Monitoring report form (Version 03.2)

Monitoring report

Title of the project activity	Hapugastenne and Hulu Ganga Small Hydropower Projects
Reference number of the project activity	0085
Version number of the monitoring report	06
Completion date of the monitoring report	1 April 2014
Registration date of the project activity	30 October 2005
Monitoring period number and duration of this monitoring period	Third 1 January 2007 to 30 September 2008 (both days included)
Project participant(s)	Eco Power (Private) Ltd. (EPL)
Host Party(ies)	Sri Lanka
Sectoral scope(s) and applied methodology(ies)	Sectoral Scope 1: Energy industries (renewable - / non-renewable sources) Type I: Renewable energy projects Category D: Renewable Electricity Generation for a Grid Methodology: AMS-I.D, version 5, "Renewable electricity generation for a grid"
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	49,796 t CO_2 per annum 87,177 t CO_2 (for the current monitoring period)
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	75,014 t CO_2
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	75,014 t CO_2
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	0

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

Purpose of the project activity and the measures taken for GHG emission reductions or net anthropogenic GHG removals by sinks

This project is a bundle of four (4) small-scale, run-of-river hydropower plants in Sri Lanka. The four hydropower plants range in size from 2.526 MW to 5.052 MW, have a combined capacity of 13.568 MW.

Power Plant	Capacity (in MW)
Hapugastenne I	5.052
Hapugastenne II	2.526
Hulu Ganga I	3.000
Hulu Ganga II	2.990
Total Capacity	13.568

The electricity from each of the hydropower plants is sold to the monopoly government-owned utility in Sri Lanka, the Ceylon Electricity Board (CEB), through a standard power purchase agreement available to all renewable energy based power generators that have individual capacities lesser than 10 MW. The PP has signed separate agreements for Hapugastenne and Hulu Ganga.

The projects results in a reduction of anthropogenic emissions of greenhouse gas by displacing an equivalent volume of electricity that would otherwise be generated by the most expensive thermal power plants tied into the national grid.

Brief description of the installed technology and equipment

All four of the project sites involve installation of a run-of-river hydropower plant system using well-established technologies. Run-of-river hydropower facilities are emissions-free and considered one of the best forms of low impact renewable energy available today. The civil structures at each project site consist of a gated weir designed to store a low volume of water, an intake arrangement, a channel, a desilting/forebay arrangement, a penstock, a powerhouse and a tailrace. Run-of-river hydropower has very low impact on river flow volumes and all water diverted to the powerhouse is returned to the main stream. The Hapugastenne projects run on a Pelton Turbine whereas the Hulu Ganga projects rely on a Francis type turbine. Both turbine types have well-demonstrated application around the world and are considered optimal for the particular sites being developed.

Commissioning dates for the project activity

The projects were commissioned on following dates:

Site	**Date of Commissioning**
Hapugastenne Phase I	14 August 2001
Hapugastenne Phase II	9 September 2002
Hulu Ganga Phase I	3 June 2003
Hulu Ganga Phase II	25 October 2006

Total GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period

The project results in a total emission reduction of 75,014 tCO_2 over the monitoring period of 01 January 2007 to 30 September 2008.

A.2. Location of project activity

>>

a) Host Party(ies): Sri Lanka

b) Region/ State/ Province
- For Hapugastenne Phase I and Phase II projects- Sabaragamuwa Province, Ratnapura District
- For Hulu Ganga I and Hulu Ganga II projects- Central Province, Kandy District

c) City/ Town/ Community
- For Hapugastenne Phase I and Phase II projects- Near the town of Ratnapura
- For Hulu Ganga I and Hulu Ganga II projects- Near the village of Panwila, north of the town of Kandy

d) Physical/ Geographical location.

Hapugastenne Phase I and Phase II Small Hydropower Projects are both located within close proximity of one another at the Hapugastenne Estate. Both projects are found at the following coordinates:

Longitude N 6^{o} 42.1' / Latitude E 80^{o} 30.3'

The next two projects, although quite close, are two distinct power generation facilities. They are located at the following coordinates:

Hulu Ganga Phase I Small Hydropower Project
Longitude N 7^{o} 23.5' / Latitude E 80^{o} 44.8'

Hulu Ganga Phase II Small Hydropower Project
Longitude N 7^{o}23.3' / Latitude E 80^{o} 44.5'

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	**Private and/or public entity(ies) project participants (as applicable)**	**Indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Sri Lanka (Host)	Eco Power (Private) Ltd. (EPL)	No

A.4. Reference of applied methodology

>>

Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)
Type I: Renewable energy projects
Category D: Renewable Electricity Generation for a Grid
Methodology: AMS-I.D, version 5, "Renewable electricity generation for a grid"

A.5. Crediting period of project activity

>>

Fixed Crediting period from 1 January 2003 to 31 December 2012 (10 years, 0 months).

