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Att: CDM Executive Board

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Response to requests for review of "Fugong Mukeji Hydropower Project" (2030)

Dear Members of the CDM Executive Board,

We refer to the issues raised by the requests for review by three Board members regarding the project activity "Fugong Mukeji Hydropower Project" (UNFCCC reference number 2030) and would like to provide the following initial responses to the issue raised.

Comment 1: The DOE is requested to justify the suitability of the benchmark, in particular, appropriateness of a benchmark of year 1995 when assessing the additionality of a project activity with investment decision made in 2006.

DNV Response:

The project proponent has compared the project financials against the benchmark of 10%. DNV would like to indicate that the selected benchmark is in accordance with the document No.SL16-95 ("*Economic Evaluation Code for Small Hydropower Projects*"), issued by the Ministry of Water Resources of China. Though this document was issued by the Chinese ministry in the year 1995, it is the only source till date which clearly defines the expected minimum returns from such type of hydropower projects. The benchmark of 10% is most commonly used in China for assessing the financial viability of such projects. This can also be seen from other similar small hydropower projects in China, recently registered under CDM, such as Hunan Yangmingshan Three Level Hydropower Project (2145), Yunnan Lincang Zhenai Hydropower Project (1994), Fujian Wuyishan Wenlin River 2nd and 3rd Level Hydropower Station (1831) and Lijiang Xinzhuhe Second Level Hydropower Project (1879) etc., all of them referring to the document No.SL16-95.

The applicability of the same benchmark for the proposed CDM project activity can further be demonstrated from the list of existing regulations for hydropower plants in China provided in the annexure of "*Notice on the current technical standard of water resources ([2006] No.05)*", published by the division for construction and management, Ministry of Water Resources of China [1] and Chinese Hydraulic Engineering Society (CHES)'s website [2], which provides the

[1] http://www.mwr.gov.cn/tzgg/qt/20060926000000479251.aspx
[2] www.ches.org.cn/jishubiaozhun/001.asp

complete list of regulations for the hydropower sector including expired regulations, regulations under amendment and existing regulations in China.

DNV would also like to state that in the preliminary design report, the financial projections of the proposed project activity have also been compared against the same benchmark of 10% and that the same preliminary design report was approved by the Development & Reform Committee of Nujiang Li & Su Autonomous Prefecture also adds to the fact that the benchmark of 10% is still considered appropriate in China. This benchmark is a decisive factor in China for the rejection or approval of the projects.

Furthermore, according to the *"Economic Evaluation Code for Small Hydropower Projects"* (Document No.SL16-95), the code of 10% is applicable to small scale hydropower projects with an installed capacity below 25 MW, and to small scale hydropower projects with an installed capacity below 50 MW in the rural hydropower region. For this project activity, the installed capacity is 31.5 MW and the project site is located on the Mukeji River, a branch of Nujiang River in Fugong County of Nujiang State, Yunnan Province. Since the installed capacity is lower than 50 MW and the area, where the project is located, can be considered as country side, this project activity complies with the applicability scope of the *"Economic Evaluation Code for Small Hydropower Projects"*.

Comment 2: The PDD (p1) and VR (p12) state that the proposed project is expected to generate 162,000 MWh per annum of electricity and about 143,630 MWh will be delivered to the grid per annum. However, in both the PDD and VR no further substantiation is provided on the use of remaining 11% expected electricity generation. Hence the DOE is requested to clarify how the reported values of annual electricity generation and electricity supply to grid are appropriate in the context of the underlying project activity.

DNV Response:

For this project activity the design parameters, including the installed capacity, the power generation and the net electricity supplied to the grid, are all from and fully consistent with the Preliminary Design Report (PDR) of this project. The PDR was developed by the qualified design institute Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd. in January 2006 and approved by the Development & Reform Committee of Nujiang Li & Su Autonomous Prefecture on 15 April 2007. Since these parameters were substantiated by the experts and authorized by the administration department, their use is deemed to be reasonable.

The "loss" of 11% of the total electricity generation is mainly due to the fact that the main meter for measuring the electricity supplied to the grid will be installed at the power substation 14 km from the power plant. The readings of this meter will be the basis for electricity payments and the power plant owner will have to bear the losses in the 14 km transmission line. Moreover, it is assumed that the grid will not take all electricity consumed by the project.

