RESPONSE TO THE REQUEST FOR REVIEW

Bureau Veritas Certification had performed the validation of the CDM Project 3262 - "*Siam Cement (Thung Song) Waste Heat Power Generation Project (TS46 Project)*". Subsequently, there have been nine requests for review raised by EB on 06/09/2010. We would like to provide our joint responses (PP's as well as DOE's) to the issues raised.

Issue 1: The DOE is requested to further substantiate the appropriateness of input values to the investment analysis, in particular, the beta coefficient for benchmark IRR calculation, total static investment, PLF (Kiln utilization factor), electricity tariff and annual O&M costs and its component, in line with the requirements of VVM/ver.1.2. para.110 & 111.

(A) The beta coefficient for benchmark IRR calculation
Response by PP :
The reason why the index of construction material sector (CONMAT) is chosen is because, unlike conventional power plants in the power sector, the risk of waste heat power plant is closely tied with the risk of the cement business. For conventional power plants in Thailand, the owner can design to operate at the plant's full capacity with the business risk being borne by the government utilities (EGAT) as it is forced to buy all the electricity generated under the take-or-pay contract.[1] As such, conventional power plants are generally regarded as low risk business in Thailand. On the other hand, the operation of waste heat power plant depends solely on the availability of waste heat from clinker production. If the clinker production drops because of the sluggish demand for cement, then the production of electricity will drop proportionately, and so as its profitability. Therefore, we consider that reference to the construction material sector should better reflect the actual risk of the waste heat power plant.

In addition, the beta coefficient of the energy sector (ENERG) of the stock market of Thailand during the same period is 1.15, which is higher than that of the construction material sector [Beta_Energy_Oct06-Oct07.xls]./A-27/ As such, the use of beta coefficient of construction material is considered conservative.

The above explanation has been added to Section B.5 of the PDD.

The beta coefficient used in the benchmark calculation can be further substantiated by 3rd party reference, which shows that 3-year average beta for construction material group in Stock Exchange of Thailand, as quoted under "building" category, is 0.9523, or that of large cap companies in the same category is 1.0525.[2] In addition, even the individual beta for

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[1] See, for example, Nikomborirak, D. and Manachotphong, W., Electricity Reform in Practice: The Case of Thailand, Malaysia, Indonesia and the Philippines, Intergovernmental Group of Experts on Competition Law and Policy, Geneva, 17-19 July 2007, p.5. http://www.unctad.org/sections/wcmu/docs/c2clp_ige8p25asia_en.pdf

[2] Volatility on the Thai Stock Exchange, by Paul Renaud 25 Mar 2004 http://www.thaipro.com/thailand_00/266_thai-stock-exchange.htm

Siam Cement Group against the SET index is 1.055.[3] As such, the beta used in the benchmark calculation of 0.944, which is lower than the above study, should be considered conservative.

Herewith,calculation sheet of beta coefficient is provided.[0085864_CEC II_benchmark.xls]/A-1/

Response by BVC :
Siam Cement Group (SCG) is a parent company of Cementhai Energy Conservation Co.Ltd (CEC). It is a listed company trading in Stock Exchange of Thailand (SET) in the building sector (CONMAT). The fund raised for this project comes from 100% equity of CEC. It is therefore reasonable to apply the cost of capital of SCG as a cost of capital of CEC. The cost of capital is comprised of both cost of debt and cost of equity. In order to derive the cost of equity, the beta coefficient of CONMAT group which is the group that SCG belongs to in SET has therefore been used. The beta coefficient figure is obtained from the official website of SET (www.setsmart.com/ism/ism_sectorquotation_historical.jsp). It is based on the timing (2007) that SCG has considered the feasibility of the project. Moreover, the beta coefficient of the energy sector (ENERG) of the stock market of Thailand during the period Oct 2006 to Oct 2007 is 1.151372 (www.setsmart.com/ism/ism_sectorquotation_historical.jsp) which is higher than the beta value used in the PDD (0.944) and hence can be considered more conservative.

(B) Total static investment
Response by PP :
The major portion of static investment can be substantiated by the values in supplier contracts [contract prices STS.pdf] /A-20/. Besides, as of end of August 2010, the budget of TS46 project 840 million Baht has been used up to approximately 95% (793.6 million Baht of which 762.2 million Baht has been paid and 31.4 million Baht is already committed in outstanding work) which can be substantiated the budget status sheet provided [TS46 WHG Phase II - August 2010.pdf] /A-2/ and confirmed by the letter from SCG Accounting Service Co., Ltd. [TS46_MOM_BudgetStatus.pdf] /A-24/, a third party accounting company that provides accounting service to CEC. Having considered this total spending in a sensitivity analysis, it shows that the project's financial stage yields the equity IRR of 8.2%, which is still below the benchmark (11.28%) [FS_TS46_ver16.xls] /A-3/.

Moreover, the total static investment can be further substantiated by comparing the total investment cost per installed capacity with other registered CDM projects implementing waste heat power generation, as shown in table below and in attached file [TS46_compareInvestment.xls] /A-4/.

