

# **MONITORING REPORT**

**Small Hydropower Projects at Alupola and Badulu Oya**

**Version 3**

**Dated 17<sup>th</sup> March 2010**

<b>Title</b>	<b>Small Hydropower Projects at Alupola and Badulu Oya</b>
<b>UNFCCC Reference No</b>	<b>0100</b>
<b>Registration Date</b>	<b>30<sup>th</sup> October 2005</b>
<b>Crediting Period</b>	<b>1 June 2004 – 31 May 2014</b>
<b>Verification No.</b>	<b>Four</b>
<b>Monitoring Period</b>	<b>1 October 2008 to 31 December 2009</b>

(i) Implementation Status of Project

The Alupola project was commissioned before the start of the monitoring period under consideration and the plant continued to operate during the entire period.

The Badulu Oya project is a run-of-river hydropower plant which sells electricity it generates to the Ceylon Electricity Board (CEB) grid. The project has an installed capacity of 5,8 MW and the equipment installed at the project consists of 2 Francis Turbines coupled to 2 Synchronous Generators, each equipment set having an electrical output capacity of 2.9 MW.

The Badulu Oya project was commissioned and connected to the CEB grid on July 3, 2009. Although the installed capacity of the plant is 5.8 MW, because of limitations in its grid, the CEB has only permitted the plant to export a maximum of 4.9 MW of power to the grid for now.

(ii) Monitoring Systems and Procedures

Eco Power (Private) Limited has established and implemented monitoring systems and procedures to ensure that the monitoring process is consistent. These systems and procedures cover management responsibilities, data monitoring procedures, training procedures, periodical internal audits, management reviews and corrective actions in case of any deviations. Meter calibration is part of this process and is carried out annually and calibration certificates are available for verification by DNV during the site visit.

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 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

**Alupola Plant**

**Electricity Output – Alupola Plant**

Electricity Output - Phapda Plant

Month	Electricity Output (kWh)			Source (Invoice Nos raised for CEB)	Con- sumption from Grid (kWh)	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of Meter (Note)	Adjusted Electricity Output			
2008						
October	1,096,040	10,960	1,085,080	7036	10	1,085,070
November	878,878	8,789	870,089	7037	10	870,079
December	1,178,550		1,178,550	7038	3	1,178,547
2009						
January	347,520		347,520	7039	4	347,516
February	153,060		153,060	7040	60	153,000
March	553,330		553,330	7041	26	553,304
April	893,455		893,455	7042	1	893,454
May	745,714		745,714	7043	7	745,707
June	1,189,803		1,189,803	7044/7045	1	1,189,802
July	1,356,337		1,356,337	7046	1	1,356,336
August	635,262		635,262	7047	1	635,261
September	1,150,202		1,150,202	7048	0	1,150,202

Month	Electricity Output (kWh)			Source (Invoice Nos raised for CEB)	Consumption from Grid (kWh)	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of Meter (Note)	Adjusted Electricity Output			
October	1,193,597		1,193,597	7049	0	1,193,597
November	1,419,710		1,419,710	7050	0	1,419,710
December	1,809,780		1,809,780	7051/7052	1	1,809,779
<b>Total</b>	<b>14,601,238</b>	<b>19,749</b>	<b>14,581,489</b>		<b>124</b>	<b>14,581,364</b>
Note: Section (iv): Calibration of Monitoring Instruments explains the methodological basis for these deductions.						

#### Employment Details – Alupola Plant

Employee Category	No of Employees
Power Station Operators	3
Power Station Assistants	6

#### Environmental Parameters – Alupola 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	September 2008 and September 2009
Surface water	BOD and COD levels	Upstream of weir and below the tailrace (water release point to the river after generation)	August 2008 and September 2009
Ecology	Flora and fauna	Within the courses of Rath Ganga below the diversion point.	February 2009
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

#### Community Development Expenditure – Alupola Plant

No community development expenditure was incurred during the verification period because funds available for such expenditure for this period was spent in advance during the previous verification period (at the request of the local community) for constructing a foot bridge over Alupola river..

#### Badulu Oya Plant

##### Electricity Output – Badulu Oya Plant

Month	Electricity Output (kWh)	Source (Invoice Nos raised for CEB)	Consumption from Grid (kWh)	Net Electricity Output (kWh)
<b>2008</b>				
	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a
	n/a	n/a	n/a	n/a
<b>2009</b>				
January	n/a	n/a	n/a	n/a
February	n/a	n/a	n/a	n/a
March	n/a	n/a	n/a	n/a
April	n/a	n/a	n/a	n/a
May	n/a	n/a	n/a	n/a

Month	Electricity Output (kWh)	Source (Invoice Nos raised for CEB)	Consumption from Grid (kWh)	Net Electricity Output (kWh)
June	n/a	n/a	n/a	n/a
July	0	n/a	47,824	(47,824)
August	405,662	0001	52,738	352,924
September	16,507	0002	1,245	15,262
October	378,678	0003	1,293	377,385
November	1,319,128	0004	58	1,319,070
December	2,210,287	0005	596	2,209,691
<b>Total</b>	<b>4,330,262</b>		<b>101,807</b>	<b>4,226,508</b>

