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Att: CDM Executive Board

Your ref.:
UNFCCC Ref # 4692

DNV responsible ref.:
PAMAS / OLFLA

Date:
22 12 2011

QUESTIONS RAISED BY CDM EXECUTIVE BOARD MEMBERS	RESPONSE SUMMARY FROM DNV	ACTION TAKEN (IF RELEVANT)
<p>Q1 1) The DOE shall further justify the suitability of annual power generation, in particularly: (a) whether the actual heat input (23.9 MW) is for the boiler or steam turbine; (b) how the heat input has been determined; (c) why the boiler efficiency has been considered while estimating the power generation; (d) how the suitability of the operational hours (7,344 hrs) has been validated; and (e) whether the 80% generation efficiency is the overall energy efficiency of the power plant, if so, how the suitability of the overall energy efficiency has been validated. Please refer to VVM v1.2, paragraph 111 (a) & (b)..</p>	<p>According to the approved FSR and energy balance of the project, in the condition that all the waste heat utilized to generate electricity and the efficiency of all the process equipment (boiler, steam turbine and the generator) is on ideal condition (the efficiency is 100%), the maximum output of the project (rated capacity) would be equal to the heat input to the steam turbine and can reach 23.9 MW. The detailed calculations of the rated capacity have been further clarified by the FSR author, based on the heat balance of the project. DNV reviewed the calculations, and confirm they are found appropriate. Therefore, according to the EB guidance on FSR (EB 48 meeting report), the rated capacity of the project is considered reasonable.</p> <p>However because of historical reason and technical limitation in China, the model capacity of steam turbines are standardized as 6 MW, 12 MW and 25 MW, etc, therefore 25 MW is chosen as the optimal designed capacity for the steam turbine.</p>	<p>The validation report has been updated to include the response to the request for review</p>

	<p>As described above, the 23.9 MW is the rated capacity of the project calculated on the condition that the efficiency of all the process equipment (boiler, steam turbine and the generator) is on ideal condition (their efficiency is 100%). However, when estimating the actual power generation, the actual efficiency of the process (including boiler, steam and generator) should be considered and included in the calculation. According to technical annex of the equipment and the evidence issued, the efficiency of the boiler is 85%, the efficiency of the steam turbine is 95% and the efficiency of the generator is 97%. Therefore, the general efficiency of equipment of project activity should be $85\% \times 97\% \times 95\% = 78.32\%$. Hence the overall efficiency of the power plant of 80% used to estimate the actual output is considered reasonable and conservative.. Therefore, the rated capacity (23.9 MW) multiplying the process efficiency (80%) results in the actual output of 19.12 MW.</p> <p>According to the FSR, the actual operation hour of the project is 7 344 hours annually. This is on the basis that the annual operational hours of the two 360 m² sintering machines is 8 160 hours, and the annual operational hours of the project is 90% (operation rate) of the sintering machine's operational hour. i.e. $8\ 160 \times 90\% = 7\ 344$ hours. The operational hours (8 160) of two 360 m² sintering machines can be verified by checking the PDR of the sintering machines project of UNFCCC Secretariat. In addition, the annual operational hour of the project is 90% (operation rate) of the sintering machine's operation hours (8 160 hours), which accounts for the required planned outage hours, forced outage hour and maintenance hour. This percentage (90%) can be verified by "The explanation of annual operation hour for the", prepared by</p>	
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	<p>Therefore, based on the above outlined the suitability of annual operational hours of the project (7 344 hours) applied in the PDD can be deemed as sufficient and this is also in line with the approved FSR</p> <p>Therefore, the estimated annual power generation is 140 417 MWh ($23.9 \text{ MW} \times 80\% \times 7\,344 \text{ h} = 140\,417 \text{ MWh}$) with plant load factor of 64.1% and annual net power supply is 126 768 MWh to UNFCCC Secretariat (the auxiliary electricity consumption rate is 9.72%).</p> <p>Furthermore, the PLF has been assessed by comparing with other similar projects in Table 1. Although the PLF (gross generation) of this project is lower than the other similar projects (PLF 67% and 74% respectively). The reason for the lower PLF of the proposed project is primarily because of the mismatch between the available heat for this project and the standardized turbine sizes. The operation hours is found to be reasonable (7 344 hours) for this type of activity.</p> <p>Moreover, the PLF applied in the PDD is consistent with the approved FSR, which is deemed as reasonable.</p>	
<p>Q2 The DOE shall further justify the suitability of the assumed O&M cost, in particular: (i) suitability of the identified indicator (annual O&M to total investment ratio) to justify the annual O&M cost given that the unit investment cost of the project activity is 26% higher than average unit investment of the similar</p>	<p>The O&M costs are fully reflected in the FSR as O&M costs covering payroll, employee welfare, operation and maintenance expense (overhaul costs, material costs), water and nitrogen consumption costs and other costs.</p> <p>The annual O&M cost for the proposed project is 26 653 000 RMB which accounts for 12.39% of total investment. DNV compared the O&M cost relative to total investment for the proposed project with other available WHR projects in Table 1. For these</p>	<p>The validation report has been updated to include the response to the request for review.</p>

<p>projects; and (ii) how each component of the O&M cost has been validated. Please refer to VVM v1.2, paragraph 111 (a) & (b)..</p>	<p>projects, the O&M cost relative to the total investment is in the range of 10.18% to 14.13%.</p> <p>In addition, in order to justify the suitability of the O&M cost of the project, the ratio of O&M cost and net power generation can also be used for comparison. However, the data for only 2 other projects are available for this comparison so that the average value of these projects may not be representative. Nevertheless, the ratio (annual O&M to gross power generation) of the project of 0.1898 RMB/kWh is similar (less than 1% higher) to one of the project in the comparison (0.1883 RMB/kWh for “Angang Sinter Machine Waste Heat Recovery and Generation Project”) in the table 1. This is found acceptable given that these values are estimates and, it can be confirmed that the O&M cost used in the project is reasonable and appropriate.</p> <p>Further validation of the suitability of O&M cost of the project can be presented by breakdown of the cost, which is explained and cross check in more detail in the validation report.</p> <p>In conclusion, the parameters used for calculating O&M costs are all reasonable and conservative. Therefore, the assumed O&M costs are verified as suitable for the project by using the available evidence and expertise and have been cross-checked against other public available sources in accordance with the requirements of Para 111 in VVM version 1.2</p>	
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