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>>

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.

The projects were commissioned on following dates:

Site	Date of Commissioning
Hapugastenne Phase I	14 August 2001
Hapugastenne Phase II	9 September 2002
Hulu Ganga Phase I	3 June 2003
Hulu Ganga Phase II	25 October 2006

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

>>

For this monitoring period:

As per the registered monitoring plan, the electricity generated is measured through meters installed at the grid interconnection points. The monthly meter reading is carried out by CEB and the statement is issued. The net electricity output from the project activity forms the basis for the emission reduction calculations.

During this monitoring period, CEB did not issue the statement for electricity imported through two of the three meters (Hapugastenne II and Hulluganga I & II) at monthly intervals as indicated in the monitoring plan.

For Hapugastenne II, the import readings for the months of July and August 2008 were issued together. A value of 356 kWh has been used as the monthly average electricity imported for the months of July and August 2008. The monthly bills for electricity import for the period prior to July 2008 (1 January 2007 to 30 June 2008) have not been issued by CEB. A conservative value of 2 254 kWh has been used as quantity of monthly electricity imported for the period of January 2007 to June 2008. It is seen from records that electricity import of 2 254 kWh during the month of January 2012 is the highest monthly consumption of Hapugastenne II during the period 2007-2012. To be conservative and to meet the requirement of Appendix 1 of project standard, 10 % correction factor has been applied on the electricity import values indicated in the MR for accounting transmission and distribution losses for the period of deviation (January 2007 to August 2008).

For Hulu Ganga I & II, the import readings for the period from February 2007 to September 2008 were issued through a letter dated 26 June 2009 and the monthly values have been obtained by apportioning the value at the end of September 2008. The import value for January 2007 was not covered by CEB letter. A conservative value of 4 917 kWh has been used for the month of January 2007. It is seen from records that electricity import of 4 917 kWh during the month of June 2012 is the highest monthly consumption of Hulu Ganga I&II during 2007-2012.. To be conservative and to meet the requirements of Appendix 1 of project standard, 10% correction factor has been applied on the electricity import values for accounting transmission and distribution losses for the period of deviation (January 2007 to September 2008).

A request of approval for post registration changes with reference number PRC-0085-002 was submitted to CDM EB to address the use of highest monthly consumption during years 2007- 2012 for the months where no monthly bills for electricity import were provided by CEB. The PRC was approved by EB on 18 March 2014[1].

A deviation request with reference number I-Dev 0265 was submitted to the EB which was subsequently rejected by CDM EB. Hence in line with the decision of the UNFCCC EB[2] a deduction based on the maximum inaccuracy specification of the meters has been applied for the period the meters were in use without being

[1] http://cdm.unfccc.int/PRCContainer/DB/prcp202561634/view

[2] http://cdm.unfccc.int/filestorage/A/M/_/AM_CLAR_BP658FWPSL5G1VGM3572Z1QKEI4HZM/Deviation%20from%20the%20monitoring%20plan%20of%20the%20registered%20PDD.pdf?t=U0d8bTVwZGR4fDDeYzjbzXEYMDIaNI5nVXtN

calibrated. This is in line with the requirements of VVS. A deduction due to delay in calibration has been done for complete 5 months to be conservative in case of Hapugastenne I and II projects and 7 months for Hulu Ganga I & II.

	Meter Calibration details		
Name of Units	Hapugastene Phase I	Hapugastenne Phase II	Huluganga Phase I & II
Details of Calibration	09 May 2006 valid till 8 May 2007	09 May 2006 valid till 8 May 2007	26 April 2006 valid till 25 April 2007
	21 September 2007 valid till 20 September 2008	21 September 2007 valid till 20 September 2008	01 March 2007 valid till 29 February 2008
	05 Jan 2008 valid till 04 January 2009	05 Jan 2008 valid till 04 January 2009	27 November 2008 valid till 26 November 2009
	06 November 2008 valid till 05 November 2009	06 November 2008 valid till 05 November 2009	
Gap	Gap of 4 months, 13 days (137 days).	Gap of 4 months, 13 days (137 days)	Gap of 8 months 27 days in calibration. However only a period of 7 months (214 days) fall during the current monitoring period.

