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	IS-CMS-MUC/ Karin Wagner	+49 89 5791-1553 Karin.wagner@tuev-sued.de	+49 89 5791-2756	2009-02-20	1 of 7

Request for Review

Dear Sirs,

Please find below the response to the review formulated for the CDM project with the title “Si-chuan Jiangyou Longfeng Hydropower Station” with the registration number 2061. In case you have any further inquiries please let us know as we kindly assist you.

Yours sincerely,

Rachel Zhang
Carbon Management Service

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Responses to the CDM Executive Board

Issue 1

Further clarification is required how the DOE has validated the investment of transmission line and an explanation why it was not included in the original PDR approved on 09 November 2006.

Response from Project Participant:

The input values for the investment of transmission line at the time of the investment decision is sourced from the approved Power Connection Feasibility Study Report (Power Connection FSR), which was completed by Mianyang Aoruite Power Design and Consulting Co.,Ltd in Oct 2006. This Institute is an independent organization which is qualified to compile design reports for Power Connection projects (it has obtained a grade B Certificate in Engineering Design issued by the National Development and Reform Commission of the People's Republic of China). In Addition, Power Connection FSR was approved by Sichuan Province Power Company on December 20, 2006. According to the report and its approval, the investment of transmission line engineering should be paid by the project owner. Therefore, the FSR for transmission line can be considered as an independent and realistic assessment of the proposed project activity, input values for the investment of transmission line is credible and appropriate.

The approved Preliminary Design Report (PDR) was completed by Sichuan Province Neijiang Institute of Architectural Design & Water Resources & Hydropower Research in September 2006. This Institute is an independent organization which is qualified to compile design reports for hydropower projects (it has obtained a grade A Certificate in Engineering Design issued by the Ministry of Construction of the People's Republic of China).

The investment of transmission line was not included in the approved PDR. Because, firstly, Power Connection FSR was not completed in September 2006 and the approval of the Power Connection FSR had not obtained when the PDR was compiled. So Sichuan Province Neijiang Institute of Architectural Design & Water Resources & Hydropower Research cannot confirm the investment of transmission line and only evaluated the static investment excluding the investment of transmission line in PDR.

Secondly, in China, it is very common to evaluate financial analysis excluding investment of transmission line in PDR or FSR. In February 2002, China executed a power system reform, and the State Department of PRC promulgated 'Power System Reform Scheme' which changed the monopoly situation of the power industry. Power stations and grids are divided, and grid price bidding is encouraged. Before the power system reform was carried out in 2002, hydropower stations and grids worked as a whole and the grid construction was invested and constructed by the National Power Company. Hence, it was not necessary for design institutes to take investment of transmission line into account when they evaluated the economic benefits of projects. However, after this reform was carried out power stations and grids work separately, and the transmission line construction is invested and constructed by the construction company. Nevertheless, the institutes still continue the previous work practice and usually they do not count investment of transmission line into FSR or PDR[1].

1 The Statement was issued by Sichuan Province Neijiang Institute of Architectural Design & Water Resources & Hydropower Research.

So the investment of transmission line was not included for investment analysis in the PDR. And it can be concluded that the investment of transmission line is credible and appropriate.

Response from TÜV SÜD:

The costs for the transmission line were not included in the PDR because the PDR was finalized in September 2006 (IRL 1) and the feasibility study of the power connection system including these costs was finalized one month later in October 2006 (IRL 2). Hence, these costs were not known at the time of the preparation of the PDR and were therefore excluded.

In addition, based on TÜV SÜD's local and sectoral expertise, TÜV SÜD confirms that these transmission line costs are typically excluded from the feasibility study of a hydro power project; however, these costs have to be covered by the project owner.

The investment decision was made in late 2006 (November), and the additional expenses for the construction of a transmission line were well known at this time. It was also clear that the project owner has to pay for these costs as indicated in the Financial Supplementary Report of Preliminary Design Report published in November 2006.

In addition, the costs for the transmission line are only a small part of the total investment costs (i.e. less than 2%). Even with the exclusion of these transmission line costs, the project is still not financially attractive with an IRR well below the applied benchmark of 8%.

In summary, TÜV SÜD considers the applied value for the transmission line costs as appropriate and suitable as well as valid. In addition, TÜV SÜD would like to point out that the project remains additional even without these costs.