The power generation and net power supplied to grid of this project activity is as per the following calculation process from the PDR developer, the Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd, originating from the *"Economic Evaluation Code for Small Hydropower Projects"* issued by the Ministry of Water Resources in 1995 (SL16-95)". In section 3 of this Code, the revenue calculation is stipulated as per the following formula:

Revenue from power sale = valid electricity amount * (1-consumed electricity of plant) * (1-line lost) * power tariff = the net electricity delivered to the grid * power tariff

Therefore, the net electricity delivered to the grid is calculated as follows:

$$E_{deli} = E_{vali} * (1 - E_{cons}) * (1 - E_{lost}) \quad (1)$$

Where:
E_{deli}: the net electricity amount will be delivered to the grid by the proposed project per annum;
E_{vali}: the valid electricity amount;
E_{cons}: the auxiliary electricity amount consumed by the proposed project.
E_{lost}: the transmission loss during delivery.

The valid electricity amount is calculated as per the following formula:

$$E_{vali} = E_{gene} * Coeff \quad (2)$$

Where:
E_{vali}: the valid electricity amount;
E_{gene}: the electricity amount generated by the proposed project per annum
Coeff: the coefficient of the valid electricity;

During the validation period, the auxiliary electricity amount consumed by the proposed project (E_{cons}), the transmission loss during delivery (E_{lost}) and the coefficient of the valid electricity (Coeff), all being stated in the PDR, have been validated by DNV.

In order to give further clarification about these data, the data selection and calculation process are described as follows:

Coefficient of the valid electricity which was selected from the following table from SL16-95:

The type of plants	Coefficient of the valid electricity
grid-connected power plants, regulating Annual / several years	0.95~1.00
grid-connected power plants, regulating seasonal	0.90-0.95
grid-connected power plants, regulating monthly, weekly, daily and no regulating The grid will take all electricity generated in wet season and night The grid will only take part of the electricity generated in wet season and night	0.80~0.90 0.70~0.80
Not connected to the grid. regulating daily and no regulating	0.60~0.70

This project is a grid-connected run-of-river hydro power plant with daily regulating. According to above table, the coefficient for the valid electricity vary from 0.7 to 0.9. However, the much more conservative coefficient of 0.95 was selected for this project.

The *power generation* of 162,000 MWh of this power plant was calculated by Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd in the PDR and is based on 47 years (1959-2005) hydrological data of the river. The calculation process of the valid *electricity amount* of 153,900 MWh was from the qualified third party also. Thus, DNV can confirm that these parameters are reliable.

The *internal consumed electricity* of this power plant (accounts for 0.716% of the electricity generation amount) was derived from the historical data of similar hydropower projects in the same region, stated by Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd in the PDR.

The *transmission loss* (accounts for 6% of the electricity generation amount for the proposed project) relied on the transmission line length of 14 km and the transmission voltage of 110 kV. This has been approved by Yunnan Nujiang Power Grid Co. Ltd., to which this project will be connected to. The agreement for the transmission line construction signed between the project owner and Yunnan Nujiang Power Grid Co. Ltd. on 08 September 2005 has been provided to DNV during validation. DNV has verified this data and can confirm it.

The main meter, which will be installed at the power substation 14 km from the power plant, will monitor the net power delivered to grid. The meter reading is the value after deducting the transmission loss, the amount of internal consumed power and the coefficient of the valid electricity. It will be the basis for business trade with the grid and certified emission reduction (CER).

Based on the equation (1) and confirmed data, E_{deli} is calculated as:

$$E_{deli} = E_{vali} * (1 - E_{cons}) * (1 - E_{lost})$$
$$= 153{,}900 * (1 - 0.00716) * (1 - 0.06)$$
$$= 143{,}630 \text{ MWh}$$

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

Comment 3: The DOE shall describe how the reliability of the input values used in the investment analysis has been validated in accordance with the requirements of EB38 paragraph 54(c) guidelines.

