

Response to CDM EB by PP

Question 1. The PP should provide separate IRR calculations for each of the three components of the project activity as per paragraph 6 of the guidance for completing the PDD for small-scale activities (version 5).

Response: The separate IRR calculations for each of the three components of the project activity are provided to DOE.. According to the calculation, the IRRs of three components of the project activity are below the benchmark IRR (10%), the sensitivity analysis for each station consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be financially attractive.

Question 2. The PP/DOE should clarify the response made to CAR 5 (VR, p51): ‘ the date of FSR approval of the three hydropower stations is the same, but the dates of PDR approval of three stages hydropower stations is different separately’, as it is not clear how the PDR was approved separately for each plant.

Response: In fact, the dates of PDR approval of three stages hydropower station is the same (19 Jan. 2006), and the approval of PDR is not separate¹, please refer to reference No. 6 in Page 58 of validation report. So the issue is not existent. From communication with the local auditor of DOE, we find that the question is due to PP’s misunderstanding on DOE’s question in CAR 5.

The question in CAR 5 is “In fact, the date of approval of the three hydropower stations is not the same. Please indicate them in the revised PDD.” When PP made the response, the “approval” is falsely written as “PDR approval”, which should actually be the “construction approval” as the original meanings of Project owner’s response. As stated in paragraph 2 of Section A4.2 of PDD, the Shuangjiangqiao, Shuanglongqiao, Hebaotang hydropower stations started in 13th July, 29th July, 28th June 2006 respectively. The approvals² of each station’s construction have been submitted to DOE for check.

Question 3. The DOE is requested to clarify how it has validated that the difference between the annual designed maximum power generation (51,280MWh) and annual on-grid electricity supply (41,024MWh) is appropriate

¹ Water Resources Bureau of Shaoyang City, Approval of Shuangjiangqiao Hydropower Plant, Shuanglongqiao Hydropower Plant and Hebaotang Hydropower Plant in Dongke County, Shaoshuinongdianzi[2006] No. 02, 19 Jan. 2006.

² Project Supervision Unit, Approval of Construction of Shuangjiangqiao Hydropower Station on 13 July 2006, Approval of ,Construction of Shuanglongqiao Hydropower Station on 29 July 2006, Approval of Construction of Hebaotang Hydropower Station on 28 June 2006.

in the context of the underlying project activity.

Response:

1. At first, we would like to clarify the definitions and the relations of designed maximum power generation, effective power generation and on-grid electricity supply as follows:

A. Designed maximum power generation: It is designed possible power generation in theory when the natural inflow available is used for the water-turbine generators to generate electricity fully, it doesn't consider the factors influencing the power generation, such as the limitation of power generation from the grid, maintenance and repair of the equipments of the hydropower plant, expected accident which causes the suspension of the power generation and other force majeure. It is mainly decided according to the natural inflow, water head, installed capacity and regulating capacity of the plant.

B. Effective power generation: It is the possible power generation in practice considering the factors influencing power generation above, it includes the electricity supplied to the grid and the electricity for internal consumption of the plant. According to *Economic Evaluation Code for Small Hydropower Projects (SL16-95)*³ issued by Ministry of Water Resources of P. R. China, effective power generation can be calculated as follows:

Effective power generation = Designed maximum power generation × Coefficient of effective generation

The coefficient can be decided according to Table 1 from the Code SL16-95 (Clause 3.4):

Table 1 Coefficient of Effective Generation

Type of Hydropower Plant	Coefficient of Effective Generation
1. Plant connected to grid with yearly or multi-yearly regulating capacity	0.95~1.00
2. Plant connected to grid with seasonal regulating capacity	0.90~0.95
3. Plant connected to grid with monthly/weekly/daily/no regulating capacity (1) The grid will absorb all power generation during high flow period and at night (2) The grid will absorb part of power generation during high flow period and at night	0.80~0.90 0.70~0.80
4. Plant not connected to grid with daily and no regulating capacity	0.60~0.70

For the project activity, the coefficient is decided as follows:

According to PDR (Page 55), the average annual natural inflow of the 3 plants of the project activity is shown in Table 2.

³ <http://www.cws.net.cn/guifan/bz/SL16-95>

Table 2 Average Annual Natural Inflow of Changtanghe Project⁴

Plant Name Inflow(m ³ /s) Month	Shuangjiangqiao Plant	Shanglongqiao Plant	Hebaotang Plant
4	5.913	6.964	6.573
5	7.578	8.925	8.425
6	7.516	8.852	8.426
7	4.682	5.514	5.205
8	3.590	4.229	4.118
9	2.558	3.012	2.844
10	1.909	2.248	2.123
11	2.343	2.760	2.606
12	1.538	1.811	1.710
1	1.677	1.975	1.865
2	2.358	2.777	2.622
3	3.123	4.078	4.150

From Table 2 it can be found that the time from April to August is high flow period, this time is also the high flow period in Hunan Province where the project activity is located. Hunan Province has rich water resources, many hydropower plants in Hunan Province would like to generate electricity supplied to the grid during the high flow period so that the power supply is evidently beyond the power demand, so the grid will only absorb the part of the power generation from the hydropower plants according to the actual grid load, so the power generation of the hydropower plants will be limited by the grid during the high flow period. Most small hydropower plants in Hunan Province have no regulating capacity, the limitation of power generation from the grid during high flow period will cause some water to be wasted and not to be used for power generation, this will cause the power generation loss for these small hydropower plants. In order to ensure the safety and stable operation of the grid⁵, there must be some installed capacity from fossil fuel-fired plants used as must-run resources, according to foot-note 3 in “Tool to calculate the emission factor for an electricity system (Version 01.1) ”, coal can be used as must-run. Therefore, on the condition that some fossil fuel-fired plants used as must-run sources for the safety and stable operation of the grid, the hydropower energy has a priority to supply to the grid, but if the power supply is greater than the power demand, the power generation of all plants including hydropower plants will be limited.

