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Response to request for review
"Hapugastenne and Hulu Ganga Small Hydropower Projects" (0085)

Dear Members of the CDM Executive Board,

We refer to the requests for review raised by five Board members concerning DNV's request for issuance of Certified Emission Reductions from the "Hapugastenne and Hulu Ganga Small Hydropower Projects" (0085). The issues raised by the review requests can be summarised as follows:

1. The reported electricity output exceeds the theoretical output from one of the power plants in some of the months of the reporting period. This should have been captured by the DOE's crosschecking of data during the verification.
2. Assessment of calibration certificate for electricity meters was not a part of the verification and conclusions regarding this are not provided in the verification report.
3. The difference between "sold" and "generated" electricity output should be made clear in the monitoring report. Any auxiliary consumption of electricity should be considered for ER calculations.

DNV would like to provide an initial response to the above issues raised by the requests for review:

1) We fully acknowledge that our verification team should have been able to identify the capacity overrun reported for some months and investigated this further. In this case, we fully recognise that this was not done with sufficient rigour from our side. Not as an excuse, but more as an explanation to some of this, we would like to state:

   - The monitoring report data was initially checked through assessing "tax invoices" (i.e. electricity invoices) raised each month by the project proponent and controlled by Ceylon Electricity Board (CEB). As an off-taker of the electricity, CEB has its own calibrated meters which determine the amount of electricity sold to them. As such, this would normally represent a reliable third party acceptance of the amount of electricity sold to them. The invoices for most months represent either less days than a full month or more days than a full month. The August 2004 invoice for example comprises 36 days for Hapu 2.

   - As the verification audit revealed that the rated turbine capacity was 2.526MW in stead of the originally anticipated 2.4 MW, this represents a slight increase in potential electricity generation. Taking into account that the real potential for

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electricity generation is determined by the water flow and head, this can be calculated as follows:

The head is 425 m
The design flow = 2000 (litre / second) / 3 turbines = Average 667 litre per second.
P (Power) = η ((H (Head) * Q (Flow))*9.81(g) / 1000)

The maximum power potential will then be 2.78 MW.

The project comprises three units, the first two are represented by the Hapu phase 1 and the third by Hapu 2. Operational preference is given to Hapu 2, since the power purchase agreement tariff is higher for this than for Hapu 1. The difference in these rates was evidenced in the invoices assessed during the verification. (Hapu 1 is LKR 4.95 and Hapu 2 is LKR 5.69). It must be noted that from the above calculation, when only one or two of the units are operating, it is possible to have a turbine flow larger than 667 litres per second. Hence, it is possible to generate up to 2.78 MW in the Hapu 2 turbine under given conditions. Furthermore, it is not uncommon that a turbine runs at a capacity 5-10% higher than the rated capacity for periods of time. In the case of Hapu 2 this would mean that this capacity is identical to the power potential calculated above, 2.78 MW. This is particularly common in periods with good hydrological conditions, such as in the monsoon months of May-August.

- As stated above, the electricity invoices from the CEB were used to verify the emission reduction. In addition, the daily reported generation for some months were used to crosscheck the aggregated monthly generation. Unfortunately, the months with capacity overrun at Hapu 2 was not sampled for this crosscheck, which they should have been. Although the verification revealed no discrepancies between reported and invoiced electricity, we have in aftertime learned that the generation reported for August 2004 was in fact disputed by CEB. This was NOT revealed to us during the verification audit. Judging from the potential generation as calculated above, this is also the only month where reported electricity generation exceeds the theoretical output with a potential capacity of 2.78 MW. For all other months the load factor, if based on the potential for generation, is below 92%, or below 101%, if the rated capacity is used for load factor determination.
- We have in aftertime requested and assessed the internal generation data from the Hapu 2 plant. These shows that for the months identified in the review requests, the recorded internal generation was identical or lower than as invoiced to CEB. For August 2004 the internal records show *significantly* lower generation. An investigation into this *has not been able to detect anything wrong* with CEB's own monitoring meters, which are placed in locked rooms with no access for the project proponent's personnel.
- For the record, our investigation has not given any reason to suspect the same discrepancies for any of the other turbines under the project.