B.2.2. Corrections

>>

The registered PDD has been revised to version 4 dated 27 November 2013 to incorporate the following five corrections. The revised PDD has been approved on 18 March 2014[3].

a) Under Table 1, section A.4.3 and E.1.2.5, the registered PDD was indicating the estimated emission reductions as per the envisaged capacity of 13.15 MW. The revised PDD (version 4 dated 27 November 2013) reflects the correct installed capacity of 13.568 MW and the corresponding emissions estimate.

b) Under section D.3 of the registered PDD, no procedures for quality assurance and quality control was included and the same have been incorporated in section B.7.3 of the revised PDD, version 4 dated 27 November 2013.

c) The Annex 1 of the registered PDD has been corrected to reflect the actual details of the contact persons for the project activity as per the latest modalities of communication available in the project interface. Also, the details under section B.5.3 of the registered PDD indicating the contact persons of the entity working out the baseline have been removed.

d) Under section E.1.2.1 of the registered PDD, the equations for calculating the emission reductions related to transportation and small engine related emissions were wrongly including the distance travelled and hours of operation. The same have been rectified as follows:

<u>For transportation-related emissions:</u>

Fuel for transportation (litres of fuel) * 2.68 (kg CO_2/litre)

<u>For small engine-related emissions (cement mixer and generator):</u>

Fuel for operation (litres of fuel) * 2.68 (kg CO_2/litre)

[3] http://cdm.unfccc.int/Projects/DB/SGS-UKL1125677521.56/view

e) Under section E.2, the registered PDD was indicating the estimated construction related emissions. The revised PDD, version 4 dated 27 November 2013 has included the actual construction related emissions under section B.6.3, which is same as the 298.7 tCO_2 indicated in the registered PDD.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

>>

The following has been changed from registered monitoring plan.

In the registered PDD, the monitoring of electricity output from Hulu Ganga I and Hulu Ganga II were mentioned to be from separate meters. 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 electricity generation by the two plants each month.

Thus a single bi-directional meter is used to monitor the electricity output from Hulu Ganga I and Hulu Ganga II projects.

The changes of monitoring plan has been elaborated in the revised PDD of version 4 dated 27 November 2013.

B.2.4. Changes to project design of registered project activity

>>

The following has been changed from registered project activity.

In the registered PDD, the project was to be implemented for a total capacity of 13.15 MW. However, during the actual implementation, the capacity implemented was slightly different from what was registered. This is because while purchasing the equipment, the exact capacity turbines as mentioned in PDD was not available and thus the nearest capacity turbines were installed. The actual combined capacity of project is 13.568 MW with following break-up:

Power Plant	Capacity indicated in the registered PDD (MW)	Actual installed capacity (MW)
Hapugatenne I	4.8	5.052
Hapugastenne II	2.4	2.526
Hulu Ganga I	3.0	3.000
Hulu Ganga II	2.95	2.990
Total Capacity	13.15	13.568

However, it is confirmed that the changes do not have any impact on additionality, scale and applicability/ application of methodology under which project was registered since the difference is only of 0.418 MW.

The changes of project design has been elaborated in the revised PDD of version 4 dated 27 November 2013.

B.2.5. Changes to start date of crediting period

>>

There is no change in start date of crediting period.

B.2.6. Types of changes specific to afforestation or reforestation project activity

>>

Not applicable.

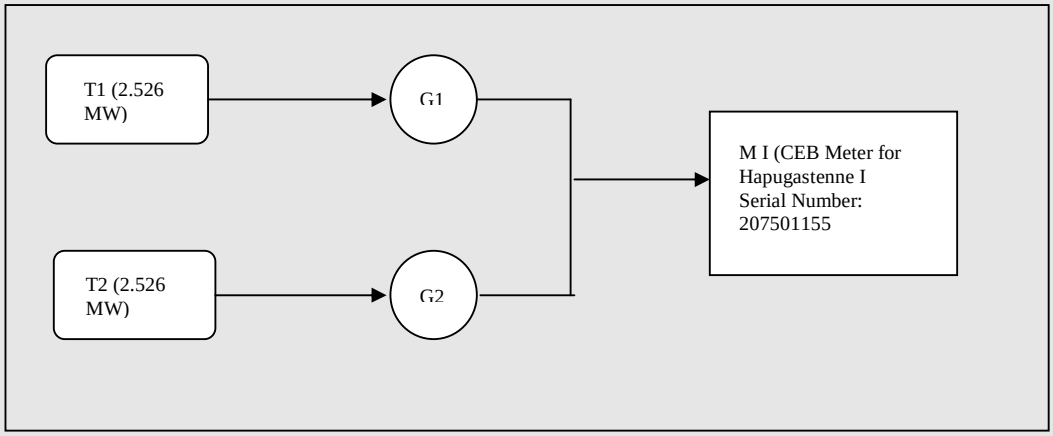
SECTION C. Description of monitoring system