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Issue 2

The DOE is requested to clarify how the reported values of annual electricity generation and annual electricity supply to the grid are appropriate in the context of the underlying project activity.

Response from Project Participant:

The theoretical/designed annual electricity generation and annual electricity supplied to the grid are sourced from approved PDR, which was completed by a qualified and independent organization. Therefore, the annual electricity generation and annual electricity supplied to the grid are applicable and credible.

According to the approved PDR, the theoretical annual electricity generation is 253,800MWh, the coefficient of effective electricity is 0.85, auxiliary power consumption is 0.5% and the line loss is 0.5%.

The annual power supplied to the grid = the theoretical annual electricity generation x coefficient of effective electricity x (1 – auxiliary power consumption) x (1 – the line loss).

The calculation formula comes from approved PDR and the Interim Regulations of Hydropower Construction Project Financial Evaluation (same guidance used by the design institute preparing the PDR). Therefore, the annual power supplied to the grid employed in the IRR calculation is reasonable. The detail explanation as below to prove that coefficient of effective electricity, auxiliary power consumption and the line loss is credible and reasonable.

The Coefficient of Effective Electricity

Based on the Economic Evaluation Code for Small Hydropower Projects (SL16-95) and the Interim Regulations of Hydropower Construction Project Financial Evaluation, the coefficient of effective electricity is defines as the ratio of electricity generated and the theoretical electricity generated, it mainly caused by overhaul of turbine and generators, the emergency stop, and electricity absorption limitation of local grid and the electricity demand of local site which the project located, of which, the last two factors are the main affected factor leading to coefficient of effective electricity. The coefficient of effective electricity mainly reflects the electricity absorption capacity of local grid.

- About the coefficient of effective electricity (85%), which is reasonable and credible as explained following,

  a) The average theoretical annual electricity generation, as well as the installed capacity of 54MW (which has been designed based on the theoretical electricity generated) and annual utilization hours of 4,700h, which are all calculated based on a strong and long term statistical basis for the hydrological conditions of Fu River, namely 44 years of water flow measurements (1959-2002). Therefore, the theoretical annual electricity generation does therefore differ from the actual electricity generation which will be generated, because full load conditions will be impossibly achieved during the plant operation throughout the year due to the lack of absorption capability of the grid and other factors above.

  b) Because of the haul and accident frequency of equipments, emergency stop, electricity absorption limitation of local grid and the electricity demand of local site which the project located, the theoretical electricity generation cannot achieve. Of which, the electricity demand of local site and the absorption limitation of local grid are main factors which

impacted the coefficient of effective electricity. The power supply in rainy seasons (the period with sufficient water resources and favorable hydrological conditions) and valley power consumption load periods is over the demand of local grid. Therefore, hydropower stations have to stop operation during rainy seasons and valley load power consumption periods if electricity supply is exceeded the demand of local grid[2]. And then the theoretical electricity generated cannot achieve. The difference part between theoretical electricity generation and actual electricity generation must be considered. Therefore, the coefficient of effective electricity is introduced.

c) According to Hydroenergy Design Code for Hydro Power Projects (SL76-94)[3] approved by f Water Resources (please see the document at website: http://www.chinawater.net.cn/guifan/bz_pdf/SL76-94/05.pdf):

For normal scale hydropower stations (with installed capacity higher than 50MW), there are no any legal regulations to prescribe the coefficient of effective electricity (because different grid system have different characteristic), and the coefficient of effective electricity could be calculated by Electricity Balance of local grid."

The installed capacity of the project is 54MW (a normal scale hydropower station), so according to above rules, the Institute has considered the coefficient of effective electricity in detail based on Electricity Balance of local grid 2015 in PDR. According to the expected Electricity Balance Analysis 2015 of local grid[4] in PDR, the coefficient of effective electricity is 75%. However, during the financial analyse in Chapter 14 in PDR, the coefficient of effective electricity of 85% is employed to calculate annual power supplied to the grid which is more conservative than actual coefficient of effective electricity.

d) Local Grid Company (which the project is connected) issued an explanation and the reasons to prove the validity of the coefficient of effective electricity of 75-85%. The main reasons[5] are as following:

- Comparing with the construction of hydropower stations, the construction of power grid in Jiangyou City (where the project is located) is lagging behind and it is beyond the capability of the power grid.
- The structure of the local grid is frail and the transmission load capacity is limited, so the bottleneck on transmission is rather common
- Due to low absorption ability and the lower load of local grid, the grid company is not able to buy all of the power that could potentially be generated by the plants during the rainy seasons and valley load power consumption periods, so during these periods, the projects have to stop operation.
- Due to the Sichuan earthquake in 2008, the local grid system is damaged partly, resulting in that the average coefficient of effective electricity has decreased further.

