TRICORONA

UNFCCC Secretariat
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Response to request for review
Fugong Mukeji Hydropower Project (2030)

Dear Members of the CDM Executive Board,

We refer to the requests for review raised by three Board members concerning DNV's request for registration of project activity 2030 "Fugong Mukeji Hydropower Project" and would like to provide below initial response to these requests for review:

Question 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.

Response of PP:
(1) The benchmark for the proposed project is quoted from the *Economic Evaluation Code for Small Hydropower Projects* (Document No. SL16-95) issued in 1995 by Ministry of Water Resources of P.R,China, in which it mentions "This evaluation code is applied for small hydropower projects with installed capacity no more than 25MW (all newly-built, capacity expansion, modification or retrofit projects). Besides, projects with a capacity of less than 50MW in rural areas can refer to this code too". The proposed project is a hydropower project with installed capacity of 31.5 MW located in Fugong County of Nujiang Li & Su Autonomous Prefecture, Yunnan Province, where is a countryside. Thus, the SL16-95 is applicable to the proposed project.

In 2002, the Ministry of Water Resources issued a Bulletion on Effective Technical Standard in Hydro & Water Industry. The *Economic Evaluation Code for Small Hydropower Projects* (Document No. SL16-95) issued in 1995 is still valid as indicated in this list (http://www.cws.net.cn/guifan/bzdt/bzgg.asp)

The ongoing validity of this code was further confirmed again by the Ministry of Water Resources of the People's Republic of China on Sep. 9, 2006[1].

The *Economic Evaluation Code for Small Hydropower Projects* (Document No. SL16-95) is widely adopted as benchmark reference for Chinese Hydropower projects.

1 Data source:
http://www.chinawater.net.cn/jishujiandu/CWSNews_View.asp?CWSNewsID=24696

Question 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.

Response of PP:
The annual electricity generation amount (162,000 MWh) and the annual electricity delivery to the grid (143,630 MWh) was quoted from the Preliminary Design Report written by a qualified design institute Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd. in Jan. 2006 . The design institute was certified by Yunnan Provincial Department of Construction (Certification No: 232051-sb). And the Preliminary Design Report of the proposed project has been approved by Nujiang Li & Su Autonomous Prefecture Construction Project Assessment Centre on Sep. 15, 2006, and finally approved by the Development & Reform Committee of Nujiang Li & Su Autonomous Prefecture on Apr. 15, 2007 (document No: Nu Fa Gai Neng Yuan [2007]137). The values of annual electricity generation and electricity supplied to grid can thus be considered information provided by an independent and recognized source.

Economic Evaluation Code for Small Hydropower Projects (Document No. SL16-95), applicable to the proposed project and widely applied in the development of design documents, shows the two equations to calculate the expected electricity supplied to the grid. The equation is stated as follows:

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

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

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

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

The choice of the Coeff is indicated by Section 3.4 of SL16-95 as follows:

No.	Power plant type	Coefficient
1	Grid connected, annual/ pluriennial regulation	0.95~1.00
2	Grid connected, seasonal regulating stations	0.90~0.95

3	Grid connected, monthly/weekly/daily regulating station 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
4	Not connected to the grid, daily/no regulating capacity	0.60~0.70

The proposed project is a grid-connected run-of-river hydropower project with daily regulating capacity. As per *Economic Evaluation Code for Small Hydropower Projects* (Document No. SL16-95) category No.3 the coefficient of even 0.70~0.90 can be chosen during the design stage. Considering local power supply and requirement status and power dispatch status the project Design Institute choose the more reliable coefficient of 0.95[2] to perform the PDR, which is conservative.

And an explication on calculation process of the electricity amount was given by Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd. on Dec. 18, 2008[3], it stated that:

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

Where:
E_{vali} is estimated to be 162,000 MWh based on 47 years (1959-2005) hydrological data[4] of the river.
Coeff selected as 0.95 which is much more conservative.

So, the E_{vali} is 153900 MWh.

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

Where:
E_{vali} is 153900 MWh as calculated according to equation (2).
E_{cons}: It accounts for 0.716% of the electricity generation amount for the proposed project based on the historical data of the similar hydropower projects during design stage and operation stage in Fugong County of Nujiang State, Yunnan Province according to the explanation from the design institute.
E_{lost}: the transmission loss during delivery. It accounts for 6% of the electricity generation amount for the proposed project according to project preliminary design report and the explanation from design institute reasons being

1. The transmission line is 14km long.
2. The transmission voltage is 110kV.

[2] Data source: the Explanation about the Electricity Calculation provided by Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd. on Dec. 18, 2008, which has been provided to DOE for validation.

[3] Data source: the Explanation about the Electricity Calculation provided by Yunnan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co. Ltd. on Dec. 18, 2008, which has been provided to DOE for validation.