DNV Response:

The project IRR of the project is 7.51% (after tax) without CDM which is lower than the benchmark of 10% (after tax). This shows that the project is not financially attractive for investors. According to the *"Guidance of EB38 paragraph 54"*, DNV has validated the input parameters used in the investment analysis as follows:

Step 1: Assess the sources of the input parameters

Most of the input parameters used in the financial analysis of this project activity are taken from the Preliminary Design Report (PDR) developed by Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd in January 2006 and approved by Development & Reform Committee of Nujiang Li & Su Autonomous Prefecture on 15 April 2007.

According to the *"Guideline for investment analysis from EB41"* the sunk costs, which were expended before the decision to proceed with the investment in the project, should be deducted from the total investment. The amount of these sunk costs was confirmed by the notice of the bridge pier site changing issued jointly by Fugong Jiacheng Hydropower Development Co. Ltd. and Yunnan Mingtong Hydropower Construction Surveillance Co. Ltd., dated on 20 August 2005. The total sunk costs were 0.95 million CNY, including the following:

- Road construction 0.376 million CNY;
- Original bridge pier construction 0.0256 million CNY;
- Electricity supply system construction 0.198 million CNY;
- Temporary housing and warehouses 0.16 million CNY;
- Geological exploration and engineering design for the new bridge 0.19 million CNY.

The evidences for the sunk costs have been provided to and verified by DNV. The input parameters used in the financial analysis can thus be considered information provided by an independent and recognised source.

The power tariff was selected from a local government document, named *"the notification of power price imported to grid issued by development and plan committee of Nujiang state, Yunnan province"*, dated on 13 December 2004. This document is still valid, which can be confirmed by the invoices from some hydropower plants in Yunan Nujiang district in 2006 to 2007 and the power purchase agreement (PPA) of 2007 for this project. These evidences have been provided to DNV during the validation phase.

Step 2: Confirm that the values used in the PDD are fully consistent with the PDR

DNV compared the input parameters for the financial analysis included in the PDD with the parameters stated in the PDR and was able to confirm that the values applied are consistent with the value stated in the PDR. The other two data sources for power tariff and sunk costs were from local government and a qualified third party. DNV was able to confirm the validity and reliability of these evidences.

Step 3: Assess the period of time between the finalization of the PDR and the investment decision

The PDR was developed by the qualified design institute "Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd" in January 2006 and finished in August 2006. The experts reviewed this PDR on 15 September 2006 and the approval letter, issued by the Development & Reform Committee of Nujiang Li & Su Autonomous Prefecture, was received on 15 April 2007. The document about power tariff was issued in 2004 and is still valid till now.

The starting date of the project is on 08 October 2006. Given the sufficiently short time of one month between the starting date of the project activity and the approval of the PDR, it is reasonable to assume that the PDR and the other supporting document for the power tariff have been (a) the basis of the decision to proceed with the investment in the project and that, (b) it is unlikely in the context of the underlying project activity that the input values would have materially changed.

Step 4: Cross-check the parameters used in the financial analysis with the parameters used by other similar projects

Furthermore, the input parameters used in the financial analysis were compared with the data reported for other similar proposed CDM projects with similar installed capacity and generation technology in the Yunnan province.

As shown in the following table, the data comparison included investment costs per MW, electricity tariff, percentage of O&M costs relative to total investment costs, the plant load factor and annual net electricity generation:

Project name	*Installed capacity (MW)*	*Load factor (%)*	*Net electricity generation annual (kWh)*	*Investment (RMB)*	*RMB/kWh*	*O&M/I (%)*	*Power tariff (RMB)*
Yunnan Dali Yanger 49.8MW Hydropower Project	49.8	41	180,838	375,934,300	2.079	1.6	0.215
Yunnan Heier 25MW Hydropower Project	25	57	124,075	115,007,000	0.927	8.7	0.2
Yunnan Yingjiang Nandihe Hydro Power Project	20	52	91,000	131,930,000	1.450	2.0	0.195
The proposed project	31.5	52	143,630	195,800,000	1.363	1.4	0.18

It is concluded from above table that the main input parameters for this project are reasonable and comparative with other projects in the same region. In addition, by applying our sectoral competence, DNV was able to confirm that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project.

We sincerely hope that the Board find our elaboration on the above satisfactory

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION AS

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