>>

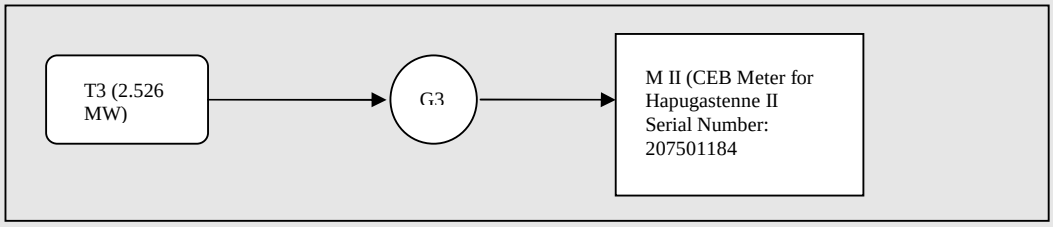
In respect of electricity supplied to the grid and electricity consumption from the grid, no special procedures were necessary to be implemented because the meter readings to determine this supply/consumption were read by an independent third party, the Ceylon Electricity Board (CEB).

In respect of monitoring of environmental parameters 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 of environmental monitoring.

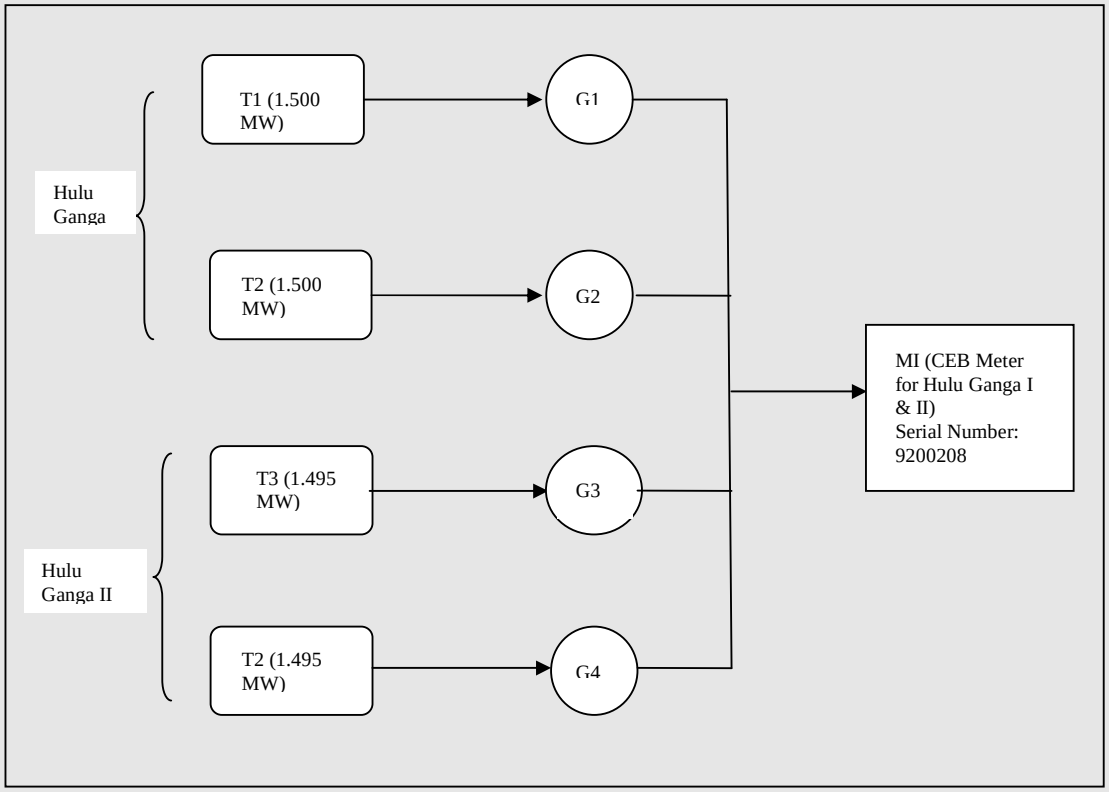
Line Diagram Showing the Monitoring Points for the Project Activity



LINE DIAGRAM SHOWING POINTS OF MONITORING FOR HAPUGASTANNE I



LINE DIAGRAM SHOWING POINTS OF MONITORING FOR HAPUGASTANNE II



LINE DIAGRAM SHOWING POINTS OF MONITORING FOR HULU GANGA I& II

The only quantitative figure that requires monitoring is the actual generation of electricity from each project site. The steps to ensure this and done correctly are as follows.

CEB installs and maintains a primary meter for purposes of billing and payment to EPL. The Metering Equipment is located in close proximity to the facility and is sealed. The equipment is tested and calibrated annually. Both parties also have the right to request a calibration at any time if they believe that the meter is dysfunctional.