[4] Data source: the PDR of the proposed project, page 21.

And the Agreement for the Construction of Transmission Line signed between the project owner and Yunnan Nujiang Power Grid Co. Ltd. on Sep. 8, 2005 confirmed the parameters above. The agreement has been provided to DNV during Validation.

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

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

$= 153,900 * (1- 0.716\%) * (1 - 6\%)$

$= 143,630$ MWh

Question 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.

Response of PP:

Reliability of the input values taken from PDR

The project Preliminary Design Report has been the basis of the decision to proceed with the investment in the proposed project. So all the input values used in the investment analysis except for power price are from the project Preliminary Design Report dated January 2006. It was completed by Yunan Lingyu Water Conservancy and Hydropower Reconnaissance & Design Co.,Ltd. And it has been approved by Nujiang Li & Su Autonomous Prefecture Construction Project Assessment Center on Sep 15, 2006 and finally approved by the Development & Reform Committee of Nujiang Li & Su Autonomous Prefecture on April 15, 2007 (document No: Nu Fa Gai Neng Yuan [2007]137). The input parameters used in the financial analysis can thus be considered information provided by an independent and recognised source.

Reliability of Power Price

The power price is based on the *notice about power price in Nujiang State* issued by the Development & Plan Committee of Nujiang Li Shu Autonomous Prefecture in 2004 (Document No: Nu Ji Jia Ge [2004]444). The document is valid and available during the project owner's CDM decision on January 07, 2006. According to the document, the power price is 0.20 CNY/kWh in low water period and 0.16 CNY/kWh in water abundant period. Thus, 0.18 CNY/kWh is adapted to the proposed project as a conservative consideration. The account sheets for power purchase in other hydro plants in Nujiang State in 2005 and 2006 also showed that the power price is 0.20 CNY/kWh in low water period and 0.16 CNY/kWh in water abundant period. Furthermore, the Power Purchase Agreement (PPA) signed between the Yunnan Nujaing Power Grid Co. Ltd. and the project owner Fugong Jiacheng Hydropower Development Co. Ltd. on Sep. 8, 2006 states that the power price was 0.20 CNY/kWh in low water period and 0.16 CNY/kWh in water abundant period. Thus, the power price is reasonable and accurate for the proposed project. Relevant evidence has been provided and validated by the DOE.

Reliability of Sunk Cost

The cost before the proposed project restarting which is 0.95 million CNY was considered as "sunk cost", and it has been deducted from the total investment during the

financial analysis according to ***Guidance on the Assessment of Investment Analysis.*** The sunk cost is substantiated by Yunan Mingtong Hydropower Construction Supervisory Co. Ltd which is assessed and certified by Ministry of Water Resources P.R. China for supervisory of hydropower construction, the project construction company Sichuan Yuechi Jiulong Construction and Installation Co, Ltd. The evidence has been provided to the DOE.

Cross-checking of the financial indicators of the proposed project with other similar projects in the area

The following similar registered projects in Yunnan Province are used as reference:
Yunnan Whitewaters Hydropower Development Project (78MW), registration date 02 Apr 2007[5] referred as A
Yunnan Yingjiang Nandihe Hydro Power Project (20MW), registered on 04 Oct 2007[6], referred as B
Yunnan Dali Yang_er 49.8MW Hydropower Project (49.8MW), registered on 20 March 2008[7], referred as C
Yunnan Heier 25MW Hydropower Project (25MW), registered on 15 July 2007[8], referred as D

	A	B	C	D	Average	The proposed project
Investment costs per KW(RMB/kW)	7451.28	6596.5	7548.89	4600.28	6549.24	6185.7
Investment cost per kWh (RMB/kWh)	1.575	1.45	2.079	0.927	1.508	1.202
Percentage of O&M costs relative to total investment costs	1.39%	1.96%	1.597%	8.66%	3.40%	1.4%

The financial indicator for the proposed project is as follows:
The investment cost per kW of the proposed project is 6185.7 RMB/kW
The investment cost per kWh of the proposed project is 1.202 RMB/kWh.
Percentage of O&M costs relative to total investment costs accounts for 1.4%.

All the data used in the financial analysis for the proposed project were compared with the data reported for other similar proposed CDM projects in Fugong County of Nujiang

[5] http://cdm.unfccc.int/Projects/DB/DNV-CUK1167909130.94/view
[6] http://cdm.unfccc.int/Projects/DB/DNV-CUK1175573697.13/view
[7] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1192114306.93/view
[8] http://cdm.unfccc.int/Projects/DB/DNV-CUK1177320241.75/view

State, Yunnan Province, as shown in the above table. The input parameters of the proposed project are considered reasonable.

Yours faithfully
for CARBON ASSET MANAGEMENT SWEDEN AB, part of the Tricorona Group

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