	Total investment cost	**Installed capacity**	**Investment cost/Installed capacity**
	USD	MW	mUSD/MW
Project 1874 : 25.3MW WHR Project of Zhejiang Leomax Group	8,656,082	8.8	0.98
Project 1907 : KCP Waste Heat Recovery Project in a Cement Plant by The KCP Limited (Cement Unit), India	2,539,494	2.4	1.08
Project 1450 : 8MW pure low temperature waste heat recovery (WHR) for power generation in SDIC Hainan Cement Co., Ltd.	8,601,918	8.0	1.08
Project activity: TS46	24,470,216	22.0	1.11
Project 1611 : Waste Heat Recovery and Utilisation for Power Generation Project of Chizhou Conch Cement Company Limited	31,889,165	28.6	1.12
Project 0366 : Taishan Cement Works Waste Heat Recovery and Utilisation for Power Generation Project	19,030,791	15.0	1.27

(1) [1] Bloomberg http://www.bloomberg.com/apps/quote?ticker=SCC:TB

Project 1730 : Inner Mongolia Wulanchabu Volan Cement Waste Heat Recovery Project	21,510,796	17.0	1.27
Project 0898 : Ningguo Cement Plant 9100KW Waste Heat Recovery and Utilisation for Power Generation Project of Anhui Conch Cement Co. Ltd	14,747,399	9.1	1.62
Project 0717 : India Cements WHR project	20,827,825	7.7	2.70

Source: UNFCCC website http://cdm.unfccc.int
Note that the investment cost is converted using 1-full year average exchange rate for 2009, in which 1 USD = 6.831035 CNY = 48.63686 INR = 34.327445 THB

The investment comparison shows that the total investment cost per MW of waste heat power generation system in cement industry ranges between 0.98 – 2.70 mUSD/MW. The total investment of the project activity TS46 is 1.11 mUSD/MW, which is already very close to the lowest investment cost.

Response by BVC :

The Total static cost has been determined in FSR as shown in the following table.

Details	Cost (Million Baht)	Cost (US Dollar)
M/C	471.2	1,372,6626
Engineering Fee	31.3	911,807
Supervision Fee	23.7	690,410
Import Duties	13.4	390,358
Local Pur.(ME)	48.2	1,404,124
Local Pur.(EE)	20.1	585,537
Erection	143.5	4,180,329
Civil Work	5.9	171,874
Project Admin.	8.4	244,702
Contingency	15.2	442,794
IDC	59	1,718,741
TOTAL	840	24,470,216

Note that the investment cost is converted using 1-full year average exchange rate for 2009, in which 1 USD = 34.327445 THB

Validation team has validated these estimated figures against the actual contracts obtained after the start of the project. They are reasonably in line with the actual figures. Please keep in mind that the FSR was conducted before the start of the project in this case. The figures therefore are not necessary to be exactly the same as that of the actual figures. We have validated to ensure that they all have solid underlying assumptions. We have even asked for the actual figures to see the differences between the two. The differences are within an acceptable range of 5%.

(C)PLF (Kiln utilisation factor)

Response by PP :

The *ex-ante* estimation of plant load factor (PLF) for the waste heat power plant (WHG) of 63% is product of the kiln utilisation factor (71%) and the WHG running factor (90%). Kiln utilisation factor is the number of days that the kiln is operating out of 365 days, while the WHG running factor is the number of days that WHG is running out of the number of days

that kiln is operating. This is because the WHG relies solely on the waste heat from the kiln to generate electricity. If the kiln is not running, the WHG will have to shut down.

The kiln utilisation factor of TS plant (including TS4, TS5 and TS6) depends on the demand for clinker and cement in that particular year. The allocation of clinker production among TS4, TS5 and TS6 depends on their efficiency. TS5, being the most efficient kiln, its kiln utilisation factor will be maximised first, followed by TS6 and TS4. The value of kiln utilisation factor for TS46 used in the PDD is based on their average 3-year historical performance (2005-2007), substantiated by the work journals /A-5/ [contained in folder 'Work Journal TS 2005-07'] for each kiln.

The WHG running factor is determined based on manufacturer's recommendation – page 5 of attachment [TS46_MOM.pdf] /A-6/– and further substantiated by SCG Engineering Co., Ltd, a third party engineering company [Plant_load_factor_WHG.pdf] /A-7/, as per EB48 Annex11.

Although the projection of the clinker production for the whole TS plant expects a gradual increase over the next decade, this is based on an optimistic and simplistic assumption that the domestic and global economy will grow steadily over the next decade. We know with the benefit of hindsight that, as a result of economic recession, deep plunge occurs in 2008-2009. In any case, any possible increase in kiln utilisation factor has still been reflected in the sensitivity analysis. As such, the use of historical kiln utilisation factor and WHG running factor should be considered reasonable.

Response by BVC :
PLF depends pretty much on the level of utilization of the kiln. In other words, the more the kiln utilization rate, the more the Waste Heat Power Generation utilization rate. It is therefore reasonable for us to use the historical information. This information has already reflected the maintenance period and the demand of the cement market. In fact, the older the kiln is, the lower the utilization rate is. The PLF (63%) applied therefore seems to be on the conservative side.

The WHG running factor , we have checked a performance guarantee document issued by Sinoma Energy Conservation Ltd (manufacture) and certified by SCG Engineering Co., Ltd, a third party engineering company. All of those substantiate in line with the requirements of VVM/ver.1.2. para.110 & 111

(D) Electricity tariff
Response by PP :
The electricity tariff used in the PDD of 2.36 THB/kWh is based on the average actual electricity cost that TS cement plant paid to the electricity utility (EGAT) during Jan-Sep 2007 before the investment decision is made in October 2007 , as substantiated by the electricity bills of TS plant from EGAT (Jan-Sep 2007) /8/ [contained in folder 'EGAT 2007'] and the average electricity cost before VAT for TS plant during Jan-Sep 2007 is calculated in the excel file provided [TS_ElectricityCost_Jan-Sep2007.xls] /A-9/. The reference electricity tariff rate is specified in Annex 1 to the Power Purchase Agreement between TS plant and EGAT. [PPA STS EGAT.pdf]. /A-10/ and its English translation [PPA STS EGAT_translation.pdf] /A-10/ Since the total electricity charge constitutes a number of components, some of which depends on how the plant manages its electrical load and some of which is beyond the control of the plant, eg Ft charge, the average electricity cost will vary from month to month.