For monitoring purposes, the project will conform the standard schedule negotiated with the CEB. This involves a CEB reading of the meter at the end of each month for determination of the electrical energy delivered to and accepted by CEB under the terms of the Power Purchase Agreement (PPA). EPL power plant operators back this information up by taking daily (sometimes hourly) readings of generation levels and recording them on-site. Monitoring data adjustments and uncertainties can only arise if the CEB does not read the meter precisely on the same date each month.

Responsibility of taking readings lies with the operator. The power plants are all automatic and the operators take down periodic readings. If there is some problem with operation, the operator contacts a senior engineer. In the event of a shut-down of the grid, the hydropower facility will automatically switch off and water will no longer be diverted to the turbine.

At the point of project verification, records of electricity generation, meter calibration and CEB power purchase receipts are available at EPL's offices in Colombo. The EPL CEO has direct responsibility for ensuring adherence to and review of compliance with these procedures.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	**EF_y**
Unit:	$kgCO_2/kWh$
Description:	Emission Coefficient
Source of data:	Ceylon Electricity Board (CEB) Expansion Plan 2002-2016
Value(s) applied):	0.8496
Purpose of data:	Calculation of Baseline Estimations
Additional comment:	-

D.2. Data and parameters monitored

Data / Parameter:	**Hapugastenne Phase I Net electricity output (H1-mmyy-kWh)**
Unit:	kWh
Description:	Hapugastenne Phase I project net electricity output
Measured/ Calculated / Default:	Measured
Source of data:	Monthly statements on net electricity supplied to the grid
Value(s) of monitored parameter:	29,265,037
Monitoring equipment:	The data has been measured continuously using calibrated meter and recorded on a monthly basis from the monthly statements.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	The actual net electricity generation was 29,310,051 kWh and was adjusted downwards for generation and upwards for consumption of grid electricity with the accuracy of 0.5% of electricity meter due to delay in calibration.

<table>
<tr><td>QA/QC procedures:</td><td>The bi-directional meter used to measure the electricity output has been calibrated as follows:

<table>
<tr><th>Meter and Accuracy</th><th>Calibrated on</th><th>Valid Till</th></tr>
<tr><td rowspan="2">Meter (replaced)- 0.5%
Serial Number: 81394347</td><td>09 May 2006</td><td>8 May 2007</td></tr>
<tr><td>21 September 2007*</td><td>20 September 2008</td></tr>
<tr><td rowspan="2">Meter (new)- 1%
Serial Number: 207501155</td><td>05 January 2008</td><td>4 January 2009</td></tr>
<tr><td>6 November 2008</td><td>5 November 2009</td></tr>
</table>

The old meter was replaced on 5 January 2008 with a new calibrated meter of accuracy class 1%. Both the old and new meters were calibrated on 5 January 2008.

The data is cross-checked with the invoices raised by the PP on CEB (Ceylon Electricity Board).

* There is a gap of 4 months, 13 days (137 days). However deduction due to delay in calibration has been done for complete 5 months to be conservative in case of Hapugastenne I project.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of Baseline Estimations</td></tr>
<tr><td>Additional comment:</td><td>The data is archived electronically and manually on paper. Data will be kept for two years after the end of crediting period or date of the last issuance of CERs for each project, whichever is later.</td></tr>
</table>

Data / Parameter:	**Hapugastenne Phase II Net electricity output (H2-mmyy-kWh)**
Unit:	kWh
Description:	Hapugastenne Phase II project net electricity output
Measured/ Calculated / Default:	Measured
Source of data:	Monthly statements on net electricity supplied to the grid
Value(s) of monitored parameter:	29,038,755 (on which emission reductions have been calculated)
Monitoring equipment:	The data has been measured continuously using calibrated meter and recorded on a monthly basis from the monthly statements.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	The actual net electricity export was 29,075,545 kWh and was adjusted downwards for generation and upwards for consumption of grid electricity with the accuracy of 0.5% of electricity meter due to delay in calibration.

<table>
<tr><td>QA/QC procedures:</td><td>The bi-directional meter used to measure the electricity output has been calibrated as follows:

<table>
<tr><th>Meter and Accuracy</th><th>Calibrated on</th><th>Valid Till</th></tr>
<tr><td rowspan="2">Meter (replaced)- 0.5% Serial Number: 81394360</td><td>09 May 2006</td><td>8 May 2007</td></tr>
<tr><td>21 September 2007*</td><td>20 September 2008</td></tr>
<tr><td rowspan="2">Meter (new)- 1% Serial Number: 207501184</td><td>05 January 2008</td><td>4 January 2009</td></tr>
<tr><td>6 November 2008</td><td>5 November 2009</td></tr>
</table>

The old meter was replaced on 5 January 2008 with a new calibrated meter of accuracy class 1%. Both the old and new meter were calibrated on 5 January 2008.