Furthermore, according to the explanation of local grid company, the poor grid situation will not change in the future dozens or tens of years. Therefore, the coefficient of effective electricity of 85% for the project is reasonable and credible.

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2 The power generated by the project will be supplied to the Grid Company, without any other electricity consumer.

3 http://www.chinawater.net.cn/guifan/bz_pdf/SL76-94/05.pdf

4 The electricity balance in PDR

5 The explanation of coefficient of effective electricity was issued by local grid company.

China is a developing country, the infrastructure especially in mountainous countries is lag behind. The existence of coefficient of effective electricity is very common in poor area. Therefore, the coefficient of effective electricity of 85% for the project is reasonable and credible during investment decision and in expected situation. Furthermore, the coefficient of effective electricity will be verified during verification to prove the coefficient of effective electricity of 85% in the IRR calculation is reasonable and credible.

Auxiliary Power Consumption

Based on "the regulation of development programming of electrical power in the region mainly supplied by rural hydropower (SL22-92)"[6], auxiliary power, auxiliary power consumption has been determined as 0.5% by the independent institute preparing the PDR. Therefore, the 0.5% of auxiliary power consumption used in investment analysis in PDD for requesting registration is appropriate and reasonable.

The Line Loss

The line loss of 0.5% has been determined by the independent and certified Institute preparing the PDR based on its professional experience. Additionally, the average line loss of Sichuan Province which is 8.1%[7], which is far higher than the value of 0.5% in the PDR. The Institute has chosen to employ the lower value of 0.5% as the line loss. This is a conservative choice as a lower line losses leads to higher power supply and therefore an overestimation of the IRR.

It can be concluded that values of annual electricity generation and annual electricity supply to the grid are appropriate and reasonable in the context of the underlying project activity.

Response from TÜV SÜD:

Although not accepted by the EB in the last EB meeting (EB45), TÜV SÜD still considers the applied effective power coefficient as real and valid.

The applicability as well as the suitability of this coefficient for this project has been further confirmed by the following documents provided by certified institutes as well as approved by official authorities:

- PDR and its approval (IRL 1), and
- Statement of the local grid company (IRL 3, attached to this response).

In addition, TÜV SÜD re-checked the IRR calculation, and would like to indicate that even with a difference of only about 5% between the annual electricity generation and annual electricity supply to the grid, the IRR of the project is below the benchmark.

Given the fact, that the power house and other facilities will also need some power, as well as the fact that the power loss cannot be completely excluded, TÜV SÜD still considers this project as additional.

The load factor has been calculated around 54%, i.e. 10% higher than the average load factor of 44% in China, based on TÜV SÜD's internal statistics. This could be considered as quite optimistic and therefore conservative, i.e. more likely leading to an overestimated power generation of this project.

6 Published by the Ministry of Water Resources of the People's Republic of China
7 China Electric Power Yearbook 2008, p519

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In summary, based on the reviewed documents as well as TÜV SÜD's expertise, we consider the applied coefficient as appropriate and valid for the given project activity. In addition, TÜV SÜD would like to point out that even with a more conservative power coefficient, the project would remain additional.

Ref. No.	Issuance and/or submission date (dd/mm/yyyy)	Title/ Type of Document	Author/ Editor/ Issuer	Additional Information (Relevance in CDM Context)
1	September 2006	Preliminary Design Report	Sichuan Province Neijiang Institute of Architectural Design & Water Resources & Hydropower Research	
2	October 2006	Power Connection Feasibility Study Report	Mianyang Aoruite Power Design and Consulting Co., Ltd.	
3	11/02/2009	The explanation of coefficient of effective electricity	Local Grid Company	