Up to May 2008 when the agreements with the WHG supplier were signed and which marked the project start date, the average electricity cost for TS plant actually fell further. The

average electricity cost during Oct 2007 – May 2008 was 2.32 THB/kWh, as shown in the spreadsheet provided [TS_ElectricityCost_Oct2007-May2008.xls] /A-25/ and substantiated by the electricity bills from EGAT [contained in folder 'EGAT Oct07-May08'] /A-26/. As such, the electricity tariff used in the financial analysis (2.36 THB/kWh) is already conservative.

With regard to VAT, even though when the TS plant pays for electricity bill, VAT will be added to the electricity price, VAT is still excluded from the calculation because VAT will have to be passed on to the government directly. As such, it will not be counted towards the company profits.

Response by BVC :
We have already verified this actual data. All electricity produced from the WHG project will be used internally within Siam Cement ThungSong plant (TS Plant). The electricity tariff used in the financial analysis (2.36 THB/kWh) is higher than the average electricity cost during Oct 2007 – May 2008 (2.32 THB/kWh) when the agreements with the WHG supplier were signed and which marked the project start date so that conservative values can be justified.It is therefore reasonable to apply the historical tariff rate paid by TS Plant. As the Power Purchase Agreement , the average electricity cost will vary from month to month depend on Quality of Electricity ,Ft charge and time which complied with PPA contract , therefore PPA value is accepted .

(E) Annual O&M costs and its component
Response by PP :
The annual O&M cost has been determined as shown in the following table.

Cost	Value (million THB)	Reference
Electricity Cost	12.66	As per the electricity generation contract between CEC and STS plant [TS46_O&M EE 5% from EGAT.pdf] /A-11/, the share of benefit from electricity cost saving is based on kiln running factor. In TS46 project, assumed that it was in the range of 51-80%, STS will make a payment 95% of electricity price, while CEC absorb the rest 5%. It can also be considered as a cost for CEC since there is no cost on waste heat used as an input to the power unit.
Water Cost	62.71	0.550 B/kWh-Gross as per recommendation from supplier [TS46_O&M MOM.pdf] /A-12/
Chemicals Cost	29.65	0.260 B/kWh-Gross as per recommendation from supplier [TS46_O&M MOM.pdf] /A-12/
Contractor Cost	4.17	60man x 300 B/day – The contractors will be out-sourced, 20 workers per shift and 3 shifts daily. The detail of contractor work is provided. [TS46_contractor.pdf] /A-13/
Maintenance Cost	19.95	0.175 B/kWh-Gross as per recommendation from supplier [TS46_O&M MOM.pdf] /A-12/
Employee Salary	10.68	The employee salary calculation is based on an average range of personnel with skill/qualification required for the operation of WHG system [CEC salary.pdf]./A-14/
Administration Cost of CEC	8.51	The file [TS46_Admin details.pdf] /A-15/ provides details of the administration cost of CEC, covering the following items. - Electricity cost in this administration portion refers to the electricity cost from grid which required when WHG system is not running and during its start up. It has been estimated at approximately 1% of gross power during WHG is not in operation.

Cost	Value (million THB)	Reference
		- Operation Management Fee – The fee is to be paid to STS at 100,000 THB/month and the operation contract between CEC and STS is enclosed [TS46_OperationFee.pdf] /A-23/. - Engineering and Account Management Fee – These fees, to be paid to other entities, have been estimated based on an actual payment occurred in CEC WHG Phase I. - Other factory over head and other administration cost – These two portions have been detailed in attachment. Please refer to pages 2-3 of the file [TS46_Admin details.pdf] /A-15/

Response by BVC :

We have verified all the above referred documents and confirm the annual O&M cost.

Cost	Value (million THB)	Means of validation
Electricity Cost	12.66	We have validated the official electricity generation contract between CEC and STS plant [TS46_O&M EE 5% from EGAT.pdf] /A-11/ and found that details and payment information between CEC and STS complied with electricity cost. Therefore electricity cost is acceptable.
Water Cost	62.71	We have checked 0.550 B/kWh-Gross as per recommendation from supplier provided in [TS46_O&M MOM.pdf] /A-12/ and found that water cost is reasonable when compared with water cost unit price of provincial waterworks authority and water usage during running machines.
Chemicals Cost	29.65	We have checked 0.260 B/kWh-Gross as per recommendation from supplier [TS46_O&M MOM.pdf] /A-12/ and found that chemical cost is acceptable when compared with chemical price in general chemical markets and chemical quantity usage during running machines.
Contractor Cost	4.17	We confirmed the number of workers required is suitable in the type of work because number of workers are complied with full job functions in process , Wage is acceptable when compared with wage in general labour work market of Thailand. Therefore the details of contractor cost provided in [TS46_contractor.pdf] /A-13/ are accepted.
Maintenance Cost	19.95	We have checked 0.175 B/kWh-Gross as per recommendation from supplier [TS46_O&M MOM.pdf] /A-12/ and found that it is reasonable when compared with maintenance plan and maintenance cost provided from supplier.
Employee Salary	10.68	The employee salary in [CEC salary.pdf]./A-14/ is reasonable when compared with wage and salary in general labour market therefore calculation could be accepted for using in O&M cost.
Administration Cost of CEC	8.51	The administration cost of CEC is accepted when we have checked with official contact between CEC and STS

Cost	Value (million THB)	Means of validation
		effective on 30/6/2009 /A-23/ and the actual payment occurred in CEC WHG Phase I complied with Engineering and Account Management fee estimated . Electricity cost is 1 % of gross power during WHG is not in operation which is conservative Therefore the total administration cost of CEC provided in [TS46_Admin details.pdf] /A-15/ is accpeted

Issue 2: The DOE is requested to further substantiate how it has validated that equity IRR calculation is in accordance with the EB 51, Annex 58, para.10.