The data is cross-checked with the invoices raised by the PP on CEB (Ceylon Electricity Board).

* There is a gap of 4 months, 13 days (137 days). However deduction due to delay in calibration has been done for complete 5 months to be conservative in case of Hapugastenne II project.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of Baseline Estimations</td></tr>
<tr><td>Additional comment:</td><td>The data is archived electronically and manually on paper. Data will be kept for two years after the end of crediting period or date of the last issuance of CERs for each project, whichever is later.</td></tr>
</table>

Data / Parameter:	**Hulu Ganga Phase I & II Net electricity output (HG1-mmyy-kWh and HG2-mmyy-kWh)**
Unit:	kWh
Description:	Hulu Ganga Phase I and Hulu Ganga Phase II project net electricity output
Measured/ Calculated / Default:	Measured
Source of data:	Monthly statements on net electricity supplied to the grid
Value(s) of monitored parameter:	30,343,070
Monitoring equipment:	The data has been measured continuously using calibrated meter and recorded on a monthly basis from the monthly statements.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	The actual net electricity generation was 30,502,358 kWh and was adjusted with the accuracy of 2% of electricity meter due to delay in calibration.

<table>
<tr><td>QA/QC procedures:</td><td>The bi-directional meter used to measure the electricity output has been calibrated as follows:

<table>
<tr><th>Meter and Accuracy</th><th>Calibrated on</th><th>Valid Till</th></tr>
<tr><td rowspan="2">Meter (replaced) – 2%
Serial Number: 59801518</td><td>26 April 2006</td><td>25 April 2007</td></tr>
<tr><td>1 March 2007</td><td>29 February 2008</td></tr>
<tr><td>Meter (New) - 1%
Serial Number: 9200208</td><td>27 November 2008*</td><td>26 November 2009</td></tr>
</table>

The data is cross-checked with the invoices raised by the PP on CEB (Ceylon Electricity Board).

* There is a gap of 9 months in the calibration of which 7 months fall in the current monitoring period. The electricity export has been reduced while electricity import has been increased by the accuracy of the meter.</td></tr>
<tr><td>Purpose of data:</td><td>Calculation of Baseline Estimations</td></tr>
<tr><td>Additional comment:</td><td>The data is archived electronically and manually on paper. Data will be kept for two years after the end of crediting period or date of the last issuance of CERs for each project, whichever is later. The electricity import from the grid is based on the letter from CEB dated 26 June 2009</td></tr>
</table>

Other Parameters (Environmental & Social) benefits have been listed below. These parameters have no impact on emission reduction calculation and have been monitored in-line with the registered PDD.

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
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 (LKR)
29/03/2007	369/317468	Donating a drum for Nissanka Kalayathanaya (art centre) Amunutenna	4,800.00
15/08/2007	458/509339	First instalment to the contractor for providing water supply & constructing a community bathing place at Hapugastenna	45,000.00
16/08/2007	Labour charges no invoice number	Transporting PVC pipes from Maliboda to Hapugastenna for the community bathing place.	9,500.00
03/12/2007	793/664323	Final payment to the contractor for providing water supply & constructing a community bathing place at Hapugastenna	157,959.00
13/03/2008	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 community water pipes system.	50,000.00
09/10/2008	897	Cost of renovation of Kirindawala road	50,000.00

Environmental Parameters – Hulu Ganga I & 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 Hulu Ganga and 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 I & II Plants

Employee category	Number of Employees (Phase I)	Number of Employees (Phase II)
Power Station Assistants	3	3
Power Station Operators	3	3

Community Development Expenditure – Hulu Ganga I & II Plants

Date	Invoice Number	Nature of Expenditure	Amount (LKR)	Phase
30/04/2007	18/901006	Donation to Kosgama temple for development work.	150,000	Phase I
30/04/2007	18/901006	Donation to Kosgama Maha Vidyalaya.	25,000	Phase I
30/04/2007	18/901006	Donation to Kosgama Ihalagama Development Committee for reparing water tank.	25,000	Phase I
29/05/2008	613	Donation to Panwila Praseshiya Sabha	7,500	Phase I
11/08/2008	592	Donation to Kosgama Ihalagama Development Committee.	200,000	Phase I
24/11/2008	1016	Donation to Kosgama Ihalagama Development Committee for temple and school development.	200,000	Phase I

D.3. Implementation of sampling plan

>>
No sampling is involved.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>
Baseline emissions reduction for each project is derived by multiplying the electricity output to the grid (in kWh) by the baseline emissions factor. The ex-ante emission factor as per the PDD which is used for the purpose of monitoring is 0.8496 kgCO_2 per kWh.

