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Response to Request for Review

Dear Sirs,

Please find below the response to the request for review formulated for the CDM project with the registration number 2073. In case you have any further inquiries please let us know as we kindly assist you.

Yours sincerely,

Thomas Kleiser
Carbon Management Service

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Response to the CDM Executive Board

Issue 1:
The PP/DOE is requested to clarify how the assumed values of annual electricity generation and electricity supply to grid are considered appropriate in the context of the underlying project activity.

Response by the Project Participants:
The theoretical/designed annual electricity generation and annual electricity supply to the grid are sourced from Feasibility Study Report (FSR), which was completed by Yunnan Investigation, Design & Research Institute of Water Resources & Hydropower. This Institute has obtained a grade A Certificate in Engineering Design issued by the Ministry of Construction of the People's Republic of China. And the FSR was approved by Yunnan Province DRC. Therefore, the annual electricity generation and annual electricity supply to the grid are applicable and credible.

The annual power supplied to the grid= the theoretical/designed annual electricity generation × coefficient of effective electricity × (1 – auxiliary power consumption) × (1 – the line losses)

The calculation formula comes from approved FSR and the Interim Regulations of Hydropower Construction Project Financial Evaluation (same guidance used by the design institute preparing the FSR). 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 generation and the theoretical electricity generation, 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, 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 99MW (which has been designed based on the theoretical electricity generated) and annual utilization hours of 5,373h, which are all calculated based on a strong and long term statistical basis for the hydrological conditions of Daying River, namely 44 years of water flow measurements (1955-2002). 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.

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b. However, 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[1]. 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 Hydro Energy Design Code for Hydro Power Projects (SL76-94)[2] approved by the Ministry of 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), the coefficient of effective electricity could be chosen based on the Electricity Balance of local grid and the experience (based on the (SL16-95) document) of the institutes.

The Institute completed the FSR of the project has considered the coefficient of effective electricity in detail based on Electricity Balance of local grid. According to the expected Electricity Balance Analysis of local grid[3] in FSR, the coefficient of effective electricity is 66%. However, during the financial analyse in FSR, 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. Based on the actual hydrological conditions, the electricity absorption limitation of local grid and the electricity demand of local site, the actual annual power generation of the project from December 2007 to November 2008 is 395,812.08MWh[4], while the annual power generation designed in Feasibility Study Report is 531,980MWh. Therefore, the actual coefficient of effective electricity is 74%, which is lower than the expected coefficient of effective electricity of 85% in FSR.

e. Local Grid Company, a third and independent party, (which the project is connected) issued an explanation and the reasons to prove the validity of the coefficient of effective electricity of 80-90%. The main reasons[5] are as following:
The structure of the local grid is frail and the absorption capacity is limited (which caused the abandoned water in rainy seasons), so the bottleneck on transmission is rather common. Therefore, these factors resulting that the grid effective electricity could not reach the design standard.
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

1 The power generated by the project will be supplied to the Grid Company, without any other electricity consumer.
2 http://www.chinawater.net.cn/guifan/bz_pdf/SL76-94/05.pdf
3 The electricity balance in FSR
4 The power generation of the project from December 2007 to November 2008
5 Notice for the coefficient of effective electricity published by local grid company

rainy season and valley power consumption load periods, so during these periods, the projects have to stop operation.
Comparing with the construction of hydropower stations, the construction of power grid in Dehong Dai-Jingpo Autonomous Prefecture (where the project is located) is lagging behind and it is beyond the capability of the power grid. The bottleneck on power generation will exist in long period, and the decreasing trend on coefficient of effective electricity will last for a few years and also this situation is applicable to all projects (including the specific project) located in the Dehong Dai-Jingpo Autonomous Prefecture.

f. Based on the Electricity Industry Development Plan Report of Dehong Dai-Jingpo Autonomous Prefecture Yingjiang County, all the hydropower stations located in the Dehong Dai-Jingpo Autonomous Prefecture are run-of-river hydropower stations, and the grid company is not able to buy all of the power that could potentially be generated by the plants during the rainy season and valley power consumption load periods, so during these periods, the projects have to stop operation. These factors lead to water resources lost during the rainy season and valley power consumption load periods.[6] Therefore, the theoretical electricity generated of the project cannot achieve. Based on the Electricity Balance Sheets (dry year with unfavorable hydrological conditions, normal year with normal hydrological conditions and rainy year with favourable hydrological conditions) in the Report above, the coefficient of effective electricity is lower than 81%.

