* from the China CITIC Bank submitted with this document. This states that coking waste heat recovery projects should at least meet the IRR benchmark of 12% for the coking industry.[2] Additional confirmation is provided by the Shanxi Coke Association which recommends that the benchmark IRR should be 12% for waste heat recovery power generation projects in the coking industry.[3] Further justification on the appropriateness of the selection of the coke benchmark over that of the power sector is provided below:

The project owner of this project is Gaoping City Sanjia Coking Co., Ltd. (“Sanjia”). Sanjia is a relatively small-scale private sector operator. Its core business is in coke production and in the project activity the project owner will recover waste heat from the coking facility for power generation. Although the investment made can be associated with the power sector and is for export to the grid, the project activity is not typical of the type of power generating facilities which are normally found in the power sector - both in terms of reliability and ability to meet demand when required. Unlike traditional power plants the amount of power generated by the project activity is not based simply on power demand but based on the ability to maintain levels of production in the underlying coking facility. The waste heat is therefore only available when the production facility is operating and consequently determines the availability of power which can be sold to the grid.

According to financial theory, the acceptable Internal Rate of Return (IRR) benchmark for an investor is determined by assessment of the risk of the investment. The lower the risk of a proposed project the lower the required benchmark will be. Therefore to determine whether or not the benchmark chosen is appropriate for the project, the

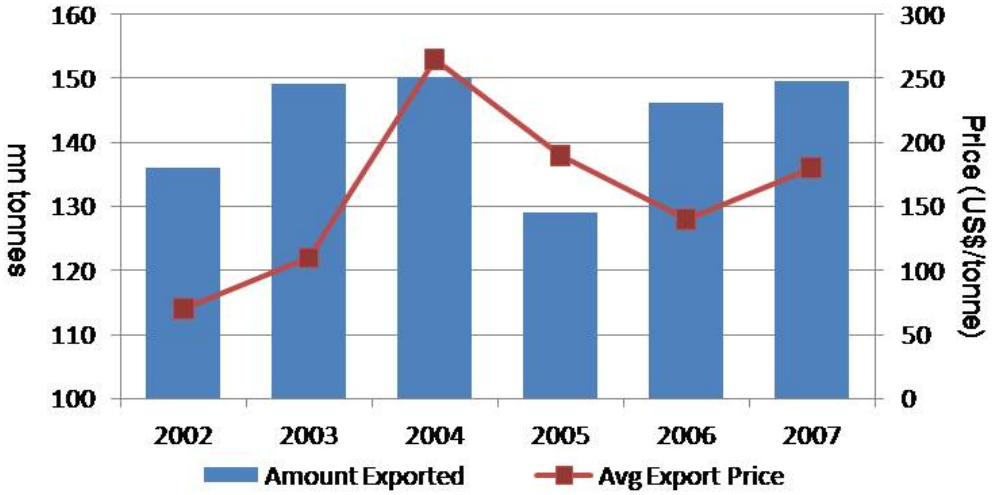
[1] Methods and Parameters for Economic Assessment of Construction Projects (version 3), published by China’s National Development and Reform Commission and Construction Ministry, December 2006, paragraph 2, point 2, page 197.
[2] The statement on loan application review of projects in coking industry (August 2008), submitted with this document in Chinese with English translation.
[3] The Notice on Benchmark Selection for Waste Heat Power Generation Projects in Coking Industry (May 2004), submitted with this document in Chinese with English translation.

risks associated with the project must be assessed to see if it is more closely linked to that of the power sector or the industrial sector on which the project depends.

As shown below, rather than being concerned with continued electricity demand (a relatively low risk given continuing economic growth in China), the project owner is primarily concerned with the future demand conditions of the coking industry as well as the degree of operational reliability of the underlying coke production facility. Because the project relies on the coking facility's production output to be maintained to generate electricity the project suffers from the following investment risks: **a) market risk**; **b) technology/operational risk**; and **c) input-supply risk**.

a) Market risk: China's coking industry is highly fragmented consisting of a large number of small-scale suppliers.[4] Although coke prices are currently increasing, the industry suffers from over-capacity which in the past has led to volatile market shares and plummeting coke prices.[5] Accurate multi-year data on domestic production output for the coking industry is difficult to obtain. However, China's coke export figures are an important indicator for domestic production output trends. The relationship between exports and coke output is particularly true for China's Shanxi Province, where the project activity is located: although Shanxi represents only 42% of China's total domestic coke production[6] it contributes to 90 percent of China's total coke exports.[7] **Figure 1** illustrates the substantial degree to which exports (and thus output) fluctuate as international coking prices change.

