

MONITORING REPORT

Hapugastenne and Hulu Ganga Small Hydropower Projects

Version 2

Dated 19th December 2009

Title	Hapugastenne and Hulu Ganga Small Hydropower Projects
UNFCCC Reference No	0085
Registration Date	30th October 2005
Crediting period	01 Jan 03 - 31 Dec 12
Verification No.	Three
Monitoring period	1 January 2007 to 30 September 2008

(i) Implementation Status of Project

All four sub projects, Hapugastenne Phase I, Hapugastenne Phase II, Hulu Ganga Phase I and Hulu Ganga Phase II, were commissioned before the start of the monitoring period under consideration and the plants continued to operate during the entire period.

(ii) Monitoring Systems and Procedures

In respect of electricity supplied to the grid and electricity consumption from the grid, no special procedures were necessary to be implemented because the meter readings to determine this supply/consumption were read by an independent third party, the Ceylon Electricity Board (CEB). The meter recording supply to the grid was recalibrated during the period under consideration. Details are provided under (iv).

In respect of monitoring of environmental parameters (see under (iii) below), the Senior Manager – Operations of the company has been specifically tasked with ensuring the regular checks of erosion and sediment are carried out and also to arrange for the test reports required as part environmental monitoring.

(iii) Parameters Required to be Monitored and Reported

Hapugastenne Phase I and II Plants

Notes:

1. The Hapugastenne Phase I and II plants have the same civil works.
2. The Phase I plant consist of 2 sets of identical turbines/generators and related equipment
3. The Phase II plant (which was commissioned one year later) consists of 1 set of the same turbines/generators as the Phase I plant plus related equipment.
4. The CEB measures the output of the two plants separately using two separate meters.
5. In practice the 2 plants are operated as a single entity.

Electricity Output – Hapugastenne Phase I Plant

Month	Electricity Output (kWh)			Source (Invoice Nos raised for CEB)	Con- sumption from Grid (kWh) (Note 1)	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of Meter (Note 2)	Adjusted Electricity Output			
2007						
January	153,970		153,970	4013	960	153,010
February	82,280		82,280	4014	960	81,320
March	70,580		70,580	4015	960	69,620
April	929,630		929,630	4016	960	928,670
May	1,612,370	8,062	1,604,308	4017	960	1,603,348
June	1,663,960	8,320	1,655,640	4018	960	1,654,680
July	1,794,270	8,971	1,785,299	4019	960	1,784,339
August	505,330	2,527	502,803	4020	960	501,843
September	3,422,060	17,110	3,404,950	4021	960	3,403,990
October	3,102,690		3,102,690	4022	960	3,101,730
November	2,088,010		2,088,010	4023	960	2,087,050
December	662,830		662,830	4024	960	661,870
2008						
January	295,307		295,307	4025 & 4026	40,026	255,281
February	434,039		434,039	4027	4,652	429,387
March	1,127,304		1,127,304	4028	3,097	1,124,207
April	2,207,430		2,207,430	4029	552	2,206,878

Month	Electricity Output (kWh)			Source (Invoice Nos raised for CEB)	Con- sumption from Grid (kWh) (Note 1)	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of Meter (Note 2)	Adjusted Electricity Output			
May	1,597,419		1,597,419	4030	1,319	1,596,100
June	2,321,841		2,321,841	4031	79	2,321,762
July	2,384,610		2,384,610	4032	40	2,384,570
August	1,183,540		1,183,540	4033	660	1,182,880
September	1,734,560		1,734,560	4034	2,034	1,732,526
Total	29,374,030		29,329,040		63,979	29,265,061

Note 1: The Ceylon Electricity Board (CEB) which supplies grid power to the plant only provided estimated bills for grid consumption during the months January to December 2007. In January 2008 the meter was read and a relatively large upward adjustment was made to the bill to reflect the shortfall in the estimated consumption during the previous year. This is the reason for the 40,026 kWh measured as January 2008 consumption.