Therefore, it can be concluded, the coefficient of effective electricity is common practice and the coefficient of effective electricity of 85% for the project is conservative, reasonable and credible.

Therefore, the coefficient of effective electricity of 85% is considered suitable for this specific project activity.

China is a developing country, the infrastructure especially in mountainous countries is under developing. The existence of coefficient of effective electricity is very common based on the Notice for the coefficient of effective electricity published by local grid company, the existence of coefficient of effective electricity is for all hydropower stations and this situation will not change in the future dozens or tens of years.

Therefore, if the project developers want to invest any hydropower projects without any regulating capacity, just as the specific project, they will face the problem on coefficient of effective electricity.

Only this kind of hydropower stations, which have reservoir with annual or annual/multi-year regulating capacity, can generate electricity in dry season and peak power consumption load periods, therefore this kind of hydropower stations which would be capable of evacuating a larger percentage of its output to the grid. This is also confirmed by the document SL 16-9. However, due to the local geographical position and water resource conditions, the hydropower stations located in Dehong Dai-Jingpo Autonomous Prefecture (which the project located) are all run-of-river hydropower stations, therefore, the project owner have no any other chance to choose other scale hydropower project which would be capable of evacuating a larger percentage of its output to the grid hydropower stations. In addition, it will cause the break of the river

6 Electricity Industry Development Plan Report of Dehong Dai-Jingpo Autonomous Prefecture Yingjiang County, published by local government

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and other environmental problems if constructing a reservoir with annual or multi-year regulating capacity. Considering environment protection and sustainable development, the project owner did not consider construct a hydropower station with an annual or multi-year regulating reservoir.

In addition, before the investment decision, the project owner seriously considered CDM revenues. Namely, after Feasibility Study Report completed, the project owner also realized that the average coefficient of effective electricity will impact the revenues of the project, they also hesitated to invest the project or not. However, at the same time, the project owner knew the CDM can bring revenues and improve the IRR. Therefore, they decided to invest the project rather than other projects.

In conclusion, the project owner of the project chose to construct the project rather than a scale which would be capable of evacuating a larger percentage of its output to the grid.

Conclusion
It can be concluded that the net power exported to the grid used in the IRR calculation is reasonable, credible and conservative.

Auxiliary Power Consumption
Based on "*the regulation of development programming of electrical power in the region mainly supplied by rural hydropower (SL22-92)*"[7], auxiliary power consumption has been determined as 0.5% by the independent institute preparing the FSR. Therefore, the 0.2% of auxiliary power consumption used in investment analysis in PDD for requesting registration is conservative and reasonable.

The Line Loss
The line loss of 16% (the line loss in transmission is 4% and line loss in transformation network is 12%) has been determined by the independent and certified Institute preparing the FSR. Based on Agreement[8] on across-grid fee signed between the project owner and the grid company, the line loss of 16.58% and the across-grid fee is undertaken by the project owner. This is a conservative choice as a lower line losses leads to higher power supply and therefore an overestimation of the IRR compared to employing a higher values as line loss.

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 by TÜV SÜD:
The difference between the annual electricity generation and the electricity supply to the grid has been indicated in the PDD as 71%. The DOE has deeply assessed the base of this value during the validation in order to verify the applicability and suitability of the same for the proposed project activity.
The DOE confirm that the approach used in PDD and above explicated is in line with the Interim Regulations of Hydropower Construction Project Financial Evaluation. The assumed value

7 Published by the Ministry of Water Resources of the People's Republic of China
8 Agreement on across-grid fee signed between the project owner and the grid company.

it's accordingly calculated starting from three different parameters: the coefficient of effective electricity, the auxiliary power consumptions and the line losses as follows:

71% = Coefficient of effective electricity * (1 – *auxiliary power consumption*) * (1 – *line losses*).

Base and reference of this calculation are both the Economic Evaluation Code for Small Hydropower Projects (SL16-95) and the Interim Regulations of Hydropower Construction Project Financial Evaluation.
The DOE has checked how each of these parameters has been defined and on which basis it can be assumed as appropriate in the context of the underlying project activity:

Coefficient of effective electricity:
This parameter is the most relevant one as it includes the actual availability of the local grid to receive the power produced by the Hydropower Station. If the capability of the grid were able to absorb the entire power produced at full load, the value of the coefficient of effective electricity would be 100%; in the case of the proposed project activity a value of 85% has been assumed.