#### Employment Details – Badulu Oya Plant

Employee Category	No of Employees
Manager	1
Power Station Operators	3
Power Station Assistants	12

#### Environmental Parameters – Badulu Oya 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	First monitoring in July 2010 [One year after commissioning]
Surface water	BOD and COD levels	Upstream of weir and below the tailrace (water release point to the river after generation)	First monitoring in July 2010 [One year after commissioning]
Ecology	Flora and fauna	Within the courses of Badulu Oya below the diversion point.	First monitoring in February 2010.
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

#### Community Development Expenditure – Badulu Oya

Date	Payee	Nature of Expenditure	Amount (Rs)
12-Sep-09	Sumudu Construction	Construction of bathing spot for villagers	99,663
14-Sep-09	Sumudu Construction	Construction of bathing spot for villagers	47,526

#### (iv) Calibration of Monitoring Instruments

##### **Alupola Plant**

The electrical meter at the Alupola plant has been recalibrated and found accurate on the following dates: 15/08/2007, 29/11/2008, 24/11/2009

The period between the testing dates of the Alupola meter on 15/08/2007 and 29/11/2008 was more than the 12 months specified in the PDD. Since each meter calibration is valid for 12 months as per the original PDD, the meter operated in an “uncalibrated mode” during the months of October and November 2008 of the period covered by the present monitoring report.

In the case of the verification report for another project by the same developer approved by the Executive Board (Project No. 0085: Hapugastenne and Hulu Ganga Small Hydropower Projects,

Third Verification), where a similar delay in meter calibration had occurred, the Executive Board required that a "deduction based on the maximum inaccuracy specification of the meters" should be applied to account for the non calibration months. The meter is in Accuracy Class 1, which allows a maximum inaccuracy specification of + or – 1.0%. Therefore a meter inaccuracy reduction of 1.0% has been applied to the generation numbers for the months of October and November 2008.

### **Badulu Oya Plant**

A pre calibrated factory supplied new meter was originally installed in July 2009 at the time the plant was commissioned. This calibration is valid for a 12 month period.

#### (v) Emission Factor

The ex ante emission factor as per the PDD which is used for the purpose of monitoring is 0.8496 kgCO<sub>2</sub> per kWh

#### (vi) Deviation Requests

No deviation requests have been made in respect of this verification period..

#### (vii) Emissions During Construction

The Project Development Document for the Alupola and Badulu Oya Small Hydropower Projects estimated that 479.5 tCO<sub>2</sub> would be generated during the site preparation and construction stage of the project and that these emissions would be deducted from the first year emissions reductions. Due to an oversight, the amount has not been deducted from the first, or subsequent Monitoring Reports. The amount is therefore deducted from the present Monitoring Report.

#### (viii) Emissions Calculations

The emissions reductions during the monitoring period are as follows:

#### **Alupola Plant**

Baseline emissions reduction (14,581,489*0.8496/1,000)	= 12,388.4 tCO <sub>2</sub>
Project emissions/leakages (124*0.8496/1,000)	= 0.1 tCO <sub>2</sub>
Net emissions reductions	= 12,388.3 tCO <sub>2</sub>

#### **Badulu Oya Plant**

Baseline emissions reduction (4,330,262*0.8496/1,000)	= 3,679.0 tCO <sub>2</sub>
Project emissions/leakages (101,807*0.8496/1,000)	= 86.5 tCO <sub>2</sub>
Net emissions reductions	= 3,592.5 tCO <sub>2</sub>

#### **All Plants in PDD**

Baseline emissions reduction	= 16,067.4 tCO <sub>2</sub>
Project emissions/leakages	= 86.6 tCO <sub>2</sub>
Net emissions reductions (during monitoring period)	= 15,980.8 tCO <sub>2</sub>

Less emissions during site preparation and construction	= 479.5 tCO <sub>2</sub>
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Final net emissions reductions	= 15,501.3 tCO <sub>2</sub>
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Net emissions reductions rounded off to the nearest whole number is 15,501 tCO<sub>2</sub>.

#### 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 tCO<sub>2</sub>.

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 plants in the PDD is the simple sum of each of the project values.

(ix) Comparison with PDD Estimate of Emissions Reduction

In the original PDD the Alupola plant was projected to result in annual emissions reductions of 10,305 tCO<sub>2</sub>. Since the monitoring period under consideration is 1.25 years, the expected emissions reduction during the period (on a pro rated basis) would be 12,881 tCO<sub>2</sub>, which is slightly more than the actual emissions reductions during the period.

In the original PDD the Badulu Oya plant was projected to result in annual emissions reductions of 21,147 tCO<sub>2</sub>. Since the monitoring period under consideration is 0.5 years, the expected emissions reduction during the period (on a pro rated basis) would be 10,574 tCO<sub>2</sub>, which is much more than the actual emissions reductions during the period.

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