Figure 1: China coke export statistics 2002-2007 (exports, price)

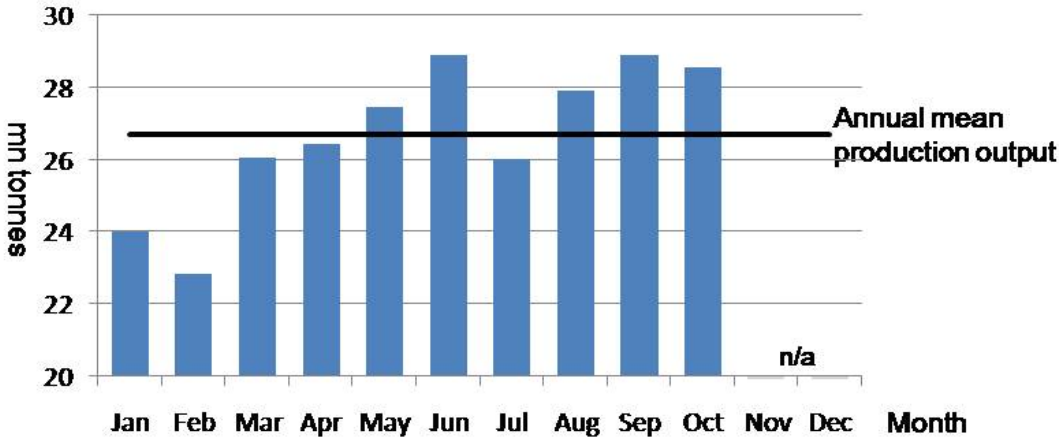


Source: China Steel Industry Association (2007)

[4] See http://russian.china.org.cn/english/BAT/158034.htm
[5] *Ibid* fn. 4
[6] "Coke export of Shanxi province accounts for 48 pct of global coke trade" (Xinhua, 04 August 2005) available at: http://english.people.com.cn/200508/04/eng20050804_200173.html
[7] "Political advisors propose assessment system for environment-damaging exports" (China, 04 March 2008) available at: http://news.xinhuanet.com/english/2008-03/04/content_7713952.htm

The above aggregated export statistics disguise further substantial coke output fluctuations within each year. **Figure 2** illustrates the latest Chinese domestic coke output figures publically available for the months January-October 2007. The monthly variations show substantial variation in production output from the annual average production output. Monthly production output varied from lows of less than 23 million tonnes (in February) to highs of almost 30 million tonnes (in June).[8]

Figure 2: China domestic coke production statistics Jan-Oct 2007 (output)



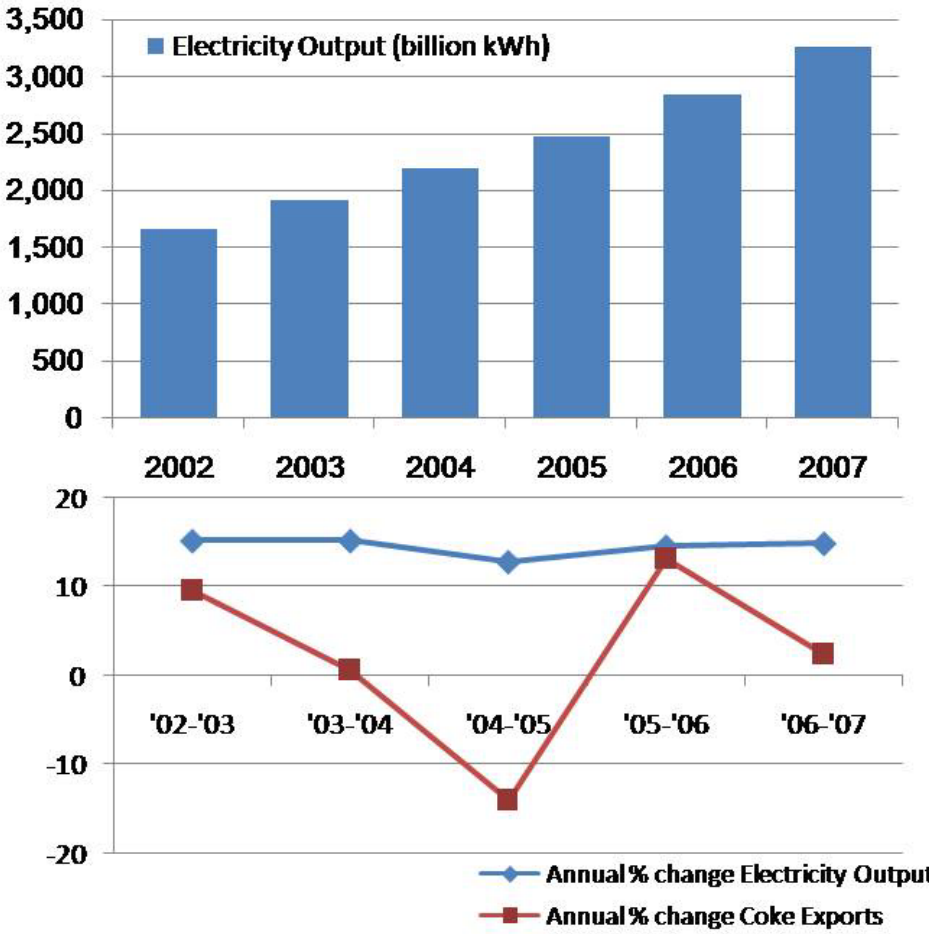
Source: China Steel Industry Association (2007)