Note 2: Section (iv): Calibration of Monitoring Instruments explains the methodological basis for these deductions.

Electricity Output – Hapugastenne Phase II Plant

Month	Electricity Output (kWh)			Source (Invoice Nos raised for CEB)	Con- sumption from Grid (kWh) (Notes 1&2)	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of Meter (Note 3)	Adjusted Electricity Output			
2007						
January	1,120,620		1,120,620	5013	356	1,120,264
February	691,020		691,020	5014	356	690,664
March	515,350		515,350	5015	356	514,994
April	1,295,200		1,295,200	5016	356	1,294,844
May	1,657,890	8,289	1,649,601	5017	356	1,649,245
June	1,455,030	7,275	1,447,755	5018	356	1,447,399
July	1,437,060	7,185	1,429,875	5019	356	1,429,519
August	1,160,900	5,805	1,155,096	5020	356	1,154,740
September	1,634,680	8,173	1,626,507	5021	356	1,626,151
October	1,678,540		1,678,540	5022	356	1,678,184
November	1,505,660		1,505,660	5023	356	1,505,304
December	1,544,380		1,544,380	5024	356	1,544,024
2008						
January	1,370,592		1,370,592	5025 & 5026	356	1,370,236
February	1,150,526		1,150,526	5027	356	1,150,170
March	1,430,304		1,430,304	5028	356	1,429,948
April	1,795,890		1,795,890	5029	356	1,795,534
May	1,346,007		1,346,007	5030	356	1,345,651
June	1,517,453		1,517,453	5031	356	1,517,097
July	1,755,240		1,755,240	5032	356	1,754,884
August	1,570,900		1,570,900	5033	356	1,570,544
September	1,487,730		1,487,730	5034	15	1,487,715
Total	29,120,972		29,084,244		7,135	29,077,109

Note 1: The CEB only started billing the plant for consumption from the grid from July 2008 and the first bill covered the two month period July and August 2008. The total 711 kWh consumption from the grid during these two months has been divided in 2 and 356 kWh allocated to each of the months of July and August 2008.

Note 2: Since the CEB did not issue bills for consumption from the grid prior to July 2008, this consumption is not known. Therefore, the conservative assumption has been made that grid consumption each month in the previous months is equal to the maximum monthly consumption of the six months (July to December 2008) for which billing is available.

Note 3: Section (iv): Calibration of Monitoring Instruments explains the methodological basis for these deductions.

Environmental Parameters – Common for Hapugastenne Phase I and II Plants

Aspect Monitored	Parameters Monitored	Monitoring Location(s)	Monitoring Dates
Surface water	Nutrient levels in terms of phosphates and Total Inorganic Nitrogen (TIN)	Upstream of weir	May 2007 and September 2008
Surface water	BOD and COD levels	Upstream of weir and below the tailrace (water release point to the river after generation)	June 2007 and June 2008
Ecology	Flora and fauna	Within the courses of Rath Ganga below the diversion point.	April 2008
River bank erosion	Erosion level	Below the tailrace and at the bottom of the spill where water is diverted in the event of a plant shut down.	Once a month over entire period
Sediment	Sediment deposits.	Upstream of the weir.	Once a month over entire period

Employment Details – Common for Hapugastenne Phase I and II Plants

Employee category	Number of Employees
Manager	1
Power Station Assistants	11
Power Station Operators	3
Power Station Supervisors	5

Community Development Expenditure – Common for Hapugastenne Phase I and II Plants