Response by PP:
The equity IRR has already been calculated in accordance with the EB 51, Annex 58, para.10, in which only the portion of investment costs that is financed by equity is considered as net cash outflow. As presented in the financial analysis spreadsheet, the equity cash flow is presented in Row95, and the net cash flow related to investment 585 million Baht [cell F95] is calculated from the total investment cost 840 million Baht [cell F85] plus initial working capital 37 million Baht [cell F87] deducting the debt portion 292 million Baht [cell F56]. The financial analysis spreadsheet is provided herewith. [FS_TS46_ver16.xls] /A-3/

Response by BVC:
From the calculation sheet submitted by Siam Cement Thung Song [FS_TS46_r16.xls] /A-3/ and validated by us, shows that the cost of debt (Long term loan) has been taken out from the project cash outflow to be an Equity cash flow and the IRR calculation is calculated from Equity cash flow, therefore it is in line with the EB 51, Annex 58, para.10. “In the calculation of equity IRR only the portion of investment costs which is financed by equity should be considered as the net cash outflow, the portion of the investment costs which is financed by debt should not be considered a cash outflow.”

Hence we confirm that the equity IRR calculation used in the IRR analysis of the project activity is in accordance with the EB51, Annex 58, para 10.

Issue 3: The DOE is requested to further substantiate how it has validated the sensitivity analysis in line with VVM/ver.1.2 para 111(e), in particular, the kiln utilisation factor, which is forecasted to be 86% by 2020 in the PDD (p.17) and 89% by the same year in the excel sheet.

Response by PP :
In the excel sheet, the forecast of clinker production of 89% has been a mistake. The excel file has been revised accordingly. This correction does not have any impact on the financial analysis because the financial analysis is based on the historical performance specific to only 2 clinker production lines TS46 and not the forecast of clinker production for the whole TS plant.

As explained above, due to their relatively low efficiency, the kiln utilisation factor of TS46 combined will be lowered than that of TS5 and that of the whole TS plant. Even in an extreme case that the average kiln utilisation factor for TS46 reaches 89% every year over the crediting period, the sensitivity analysis shows that the equity IRR (11.1%) would be still below the benchmark of 11.28%.

Response by BVC:

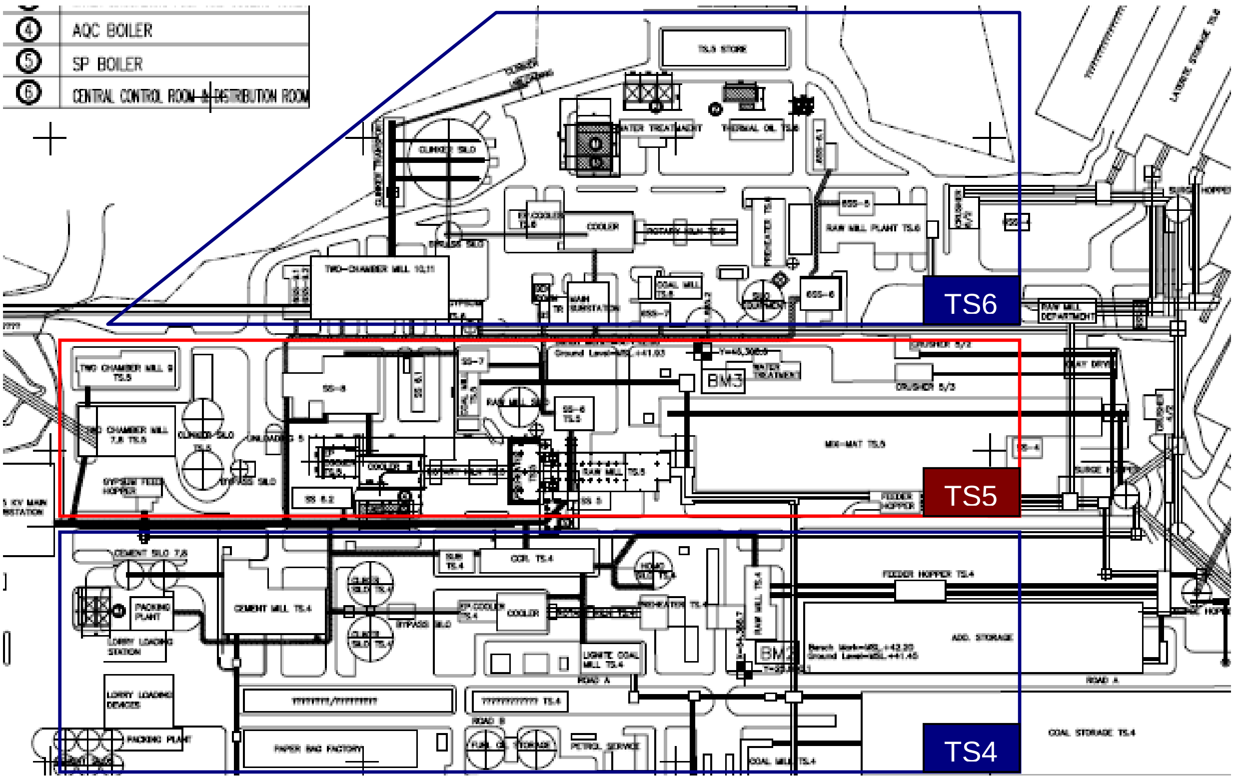
We apologize for overseeing this mistake in the forecast of clinker production between PDD and excel sheet The PP has revised the excel sheet accordingly. However, the sensitivity analysis confirms that at 90% Klin utilization factor the bencmark is reached. When comparing the historical record over the last three year prior implementation (2005-2007), the average utilisation factor of kilns 4 and 6 is only around 70 % which substantiate the unlikelihood of not reaching this higher kiln utilization factor.