Hapugastenne Phase I							
Month	Electricity Output (kWh)			Consumption from Grid (kWh)	Addition for Non Calibration of Meter	Adjusted Consumption	Net Electricity Output (kWh)
	As per Meter Reading	Deduction for Non Calibration of	Adjusted Electricity Output				
2007							
January	1,53,970		1,53,970	960		960	1,53,010
February	82,280		82,280	960		960	81,320
March	70,580		70,580	960		960	69,620
April	9,29,630		9,29,630	960		960	9,28,670
May	16,12,370	8,062	16,04,308	960	5	965	16,03,343
June	16,63,960	8,320	16,55,640	960	5	965	16,54,675
July	17,94,270	8,971	17,85,299	960	5	965	17,84,334
August	5,05,330	2,527	5,02,803	960	5	965	5,01,839
September	34,22,060	17,110	34,04,950	960	5	965	34,03,985
October	31,02,690		31,02,690	960		960	31,01,730
November				960		960	20,87,050

	20,88,010		20,88,010				
December	6,62,830		6,62,830	960		960	6,61,870
2008							
January	2,95,307		2,95,307	40,026		40,026	2,55,281
February	4,34,039		4,34,039	4,652		4,652	4,29,387
March	11,27,304		11,27,304	3,097		3,097	11,24,207
April	22,07,430		22,07,430	552		552	22,06,878
May	15,97,419		15,97,419	1,319		1,319	15,96,100
June	23,21,841		23,21,841	79		79	23,21,762
July	23,84,610		23,84,610	40		40	23,84,570
August	11,83,540		11,83,540	660		660	11,82,880
September	17,34,560		17,34,560	2,034		2,034	17,32,526
Total	**2,93,74,030**		**2,93,29,040**	**63,979**		**64,003**	**2,92,65,037**

Hapugastenne Phase II							
Month	**Electricity Output (kWh)**			**Consumption from Grid (kWh) incorporating 10%T&D losses**	**Addition for Non Calibration of Meter**	**Adjusted Consumption**	**Net Electricity Output (kWh)**
	As per Meter Reading	**Deduction for Non Calibration of Meter**	**Adjusted Electricity Output**				
2007							
January	11,20,620		11,20,620	2,479		2,479	1,118,141
February	6,91,020		6,91,020	2,479		2,479	688,541
March	5,15,350		5,15,350	2,479		2,479	512,871
April	12,95,200		12,95,200	2,479		2,479	1,292,721
May	16,57,890	8,289	16,49,601	2,479	12	2,492	1,647,109
June	14,55,030	7,275	14,47,755	2,479	12	2,492	1,445,263
July	14,37,060	7,185	14,29,875	2,479	12	2,492	1,427,383
August	11,60,900	5,805	11,55,096	2,479	12	2,492	1,152,604
September	16,34,680	8,173	16,26,507	2,479	12	2,492	1,624,015
October	16,78,540		16,78,540	2,479		2,479	1,676,061
November	15,05,660		15,05,660	2,479		2,479	1,503,181
December	15,44,380		15,44,380	2,479		2,479	1,541,901
2008							
January	13,70,592		13,70,592	2,479		2,479	1,368,113
February	11,50,526		11,50,526	2,479		2,479	1,148,047
March	14,30,304		14,30,304	2,479		2,479	1,427,825
April				2,479		2,479	

	17,95,890		17,95,890				1,793,411
May	13,46,007		13,46,007	2,479		2,479	1,343,528
June	15,17,453		15,17,453	2,479		2,479	1,514,974
July	17,55,240		17,55,240	392		392	1,754,848
August	15,70,900		15,70,900	392		392	1,570,508
September	14,87,730		14,87,730	15		15	1,487,715
Total	**2,91,20,972**		**2,90,84,244**	**45,427**		**45,489**	**29,038.755**

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. This has been taken for all the months during the current monitoring period.

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 monthly grid consumption in the previous months is equal to the highest monthly consumption of Hapugastenne II during years 2007-2012 for which billing is available. It is seen from records that electricity import of 2,254 kWh during the month of January 2012 is the highest monthly consumption of Hapugastenne II during years 2007-2012. As a result, 2,254 kWh has been used conservatively for months where bill was not provided. To be conservative and to meet the requirement of Appendix 1 of project standard, 10 % correction factor has been applied on the electricity import values indicated in the MR for accounting transmission and distribution losses for the period of deviation. Thus the monthly values applied for electricity imported from the grid are 2,479 kWh (for period January 2007 to June 2008) and 392 kWh (July and August 2008) respectively. The monthly grid consumption has been adjusted for non-calibration of meters during five months as detailed in the above tables.