Date	Invoice Number	Nature of Expenditure	Amount (Rs)
03/29/2007	369/317468	Donating a drum for Nissanka Kalayathanaya (art centre) Amunutenna	4,800.00
08/15/2007	458/509339	First installement to the contractor for providing water supply & constructing a community bathing place at Hapugastenna	45,000.00
8/16/2007	Labour charges no invoice number	Transporting PVC pipes from Maliboda to Hapugastenna for the community bathing place	9,500.00
12/3/2007	793/664323	Final payment to the contractor for providing water supply & constructing a community bathing place at Hapugastenna	157,959.00
3/13/2008	1126/967953	Donation given to Rathgama , Gallella Community Service for constructing a drinking water tank at Kotigahawatte.	50,000.00
15/05/2007	149/317590	Constructing a community hall at Hal -Ela	50,000.00
19/09/2007	549/566194	Donation given to Rathgama , Gallella Nivahal Prajamula Sanvidhanaya (Community Organiasation) Ihala Ratgama for repairing	50,000.00

Date	Invoice Number	Nature of Expenditure	Amount (Rs)
		community water pipes system.	
10/9/2008	897	Cost of renovation of Kirindawala road	50,000.00

Hulu Ganga Phase I and II Plants

Notes:

- The Hulu Ganga Phase I and II plants are situated next to each other and are considered a single plant complex by the CEB. As a result the CEB only has a single meter to measure the combined energy generation by the two plants each month.

Electricity Output – Hulu Ganga Phase I and II Plants

Month	Electricity Output (kWh)			Source (Invoice Nos raised for CEB)	Con- sumption from Grid (kWh) (Note 1)	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of Meter (Note 2)	Adjusted Electricity Output			
2007						
January	2,857,000		2,857,000	6013	0	2,857,000
February	969,500		969,500	6014	0	969,500
March	201,800		201,800	6015	0	201,800
April	552,000		552,000	6016	0	552,000
May	361,000		361,000	6017	0	361,000
June	1,354,700		1,354,700	6018	0	1,354,700
July	1,693,800		1,693,800	6019	0	1,693,800
August	593,400		593,400	6020	0	593,400
September	2,310,800		2,310,800	6021	0	2,310,800
October	3,822,300		3,822,300	6022	0	3,822,300
November	937,700		937,700	6023	0	937,700
December	3,245,200		3,245,200	6024	0	3,245,200
2008						
January	2,767,900		2,767,900	6025	0	2,767,900
February	897,800		897,800	6026	0	897,800
March	2,619,200	52,384	2,566,816	6027	0	2,566,816
April	1,902,700	38,054	1,864,646	6028	0	1,864,646
May	707,100	14,142	692,958	6029	0	692,958
June	299,700	5,994	293,706	6030	0	293,706
July	854,500	17,090	837,410	6031	0	837,410
August	765,900	15,318	750,582	6032	0	750,582
September	809,700	16,194	793,506	6033	0	793,506
Total	30,523,700		30,364,524		-	30,364,524

Note: Section (iv): Calibration of Monitoring Instruments explains the methodological basis for these deductions.

Environmental Parameters – Hulu Ganga Phase I Plant

Aspect Monitored	Parameters Monitored	Monitoring Location(s)	Monitoring Dates
Surface water	Nutrient levels in terms of phosphates and Total Inorganic Nitrogen (TIN)	Upstream of weir	May 2007 and September 2008
Surface water	BOD and COD levels	Upstream of weir and below the tailrace (water release point to the river after generation)	June 2007 and June 2008

Aspect Monitored	Parameters Monitored	Monitoring Location(s)	Monitoring Dates
Ecology	Flora and fauna	Within the courses of Hulu Ganga below the diversion point.	April 2008
River bank erosion	Erosion level	Below the tailrace and at the bottom of the spill where water is diverted in the event of a plant shut down.	Once a month over entire period
Sediment	Sediment deposits.	Upstream of the weir.	Once a month over entire period