Issue 4: DOE is requested to further substantiate the appropriateness of the project boundary and facilities included in the boundary, in particular the Kiln 5 and internal grid in line with the requirements of VVM/ver.1.2, para. 78-80.

Response by PP:

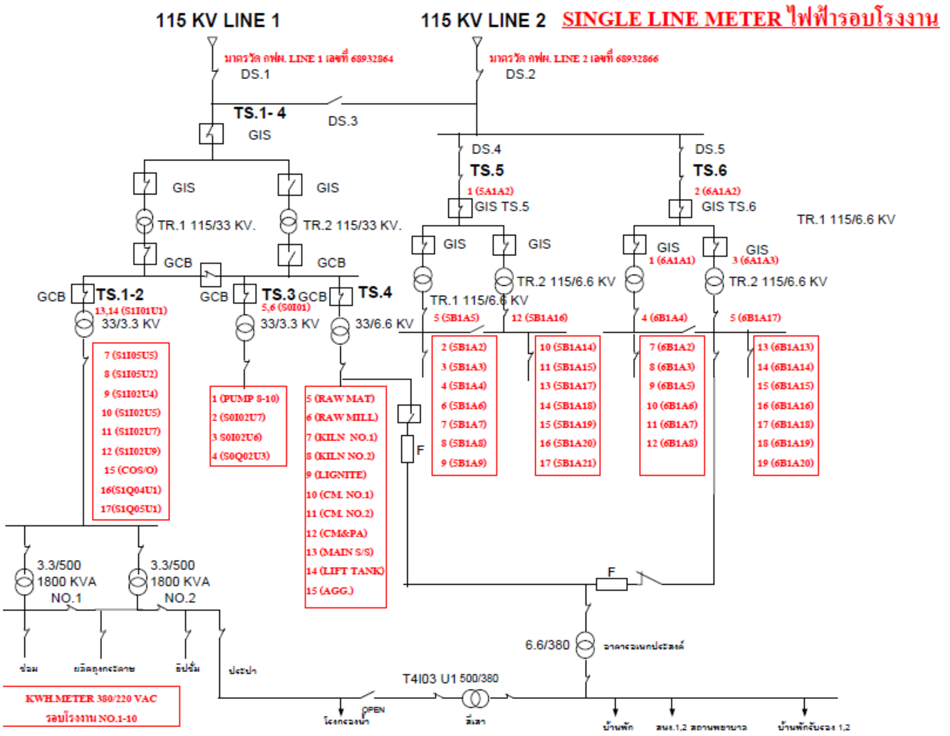
Under Section B.3 of the PDD, the physical boundary of TS46 is defined as the facilities constructed/erected on account of the project activities and the local power grid system (meaning the national grid supplied by EGAT). There is no captive power plant within the project boundary, which denotes that no captive power plant exists for clinker production line 4 and 6. In contrast, for the whole TS plant [on page 18], there is a captive power plant at the clinker production line 5, but the clinker production line 5 is separate from the clinker production line 4 and 6. As such, TS5 WHG is excluded from the project boundary and that Kiln 5 (TS5) and the electricity generated from its WHG system are clearly distinct from the project boundary of TS46, as further substantiated below.

The plant layout below shows the clinker production line TS4, TS5 and TS6. Each line has on its own complete stand-alone production facilities from raw mill and fuel mill until the clinker silo so that each production line can be in operation independently of the other line. The plant layout also shows that the existing TS5 WHG is located outside the physical boundary of the project.



The plant layouts that show the location of each piece of equipment installed in the project activities are [Plant layout TS5.pdf] /A-16/ and [Plant layout TS46 v1.pdf]./A-17/

The independence of electricity use between TS5 and TS46 can be further demonstrated by the single line diagram. As shown in the attached single line diagram [STS EE diagram TS4 5 6.pdf] /A-18/ , the electricity line is connected between TS4 and TS6. However, the TS5 electricity system is separate to TS46. TS5 WHG is connected and supplies electricity to TS5 production line only. Similarly, TS46 WHG will be connected to clinker production line TS4 and TS6, and located in a close vicinity of line 6 (because TS6 production line is more efficient than TS4, so that TS6 will be utilised before TS4).



TS5 WHG is not considered as internal grid for TS46 since it is not possible to export electricity from clinker production line TS5 itself. This is because the TS5 WHG can generate 7.30 MW of electricity only when the clinker production line 5 is operating, which requires approximately 22 MW of average electricity demand (average from the total plant demand of 65 MW for 3 clinker production line), although the rated capacity of equipment installed in TS5 production line alone is totalled 43.80 MW [TS5_demand.xls] /A-19/ as supported by equipment specification .When the clinker production line 5 is not operating, the TS5 WHG cannot generate any electricity. Therefore, TS5 WHG cannot supply any electricity to the project activity and should not be considered as internal grid for the project activity.