By contrast, the Chinese power industry is highly regulated and market segments are carved up by the authorities to ensure that market shares are relatively stable. Chinese power industry operators are dominated by large scale enterprises which enjoy relatively easy access to capital.[9] As shown in **Figure 3**, this is reflected in the statistics of electricity output in the power industry which is stable compared to that of the coking sector.

[8] See also http://www.geonet.cn/Market/41087.shtml with the statistics in their original Chinese context

[9] In China the power industry is considered a so-called "Basic Industry". This means that operators in this industry enjoy policy support such as preferential access to finance by China's policy banks. See for example: http://www.cdb.com.cn/English/NewsInfo.asp?NewsId=1926

Figure 3: China domestic electricity statistics (output); Annual % change Electricity Output and Coke Exports Compared



Source: China Electricity Power Yearbook (various years); China Steel Industry Association (2007)

What the above statistics therefore illustrate is that although the project owner exports electricity to the grid it can only do so when there is coke produced and therefore waste heat is available on which electricity output is dependent. Output does not respond to electricity demand (export of electricity) but on coke demand. Therefore the export of electricity is not the primary risk characteristic influencing the investment decision but rather is secondary to considerations related to the coke market.

b) Technology/operational risk: As explained in the PDD, the project activity is based at a coking facility which uses a clean type *non-chemical-recovery* coking system that produces only waste heat. This is a new environmentally friendly coking technique but not as financially attractive as compared to the traditional *by-product* coke ovens. Furthermore, as the project will generate power by utilizing waste heat from coke production, which is currently vented into the atmosphere, power production is dependent upon the core business of the project owner. This brings with it its own risks not normally associated with the power industry. The power generation

facility will only produce power when there is sufficient waste heat being produced by the coking ovens and there is demand from the grid. Supply will be interrupted should either the ovens or the power generation facility suffer periods of operational downtime. These operational risks are increased by the project owner's unfamiliarity with the technology involved and the additional need to provide new training to staff to operate and perform maintenance on the power generating facility.

c) Input-supply risk: There are uncertainties in particular about the reliability of the coal supply used for coking.[10] The project will generate electricity not based solely on power demand but based on the ability to maintain levels of production of the underlying coking facility. Such uncertainties are less of a concern for operators within the mainstream power sector who enjoy higher buyer power and base their investment assumptions on a more stable supply of inputs.[11]

There is a large potential mismatch between electricity demanded and the availability of waste heat used by the project activity. Whereas a typical thermal power station can relatively easily control its inputs to meet variations in electricity demand, the project activity is far more constrained: it can only match electricity demand insofar as the underlying coke production facility allows it by generating the necessary waste heat to meet electricity demand. The production of this waste heat is not responsive to demand for electricity supply but for coke. Such potential mismatches are illustrative of how the project activity's power generating unit responds to the supply of waste heat from the coking facility rather than the electricity demanded from the grid which is how normal thermal power-generating facilities operate and why the IRR benchmark for the traditional power generating industry is not appropriate