The DOE has verified the base for this assumption and value: in particular has been evidenced that the FSR issued on May 2004 mentions as appropriate a lower value of 66%, basing this estimation on the electricity balance of the local grid, in conformity with the Hydro Energy Design Code for Hydro Power Projects (SL76-94) (see IRL49 in Validation Report). Despite of this the FSR uses a factor of 85% in order to estimate the annual power delivered to the grid within the financial analysis and this choice reflects further regulations such as the Economic Evaluation Code for Small Hydropower Projects (SL16-95) which suggests values of the coefficient from 0.80 to 0.90 in case of grid connected regulating capacity plants where the grid takes all the electricity generated in rainy season and night. Further confirmation of this value has been obtained by the local grid company in August 8th, 2008 (see IRL 50 in Validation Report) and the reasonability of a coefficient between 0.80 – 0.90 reaffirmed on February 9th, 2009.

Further confirmation of the reasonability of the 85% coefficient of effective electricity is offered with the Electricity Industry Development Plan Report, issued on February 2008 by the Yunnan Grid Company Supply Power Bureau; the report develop a study based on the electricity balance between the rainy season and the dry season assuming a coefficient of effective electricity of about 81%, thus confirming the validity of the value assumed in the PDD.
It should be noted that all the above mentioned evidences take into account the local context in terms of hydrological data (water availability throughout the year) and demand of power during day time and night and that the result is in compliance with the relevant applicable standards for projects evaluation and design.

Auxiliary Power Consumption
The auxiliary power consumption, which have usually a marginal role in defining the difference between the annual power production and the electricity delivered to the grid, has been assumed as 0.2%. The DOE have verified the validity of a similar value through literature references: in particular it's confirmed that, according to the Regulation (SL22-92), issued by the Ministry of the Water Resources of the People's Republic of China, it's deemed to be reasonable a value of 0.5%. It's opinion of the DOE that the value chosen by the PPs it's reliable and even conservative in the context of the proposed project activity.

Line Losses
The line losses of 16%, based on the FSR, have been considered appropriate in the context of the proposed project activity as similar losses are typical of the grid systems in China. In particular has been evidenced that the project owner have to take undertake the losses attributable

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to both the booster station (which is part of the project boundary) and to the main transformer station (Yingjiang transformer substation). This fact has been evidenced and substantiated by the agreement signed between the project owner and the local grid company on December 26th, 2006; the document clearly states this and also provide an estimation of these losses of 16,58% of the power generation. It's therefore confirmed that the value assumed in the FSR was reasonable and in compliance with the actual situation.

According to the above analysis and based on the knowledge of the area of the local auditors, it's confirmed that the difference between the annual electricity generation and the electricity supplied to the grid is based on a recognized approach and documented figures. It's furthermore confirmed that the value of 71% has been obtained considering the local context and data sources allowing the DOE to consider it as appropriate for the proposed project activity.

Issue 2:
The data used to calculate the grid emission factor in the PDD submitted for registration was not available at the commencement of validation (04/2007). The PP and DOE are therefore requested to amend the grid emission factor using data, which was available at this date and provide the corresponding calculation of the emission reductions.

Response by the Project Participants:
The PDD was published on UNFCCC website on July 5, 2007 for global stakeholder consultation, at that time, the available grid emission factor is published by China DNA on 15 December 2006. Then the DOE conducted validation in the end of July 2007. However, China DNA updated the emission factor of "Bulletin on Baseline Emission Factors of China's Regional Grids" on 9 August 2007, which was published before the PDD submitted to EB. Therefore the updated baseline emission factor was used in PDD requesting for registration.

However, at the commencement of validation (July 2007), the available grid emission factor is 0.77835tCO2e/MWh, which is calculated base on Bulletin on Baseline Emission Factors of China's Regional Grids announced by China DNA on 15 December 2006. The published Operating Margin Emission Factor (EF_{OM}) of the Southern Grid is 0.9853tCO2e/MWh and the Build Margin Emission Factor (EF_{BM}) is 0.5714tCO2e/MWh. The defaults weights for hydropower projects are used as: $w_{OM} = 0.5$, $w_{BM} = 0.5$. Therefore, the available Baseline Emission Factor (EF_y) at the commencement of validation of 0.77835tCO2e/MWh will be revised in the PDD.

Response by TÜV SÜD:
The PPs agreed in revising the PDD according to the grid emission factors available at the commencement of the validation (April 2007).
The revised PDD will be object of a re-validation related to the amended sections and calculations.