The 3 plants of the project activity are run-of-river plants without regulating capacity, so according to the analysis above, the coefficient of effective generation for the project activity should fall into the type “The grid will absorb part of power generation during high flow period and at night” in Table 1, namely the coefficient of effective generation for the project

⁴ Hydroelectric Investigation and Design Institute of Nanping City, Primary Design Report on Shuanglongqiao, Shuangjiangqiao, Hebaotang stations in Dongkou County, Hunan Province, Dec. 2004.

⁵ Hunan Province Economic Commission, Hunan Province Power Grid, Plan of On-grid Electricity Supply for Power Plants in 2009 (Xiangjingnengyuan[2008]N0. 503), 23 Dec. 2008

activity should be 0.70~0.80, the value 0.804 which is a little greater than the upper limit 0.8 for this type is used as the coefficient of effective generation for the project activity in the PDR, it is conservative.

C. On-grid Electricity Supply: It is the generation supplied to the grid by the plant, it equals the effective power generation deducting the electricity for internal consumption of the plant, it can be calculated as follows:

On-grid electricity = Effective generation \times (1—internal electricity consumption rate)

According to *Specifications on Hydropower Energy Design Code for Small Hydropower Plant (SL-76-94)*⁶ (Clause 4.6), the internal electricity consumption rate for small hydropower plants is 0.5%~1.0%, the lower limit 0.5% is used as the internal electricity consumption for the project activity, it is conservative.

Because effective power generation = Designed maximum power generation \times Coefficient of effective generation, so on-grid electricity supply can also be expressed as follows:

On-grid electricity supply = Designed maximum power generation \times Coefficient of effective generation \times (1—internal electricity consumption rate).

For the project activity, on-grid electricity supply = Designed maximum power generation \times 0.803 \times (1—0.5%) = 51,280 MWh \times 0.803 \times (1—0.5%) = 41,024MWh.

So the calculation of on-grid electricity supply in PDR for the project activity is in accordance with related codes & specifications and is conservative.

2. According to *Explanation on Changtanghe Small Hydropower Project*⁷ provided by Dongkou County Power Bureau dated on 28 April 2009 which has been submitted to DOE, usually the power supply is greater than the power demand during the high flow period, the grid will at first decide a suitable proportion according to the concrete status of the power demand and the power supply, then decide the on-grid electricity supply of each small hydropower plant according to the designed annual power generation multiplied by the same proportion, namely the on-grid power supply is the designed power generation multiplied by a proportion decided by the grid no matter how much the installed capacity of a hydropower plant is. Since the power supply is beyond the power demand during the high flow period, the power generation of the hydropower plants is limited by the grid, this causes that some water flow is wasted without power generation during the high flow period; according to the actual operation status of the small hydropower plants in Dongkou County, the on-grid electricity supply is about 70%~80% of the designed maximum power generation, this proves that the chosen value of the coefficient of effective generation in PDR is in line with the actual status and is conservative.

3. Even if we consider the project activity as the type “The grid will absorb all power generation during high flow period and at night” in Table 1, the corresponding coefficient of effective generation for the project activity should be 0.80~0.90, if we use the upper limit 0.90 as the coefficient of effective generation for the project activity, the calculation shows

⁶ <http://www.cjw.com.cn/ad/bid/detail/20060512/20060512183718ICQSAN.doc>

⁷ Dongkou County Power Bureau, *Explanation on Changtanghe Small Hydropower Project*, 28 April 2009

that IRRs of every plant of the project activity are still less than the benchmark (10%).

From above it can be concluded that the difference between the annual designed maximum power generation (51,280 MWh) and annual on-grid electricity supply (41,024MWh) is appropriate and conservative because it is in accordance with the related codes & specifications and the actual operation status of small hydropower plants in the district where the project activity is located.

Question 4. The PP should specify the monitoring details (PDD, section B.7.1) for each of the three hydropower components as per paragraph 6 of the guidance for completing the PDD for small-scale activities (version 5).

Response: The monitoring details are specified for each of the three hydropower components in Section B.7.1. in the updated PDD (Version 05).

Question 5. The DOE should validate if there are more hydropower stations connected to the project sub-station.

Response: *Explanation on Changtanghe Small Hydropower Project*⁸ provided by Dongkou County Power Bureau dated on 28 April 2009 clarifies that there are other hydropower stations connected to the project sub-station besides the 3 hydropower stations of the project activity, but the meter at the sub-station monitoring the electricity supplied to the grid for the project activity is separate to that for other hydropower stations.

⁸ Dongkou County Power Bureau, *Explanation on Changtanghe Small Hydropower Project*, 28 April 2009