It could be argued that certain must-run renewable energy technologies share similar input-supply constraints as the project activity, particularly wind and hydro power. However, it is important to note that waste heat recovery projects, unlike renewable energy projects, do not get preferential dispatch to the grid in China.[12] Instead, waste heat recovery projects must follow the same load curve as thermal power plants. This means that the amount of power that can be sold is further constrained by the daily load pattern of the grid. At the same time, more traditional, state-owned, generators and grid companies have retain close links with local government.[13] This means that

[10] Beyond the operational reliability constraints of the coking facility, the most likely reason for interruptions to the coking process is shortages in thermal coal supply. See also http://www.chinamining.org/News/2008-06-03/1212473878d14395.html

[11] The Chinese government has called on mines and those in charge of transport to ensure that thermal coal is supplied to power plants over coking plants. Recently China prioritised thermal coal supplies to power plants while weather impeded coal shipments from abroad: http://uk.reuters.com/article/oilRpt/idUKSHA23542120080226

[12] "Shanxi Representative Gao Zhicheng – Problems of Selling electricity from Coke Waste Heat to the Grid", attached to this response in Chinese and translated into English. Link to original Chinese version is available at: http://www.86ne.com/Energy/200801/Energy_109038.html. Reference is also made to the Chinese Renewable Energy Law (available at: http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=5371). This Law is the cornerstone of Chinese clean energy policy; however the scope of the law (art 2) only applies to "non-fossil energy of wind energy, solar energy, water energy, biomass energy, geothermal energy, and ocean energy, etc."

[13] See International Energy Agency (2006) "China's Power Sector Reforms: Where to next?" on page 85, available at http://www.iea.org/textbase/nppdf/free/2006/chinapower.pdf

although in theory Chinese Law requires that power plants should be economically dispatched on a merit order basis, in reality large state-owned power companies are able to maintain relatively high load levels even during off-peak times. The project owner of this small-scale power generating unit does not have the regulatory support or the political influence to ensure it can provide full capacity power during periods of low demand.

The combination of the risks outlined above means that the project owner will apply the appropriate IRR as reflected by the actual risk of the investment (i.e. at least matching that of the coking industry). Adopting the coke industry benchmark for this project is furthermore conservative as the project owner had no prior experience in power plant installation and management. The project requires new investments in operational capabilities and staff training outside the project owner's existing competencies. All things being equal, without the additional incentives provided by the CDM, Sanjia would therefore give priority to investing its limited capital in adding capacity to its core business of coking production rather than investing in the proposed project activity which provides a relatively lower return.

The above discussion illustrates why, for this project activity, the fact that the electricity generated is exported to the grid is not the primary factor determining the risk profile of the project (and thus the investment considerations of the project owner). These risks and financial considerations are particularly important for a small-scale private investor such as Sanjia which operates in the high-risk coke industry. While traditional power industry operators typically retain close political and financial links with the state, Sanjia does not enjoy the privileges accrued from these incumbents' ties (e.g. in terms of grid access). On the other hand, these state-owned industry players are often "encouraged" to bid for renewable energy below realistic market prices.[14] As a private enterprise, the Sanjia project owner is not under direct influence by the government, and beyond statutory requirements is not incentivized to invest in socially or environmentally sustainable projects. For project owners such as Sanjia the CDM provides a powerful financial incentive to move away from the unsustainable business-as-usual scenario towards more sustainable business practices.

Issue 2:
Further clarification is required on how the DOE has validated the suitability of the input values, as per the guidance of EB 38 paragraph 54.

Besides the response from the DOE, we would like to clarify as follows:

The requirement of EB 38 para 54 (a) states that the period of time between the finalization of the FSR and the investment decision should be sufficiently short for the

[14] Under the current regime, big state-owned power companies can bid well below realistic market prices, offsetting their losses with profits from coal-fired plants. See also "China Could Be World's Biggest Wind Power By 2020" available at: http://www.treehugger.com/files/2007/01/china_could_be.php

DOE to confirm that it is unlikely in the context of the underlying project activity that the input values would have materially changed.

The DOE has validated that the revised Feasibility Study Report (FSR) of the project activity was completed in April 2005 and the validated project start date is 1 November 2005 when the construction agreement was signed. As the time gap between FSR and the project start date is seven months the input values used in the FSR would not have materially changed by the time of finalizing the investment decision leading to the start of the project.

Yours faithfully,

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