Lastly, since TS5 is also a CDM project (project no 2696 registered 12 Feb 2010), there is no incentive to divert heat or steam from TS5 to generate electricity for TS46, or to generate electricity from TS46 to displace electricity generated from TS5.

Response by BVC:
We apologize for not clearly reporting of this issue.
During site observation, validation teams have carefully checked project boundary with plant layout and single line diagram and found that TS5 WHG is excluded from TS46 project boundary and comfirm that TS5 WHG is not captive power plant within project boundary . In addition, the TS5 could not export electricity from clinker production line 5 because its electricity generation is lower than clinker production line electricity requirement.

Without operation of clinker production line 5 , the TS5 WHG could not generate electricity. Therefore TS5 is not internal grid for the project activity.

Issue 5: The DOE is requested to further substantiate why not all possible options of baseline scenarios are considered and assessed in the PDD, in particular, the option requested by the applied methodology in case of *ex-ante* projected increase in electricity consumption (Step 1.B, second bullet (iii), page 4), which is installation of captive power with different fuel options.

Response by PP :
As shown in Step 1.B of Section B.4, although the *ex-ante* projection of annual electricity consumption (in MWh) is expected to increase, the capacity addition (in MW) is not required because the increase in consumption is the result of an increase in running hours, not the result of production capacity expansion. Based on the past record and future production plan, it shows that the electricity demand (in MW) of the cement works will not increase beyond 65 MW, which is the highest historical demand amongst the past 3 years before the project implementation at TS plant. In such case, the plant can continue to meet its electricity demand by the national grid without having to consider the construction of a captive power plant with different fuel options.

The above explanation has been added to the PDD Section B.4.

Response by BVC:
The response given by the PP is justified in the context that the capacity addition (in MW) is not required because the increase in consumption is the result of an increase in running hours, not the result of production capacity expansion. Validation teams have checked the historical of kiln utilization of 4 and 6 found the average utilisation factor of kilns 4 and 6 is only around 70 % and future plan utilisation factor of both kilns maximum is 86 % which substantiate the unlikelihood of not increasing kilns capacity therefore the option requested by the applied methodology in case of *ex-ante* projected increase in electricity consumption (Step 1.B, second bullet (iii), page 4), which is installation of captive power with different fuel options is unnecessary.

Issue 6: The DOE is requested to substantiate: (a) the conservativeness of approach applied for calculation of fuel EF ($COEF_{fuel,y}$) when 12 different types of fuels are combusted in one facility in the pre-project scenario, in line with VVM 1.2., para 92(d); and (b) why a clarification was not requested from the Board on the approach followed by the project participants (Annex 12, EB 31).

Response by PP:
(a) To ensure the conservativeness of project emission, however, the project participant has revised the calculation of $COEF_{fuel,y}$ based on only one fuel type that has the highest carbon coefficient in the concerning year. For instance, from the 12 fuel types used in 2007, charcoal has the highest emission coefficient of 112 t CO_2/TJ and has been used in both kilns, so that $COEF_{fuel,y}$ for that year will be 112 t CO_2/TJ for both kilns, as compared to 89.94 t CO_2/TJ for Kiln 4 and 82.90 t CO_2/TJ for Kiln 6 from previous calculation (weighted average). This approach is considered conservative.

(b) The request for clarification is now unnecessary as the calculation of $COEF_{fuel,y}$ has been revised based on a single fuel.

Response by BVC:
(a) We apologize for overseeing this mistake in the previous $COEF_{fuel,y}$ calculation to cause the clarification was not requested from the Board on the approach followed by the PP.
The PP would like to ensure the conservativeness of project emission therefore the calculation of $COEF_{fuel,y}$ was revised by based on only one fuel type that has the highest carbon coefficient in the concerning year . The highest emission coefficient of 112 t CO2/TJ has been checked and found it conmplies with IPCC 2006 table 2.2. Further, 0085864_SCG-TS46_calculation_ver06 .xls /A-21/ has been checked and found calculation is reasonable.
(b) The calculation of $COEF_{fuel,y}$ has been revised based on a single fuel (charcoal) therefore now PP does not have to follow the Annex 12, EB 31 which is reasonable and hence accepted.

Issue 7: DOE is requested to: (a) substantiate how it has validated the appropriateness of grid (external vs. internal), (b) grid EF (VVM 1.2, para 91); and (c) provide the excel file for calculations of grid EF.

(a) The relationship between TS5 waste heat power plant ("internal grid") and the Thailand electricity grid ("external grid") has been explained in the PDD p.18.

Response by PP:
Although the existing TS5 WHG is considered a captive power plant for the whole TS cement plant, it is not considered a captive power plant for the project activity, because in reality TS5 WHG can only generate electricity when TS5 production line is running which requires more electricity than TS5 WHG can generate. Therefore, it is not possible for TS5 WHG to supply electricity to the project activity. See also response to issue 4 above.

Response by BVC:
We apologize for not clearly reporting of this issue
According to issue 4, TS5 is not considered a captive power plant within the projcet boundary (please refer to plant layout /A-16,17/ , single line diagarm /A-18/) Also it is not internal grid because electricity generation capacity is less than all energy requested from production kiln line 5

(b) Grid EF (VVM 1.2, para 91)

Response by PP:
The project activity applies the grid emission factor for the year 2007 as an estimate of grid EF ($EF_{grid,y}$) which was calculated in the latest technical paper issued in 2009 by the Ministry of Energy [4] using the ***Tool to calculate the emission factor for an electricity system version 01.1***. Although there is a newer version of the tool (ie version 02), the change does not have any impact on the method that the grid emission factor is calculated. Since this parameter $EF_{grid,y}$ will be monitored on implementation and hence become available only after validation of the project activity, the project participant considers that this grid emission factor calculated by the Ministry of Energy should be a reasonable estimate for the purpose of *ex-ante* calculation, as per VVM 1.2, para 91.