Environmental Parameters – Hulu Ganga Phase II Plant

Aspect Monitored	Parameters Monitored	Monitoring Location(s)	Monitoring Dates
Surface water	Nutrient levels in terms of phosphates and Total Inorganic Nitrogen (TIN)	Upstream of weir	May 2007 and September 2008
Surface water	BOD and COD levels	Upstream of weir and below the tailrace (water release point to the river after generation)	June 2007 and June 2008
Ecology	Flora and fauna	Within the courses of Moragaha Oya below the diversion point.	April 2008
River bank erosion	Erosion level	Below the tailrace and at the bottom of the spill where water is diverted in the event of a plant shut down.	Once a month over entire period
Sediment	Sediment deposits.	Upstream of the weir.	Once a month over entire period

Employment Details – Hulu Ganga Phase I and II Plants

Employee Category	Number of Employees	
	Phase I	Phase II
Power Station Assistants	6	6
Power Station Operators	3	3

Community Development Expenditure – Hulu Ganga Phase I and II Plants

Date	Invoice Number	Details of projects	Expenditure (Rs.)	Project
4/30/2007	18/901006	Donation to Kosgama temple for development work.	150,000	Phase I
4/30/2007	18/901006	Donation to Kosgama Maha Vidyalaya.	25,000	Phase I
4/30/2007	18/901006	Donation to Kosgama Ihalagama Development Committee for repairing water tank.	25,000	Phase I
5/29/2008	613	Donation to Panwila Praseshiya Sabha	7,500	Phase I
8/11/2008	592	Donation to Kosgama Ihalagama Development Committee.	200,000	Phase I
11/24/2008	1016	Donation to Kosgama Ihalagama Development Committee for temple and school development.	200,000	Phase I

(iv) Calibration of Monitoring Instruments**Hapugastenne Phase I**

The Hapugastenne Phase I electrical meter was tested and found accurate on May 9, 2006. The next testing of the meter was done on September 21, 2007. The meter was replaced on January 5, 2008 and both the old meter and the new meter were tested on that date and found to be accurate.

The period between the two testing dates of the old meter was more than the 12 months specified in the PDD. A deviation request was made in this connection to the Executive Board. The Executive Board refused the deviation request and required that a "deduction based on the maximum inaccuracy specification of the meters" should be applied to account for the non calibration within the one year period. The following procedures have been used to calculate the deductions.

The meters is in Accuracy Class 0.5S, which allows a maximum inaccuracy specification of + or - 0.5%.

The months during which the Hapugastenne Phase I meter operated in an "uncalibrated mode" during the period covered by the PDD were from May 2007 to September 2007, since the calibration done in May 2006 was valid till April 2007. Therefore a maximum inaccuracy reduction of 0.5% has been applied to the generation numbers for the months of May 2007 to September 2007.

Hapugastenne Phase II

The Hapugastenne Phase II electrical meter was tested and found accurate on May 9, 2006. The next testing of the meter was done on September 21, 2007. The meter was replaced on January 5, 2008 and both the old meter and the new meter were both tested on that date and found to be accurate.

The period between the two testing dates of the old meter was more than the 12 months specified in the PDD. A deviation request was made in this connection to the Executive Board. The Executive Board refused the deviation request and required that a "deduction based on the maximum inaccuracy specification of the meters" should be applied to account for the non calibration within the one year period. The following procedures have been used to calculate the deductions.

The meter is in Accuracy Class 0.5S, which allows a maximum inaccuracy specification of + or - 0.5%.

The months during which the Hapugastenne Phase II meter operated in an "uncalibrated mode" during the period covered by the PDD were from May 2007 to September 2007, since the calibration done in May 2006 was valid till April 2007. Therefore the maximum inaccuracy reduction of 0.5% has been applied to the generation numbers for the months of May 2007 to September 2007.

Hulu Ganga Phase I and II

The Hulu Ganga electrical meter (the output of the Phase I and II plants are measured in total by this meter) was tested and found accurate on April 26, 2006. January 3, 2007. The next testing of the meter was done on March 1, 2007 and the following testing was done on November 27, 2008. The meter was found accurate on the latter two test dates. Since the period between the two testing dates of March 1, 2007 and November 27, 2008 the old meter was more than the 12 months specified in the PDD, a deviation request was made in this connection to the Executive Board. The Executive Board refused the deviation request and required that a "deduction based on the maximum inaccuracy specification of the meters" should be applied to account for the non calibration within the one year period. The following procedures have been used to calculate the deductions.