Given the information above, DNV proposes that DNV's *ex post* determination of the reported emission is revised and based on the lower monthly electricity generation determined based on the project participants internal generation or based on the "tax invoices" (see Table 1).

Table 1 Electricity generation for Hapugastenna Phase II in 2003-2005

Year	Month	Meter reading date	Number of days since previous meter reading	Generation (kWh) – internal records	Generation (kWh) – "Tax invoices"	Lowest (kWh)
2003	January	January 31, 2003	31	1594132	1598770	1594132
	February	March 4, 2003	32	1482873	1484840	1482873
	March	March 31, 2003	27	448406	472870	448406
	April	April 30, 2003	30	1462546	1360870	1360870
	May	May 30, 2003	30	1212338	1268940	1212338
	June	June 26, 2003	27	1451713	1449560	1449560
	July	July 30, 2003	34	1852153	1840440	1840440
	August	August 29, 2003	30	1638254	1636680	1636680
	September	September 30, 2003	32	1824088	1415530	1415530
	October	November 4, 2003	35	1927030	1406320	1406320
	November	December 1, 2003	27	1452711	1470520	1452711
	December	December 31, 2004	30	1382307	1233560	1233560
2004	January	January 31, 2004	31	590417	638340	590417
	February	March 2, 2004	31	1441731	1356500	1356500
	March	March 31, 2004	29	1101242	1073900	1073900
	April	April 30, 2004	30	1685428	1675600	1675600
	May	June 4, 2004	35	1944109	1947540	1944109
	June	July 5, 2004	31	1711086	1906630	1711086
	July	August 2, 2004	28	1520022	1519600	1519600
	August	September 7, 2004	36	2024588	2907890	2024588
	September	October 4, 2004	27	1555052	1557000	1555052
	October	November 2, 2004	29	1623460	1614150	1614150
	November	November 30, 2004	28	1610537	1597830	1597830
	December	December 31, 2004	31	1787259	1785180	1785180
2005	January	January 31, 2005	31	1473958	1471470	1471470
	February	March 1, 2005	29	1184360	1204770	1184360
	March	March 31, 2005	30	974352	994080	974352
	April	April 30, 2005	30	1163423	1106490	1106490
	May	May 28, 2005	28	1292191	1300250	1292191
	June	June 27, 2005	30	1494788	1474010	1474010
	July	July 28, 2005	31	1445106	1433780	1433780
	August	August 31, 2005	34	1476623	1471500	1471500
	September	October 4, 2005	34	1666525	1669370	1666525
	October	October 30, 2005	26	1407092	1395010	1395010
	November	December 1, 2005	32	1639993	1653210	1639993
	December	December 31, 2005	30	1319854	1308280	1308280
TOTAL				52861747	52701280	51399393

2) As stated in the verification and certification report, calibration records for electricity monitoring meters were provided after the verification audit, as these were not available during the visit. These records consist of calibration certificates and test reports, presented

by CEB's own calibration department. It is quite common that institutions like CEB have its own calibration laboratory. Hence, in our opinion, these records evidence satisfactorily that the meters in question are accurate and within the tolerances of their respective classes, and that the test results are satisfactory. If necessary, we can include a statement for this in a revised verification and certification report.

3) The difference between "sold" and "monitored" electricity is hopefully explained under our above response to the first issue. Electricity output from the plant means certified electricity sales to the Ceylon Electricity Board (CEB). As for auxiliary consumption, Hapugastenna Phase 1 and Hapugastenna Phase 2 are importing the electricity from the national grid for their own use (e.g. lighting the lamps, etc). Compared to sales (exports) this is less than 0.1% and hence negligible. In case of Huluganga, the plant power can be considered for auxiliary consumption, since it uses own generated energy. However, the monitored and reported values are the values exported to the grid and not total generation.

Lastly, we can ensure that these requests for review have caused us to update our CDM auditor training and procedures, to avoid similar situations in the future.

We hope that the Board accepts our above explanations and will be pleased to provide further clarifications, if needed, on the "Hapugastenne and Hulu Ganga Small Hydropower Projects".

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION LTD.

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