Moreover, the comparison below can be used to further substantiate that the estimate provided in the PDD is reasonable and conservative.

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[4] Hinchiranan, S., The Estimation of Emission Factor for an Electricity System in Thailand 2007, Ministry of Energy, 2009, http://www2.dede.go.th/cdm/520126_GridEmission2007.pdf

Comparative Study	Value tCO2/MWh	Source
TS46 Project activity parameter estimate for 2007 (DEDE, 2009)	0.5070	http://www2.dede.go.th/cdm/520126_GridEmission2007.pdf
Study on Electricity Sector Baselines in Thailand	0.5090	http://www2.onep.go.th/CDM/0038829_GridEmissions.pdf
The Study of emission factor for an electricity system in Thailand 2009	0.5812	http://www.tgo.or.th/download/publication/GEFReport_EN.pdf
Project 3334 : Biogas from Ethanol Wastewater for Electricity Generation [Registered project]	0.5060	http://cdm.unfccc.int/UserManagement/FileStorage/SWLKIJQ92PBN3AHO81X0TU6DFMYCG4
Project 2934 : Decha Bio Green Rice Husk Power Generation 7.5MW [Registered project]	0.5510	http://cdm.unfccc.int/UserManagement/FileStorage/452HECIWKXM1OFRLJ768BQAG9NZU3Y
Project 2697 : Siam Cement (Kaeng Khoi) Waste Heat Power Generation Project, Thailand (KK6 Project) [Registered project]	0.5192	http://cdm.unfccc.int/UserManagement/FileStorage/0EMN2J7OSYFVKUXZ3169WHQCBD5IR8

The comparison shows that the estimate for grid emission factor used in the PDD is comparable with other independent studies and is already near the lower end of the range. Hence is the estimate should be considered reasonable.

The project participant did not update this parameter using the most recent data or most recent version of the tool because this parameter will have to be monitored on implementation and no significant structural change in Thailand grid power generation is anticipated. Hence, the parameter used in the PDD for *ex-ante* calculation should be reasonable.

Response by BVC:
The Grid Emission factor data taken from the Thailand Ministry of Energy which are publicly avalible on its website. The grid EF of the project has been validated based on an official source: Electric Power in Thailand (DEDE). The annual reports are published by the Department of Alternative Energy Development and an official source : Thailand Greenhouse Gas Management Organization (TGO) the Summary Report The Study of emission factor for an electricity system in Thailand 2009 on http://www.tgo.or.th/download/publication/GEFReport_EN.pdf Thailand has single grid (national grid or EGAT 's grid). The result of calculation by Tool to calculate the emission factor for an electricity system version 01.1 which updated to version 2.0 but the change does not have any impact on the method that the grid emission factor is calculated .
Grid EF of *ex-ante* parameter will be monitored on implementation and hence become availble only after validation of the project activity. When compared with other projects which use same grid with the project activity it can be found that the value is conservative. BVC confirms that the estimates of grid EF and information provided in the PDD and calculation sheet are accepted.

(c) provide the excel file for calculations of grid EF.

Response by PP:
The calculation spreadsheet is provided in the Thailand_GridEmissionFactor2007_DEDE2009.xls /A-22/

Response by BVC:
The PP has provided the calculation spreadsheet in the file Thailand_GridEmissionFactor2007_DEDE2009.xls /A-22/. Validation teams have checked it with *Tool to calculate the emission factor for an electricity system version 01.1* and the estimation of emission factor for an electricity system in Thailand 2007 published by

Department of Alternative Energy Development and Efficiency Ministry of Energy on http://www2.dede.go.th/cdm/520126_GridEmission2007.pdf that are reasonable.

Issue 8: The DOE is requested to substantiate: (a) how it has validated that "annual production of clinker after implementation of project, $O_{clinker,y}$" is monitored in accordance with the applied methodology; and (b) if clinker output assessment approach is not in accordance with the approved methodology why the request for deviation has not been submitted, to the Board in accordance with Annex 12, EB 31.

Response by PP:
(a&b) The methodology AM0024 (version 02.1) describes that the annual production of clinker after implementation of project ($O_{clinker,y}$) shall be measured continuously during the crediting period. The project participant proposes in the PDD the measurement of clinker production from the raw material input, which is considered an industry norm amongst cement producers [http://www2.cemsuisse.ch/file/B3-_HARP-Berechnungen_von_Klinker_=2b_Zement_-_MIM_-_20090430.doc]. As already explained in Section B.7.1 of the PDD, the clinker production process is generally not weighed directly due to its high temperature.

This method of measurement is analogous with, for example, the measurement of heat, in which no direct measurement of amount of heat generated in a boiler is available. As such, it has to be derived from the amount of fuel being combusted and the energy content of such fuel. This method should be considered as a measurement, not a calculation. Likewise, the NCV cannot be measured directly but through measuring of gross calorific value, and then converted from our scientific knowledge in to net calorific value. As such, the project participant still considers that the proposed method of measuring $O_{clinker,y}$ is still in line with the methodology.

Response by BVC:
(a) We confirm that the annual production of clinker after implementation of project ($O_{clinker,y}$) shall be measured continuously during the crediting period by the production department . The data of clinker output must be continuously measured in a dialy report will be manually/electronically during,and 2 years beyond, the crediting period. It is practically difficult to measure $O_{clinker,y}$ directly because of its high temperature. The measurement of clinker production from the raw material input which is justifiable to measure $O_{clinker,y}$ based on raw material input values (data unit : tonnes) . The same approach had been followed in similar registered projects (UNFCCC registration no. 2697) also.