The meters is in Accuracy Class 2.0, which allows a maximum inaccuracy specification of + or - 2%.

The months during which the Hulu Ganga meter operated in an "uncalibrated mode" during the period covered by the PDD was from March 2008 to November 2008, since the calibration done in March 2007 was valid till February 2008. Therefore a maximum inaccuracy reduction of 2% has been applied to the generation numbers for the months of March 2008 to September 2008.

(v) Emission Factor

The ex ante emission factor as per the PDD which is used for the purpose of monitoring is 0.8496 kgCO₂ per kWh

(vi) Deviation Requests

As detailed under Calibration of Monitoring Instruments the Executive Board refused a Deviation Request in connection with the greater than 12 month period between calibrations and required that a specific procedure be adopted to account for the delay in calibration.

(vii) Emissions Calculations

The emissions reductions during the monitoring period are as follows:

Hapugastenne Phase I

Baseline emissions reduction $(29,329,040 \times 0.8496 / 1,000) = 24,917.952 \text{ tCO}_2$

Project emissions/leakages $(63,979 \times 0.8496 / 1,000) = 54.357 \text{ tCO}_2$

Net emissions reductions = 24,863.596 tCO₂

Hapugastenne Phase II

Baseline emissions reduction $(29,084,244 \times 0.8496 / 1,000) = 24,709.974 \text{ tCO}_2$

Project emissions/leakages $(7,135 \times 0.8496 / 1,000) = 6.062 \text{ tCO}_2$

Net emissions reductions = 24,703.912 tCO₂

Hulu Ganga Phase I and II

Baseline emissions reduction $(30,364,524 \times 0.8496 / 1,000) = 25,797.700 \text{ tCO}_2$

Project emissions/leakages = 0 tCO₂

Net emissions reductions = 25,797.700 tCO₂

All Plants in PDD

Baseline emissions reduction = 75,425.626 tCO₂

Project emissions/leakages = 60.419 tCO₂

Net emissions reductions = 75,365.207 tCO₂

The final net emissions reductions (rounded off to the nearest tCO₂) is 75,365.

Notes:

1. Baseline emissions reductions and project emissions/leakages for each project are derived by multiplying the electricity output/consumption from the grid (in kWh) by the emissions factor specified in (v) and dividing by 1,000 to convert to tCO₂.
2. Net emissions reductions for each project are calculated by subtracting the project emissions/leakages from the baseline emissions reduction for the project.
3. Totals for all projects in the PDD is the simple sum of each of the project values.

(viii) Comparison with PDD Estimate of Emissions Reduction

In the original PDD the Hapugastenne Phase I project was projected to result in annual emissions reductions of 14,273 tCO₂. Since the monitoring period under consideration is 1.75 years, the expected emissions reduction during the period (on a pro rated basis) would be 24,977.5 tCO₂, which is slightly more than the actual emissions reductions during the period.

In the original PDD the Hapugastenne Phase II project was projected to result in annual emissions reductions of 15,463 tCO₂. Since the monitoring period under consideration is 1.75 years, the expected emissions reduction during the period (on a pro rated basis) would be 27,060.25 tCO₂, which is more than the actual emissions reductions during the period.

In the original PDD the combined Hulu Ganga Phase I and II projects was projected to result in annual emissions reductions of 18,352 tCO₂. Since the monitoring period under consideration is 1.75 years, the expected emissions reduction during the period (on a pro rated basis) would be 32,116 tCO₂, which is more than the actual emissions reductions during the period.

Prepared by: Eco Power (Private) Limited
30/1 Bagatalle Road
Colombo 3
Sri Lanka



Dr. Romesh Dias Bandaranaike
Chief Executive Officer
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