(b) We apologize for not requesting a clarification from the EB but confirm that the request for deviation is unnecessary because the proposed method of measuring $O_{clinker,y}$ is complied with the methodology AM0024 (version 02.1)

Issue 9: The DOE is requested to substantiate how it has validated the monitoring parameters of the monitoring plan, in line with the applied methodology.

Response by PP:
The PP has applied the Approved Monitoring Methodology AM0024 and the relevant monitored parameters are summarised in the table below.

Parameter	Data Description	Unit	Measurement method
$F_{P,y}$	Energy of the fuel used in clinker making process in year *y*	TJ	On-site measurement
$O_{clinker,y}$	Annual production of clinker after implementation of project	tonnes	On-site measurement
$NCV_{fuel,y}$	Net calorific value (energy content) per mass or volume unit of a fuel used in clinker making process in year *y*	TJ/unit mass or volume	On-site measurement
$EF_{CO2,fuel,y}$	Emission factor of fuel used in clinker production	tCO_2/ unit mass or volume of fuel	On-site measurement
$EG_{CP,y}$	Electricity supplied from the project activity to the cement plant	MWh	On-site measurement
$EG_{Grid,y}$	Electricity supplied from the project activity to the grid	MWh	On-site measurement
$EF_{Elec,y}$ *	Emissions factor of the electricity grid	tCO_2/MWh	Obtained from local reliable source or calculated using publicly available information

Response by BVC:
BVC had validated each of the parameters, data descirptions , and measurement methods presented in the monitoring plan of PDD and confirmed that all parameters presented in the monitoring plan meets the requirements of the methodology AM0024 version 2.1 and that no deviations were observed. The monitoring paramenters were reviewed by the validation team through desk document review and discussion with the relevant staff and personnel during site observation which allow the validation team to confirm that the processed monitoring plan is tangible within project activity. The key parameters were discussed with the project owner especially regarding the location of the meters which are shown in single line diagram, the information management and QA/QC procedures to implement the project activity. The energy of fuel consumed in the clinker making process can be checked by the amount of fuel multiplied by its net calorific value (NCV) which are recorded by production department which we validated for parameter energy of the fuel used in clinker making process. Annual production of clinker after implementation of project can be checked by the measurement of clinker production from the raw material input, which is considered an industry norm amongst cement producers (http://www2.cemsuisse.ch/file/B3-_HARP-Berechnungen_von_Klinker_=2b_Zement_-_MIM_-_20090430.doc)., We have checked the location of electricity meter that recorded electricity supplied from the project activity to the cement plant. Emission factor of fuel used in clinker production can be checked by the results from the laboratory measurement of % carbon in type of fuel which might be provided with fuel upon purchase or measured on site monthly and IPCC default values have been used for cross-checking purpose.
The Electricity supplied from the project activity to the grid could be cross checked with EGAT electricity payment records. The Emissions factor of the electricity grid will be calculated on a yearly basis using the latest publically available information from Ministry of Energy and Thailand Greenhouse Gas Management Organization (TGO). To monitor the

project emissions, net calorific value of fuels used in clinker making process & the amount of fuel consumed will be measured on-site and recorded on a continuous basis. The amount of fuel consumed will be measured using a weigh feeder with less than 3% error. Hence it is expected that the Project owner will be able to implement the monitoring plan and the emission reductions achieved can be reported ex-post and verified.

All the parameters in monitoring plan of the PDD are in line with AM0024 Version 2.1

Hope the above responses given clarify the queries raised.

In case you have any further inquiries please let us know .

Yours faithfully,
For Bureau Veritas Certification Holding SAS

Ashok Mammen
Team Leader

29/09/2010

Kusheru Wibowo
Local Product Manager for Climate Change South East Asia Region

29/09/2010

Annex

Additional supporting document accroding to request for review from EB

/A-1/ 0085864_CEC II_benchmark.xls

/A-2/ TS46 WHG Phase II - August 2010.pdf

/A-3/ FS_TS46_r16.xls

/A-4/ TS46_compareInvestment.xls

/A-5/ The work journal

/A-6/ TS46_MOM.pdf

/A-7/ Plant_load_factor_WHG.pdf

/A-8/ The electricity bills of TS plant from EGAT (Jan-Sep 2007)

/A-9 / TS_ElectricityCost_Jan-Sep2007.xls

/A-10/ PPA STS EGAT.pdf and PPA STS EGAT_translation.pdf

/A-11/ TS46_O&M EE 5% from EGAT.pdf

/A-12 / TS46_O&M MOM.pdf

/A-13/ TS46_contractor.pdf

/A-14/ CEC salary.pdf

/A-15/ TS46_Admin details.pdf

/A-16/ Plant layout TS5.pdf

/A-17/ Plant layout TS46 v1.pdf

/A-18/ STS EE diagram TS4 5 6.pdf

/A-19/ TS5_demand.xls

/A-20/ Contract prices STS.pdf

/A-21/ 0085864_SCG-TS46_calculation_ver06 .xls

/A-22/ Thailand_GridEmissionFactor2007_DEDE2009.xls

/A-23/ TS46_OperationFee.pdf

/A-24/ TS46_MOM_BudgetStatus.pdf

/A-25/ TS_ElectricityCost_Oct2007-May2008.xls

/A-26/ The electricity bills from EGAT (Oct07-May08).

/A-27/ Beta_Energy_Oct06-Oct07.xls