NET ELECTRICITY OUTPUT (HULU GANGA PHASE I AND II PLANTS TOGETHER)							
Month	**Electricity Output (kWh)**			**Consumption from Grid (kWh) incorporating 10%T&D losses**			***Net Electricity Output (kWh)**
	As per Meter Reading	**Deduction for Non Calibration of Meter**	**Adjusted Electricity Output**		**Addition for Non Calibration of Meter (kWh)**	**Adjusted Consumption (kWh)**	
2007							
January	28,57,000		28,57,000	5,409		5,409	28,51,591
February	9,69,500		9,69,500	781		781	9,68,719
March	2,01,800		2,01,800	798		798	2,01,003
April	5,52,000		5,52,000	798		798	5,51,203
May	3,61,000		3,61,000	798		798	3,60,203
June	13,54,700		13,54,700	798		798	13,53,903
July	16,93,800		16,93,800	798		798	16,93,003
August	5,93,400		5,93,400	798		798	5,92,603
September	23,10,800		23,10,800	798		798	23,10,003
October	38,22,300		38,22,300	798		798	38,21,503
November	9,37,700		9,37,700	798		798	9,36,903

December	32,45,200		32,45,200	798		798	32,44,403
2008							
January	27,67,900		27,67,900	798		798	27,67,103
February	8,97,800		8,97,800	798		798	8,97,003
March	26,19,200	52,384	25,66,816	798	16	814	25,66,003
April	19,02,700	38,054	18,64,646	798	16	814	18,63,833
May	7,07,100	14,142	6,92,958	798	16	814	6,92,145
June	2,99,700	5,994	2,93,706	798	16	814	2,92,893
July	8,54,500	17,090	8,37,410	798	16	814	8,36,597
August	7,65,900	15,318	7,50,582	798	16	814	7,49,769
September	8,09,700	16,194	7,93,506	798	16	814	7,92,693
Total	**3,05,23,700**		**3,03,64,524**	**21,342**		**21,454**	**3,03,43,070**

*The net electricity calculated considers the electricity imported. As per the registered Project Design Document of the project, the primary recording of the electricity exported to the grid is the meter located at the point of interconnection to the grid. This meter is installed and maintained by the Ceylon Electricity Board (CEB). The measurement is recorded monthly by CEB and forms the basis for the calculation of the emission reductions. The quantity of electricity imported by the Hulu Ganga project is provided by CEB. CEB has provided the quantity of electricity imported by the Hulu Ganga project for the period February 2007 till March 2009 by equally apportioning the import meter readings for all the months. Import of electricity for the period of February 2007 to 30 September 2008 (current monitoring period) amounts to 14485 kWh and same has been accounted in net electricity generation.

The monthly bill for electricity import was not issued by CEB for the month of January 2007. Therefore, a conservative assumption has been made that monthly grid consumption of January 2007 is equal to the highest monthly consumption of Hulu Ganga I & II during years 2007-2012 for which billing is available. It is seen from records that electricity import of 4,917 kWh during the month of June 2012 is the highest monthly consumption of Hulu Ganga I&II during years 2007-2012.

To be conservative and to meet the requirement of Appendix 1 of project standard, 10 % correction factor has been applied on the electricity import values indicated in the MR for accounting transmission and distribution losses for the period of deviation. Thus the monthly values applied for electricity imported from the grid are 5,409 kWh (for January 2007), 781 kWh (February 2007) and 798 kWh (March 2007 to September 2008) respectively. The monthly grid consumption has been adjusted for non-calibration of meters during seven months as detailed in the above table.

Hapugastenne Phase I
Baseline emissions reduction (29,265,037*0.8496)/10^3 = 24,863 tCO_2e (after rounding down)

Hapugastenne Phase II
Baseline emissions reduction (29,038,755*0.8496)/10^3 = 24,671 tCO_2e (after rounding down)

Hulu Ganga Phase I and II
Baseline emissions reduction (30,343,070*0.8496) = 25,779 tCO_2e (after rounding down)

All Plants in PDD
Baseline emissions reduction = 75,313 tCO_2e (after rounding down)

E.2. Calculation of project emissions or actual net GHG removals by sinks

>>

The Project Development Document for the Hapugastenne and Hulu Ganga Small Hydropower Projects estimated that 298.7 tCO_2 would be generated during the site preparation and construction stage of the project and that these emissions would be deducted from the first year emission 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.

The total project emissions are thus calculated to be 299 tCO_2e after rounding up.

There are no other project emissions related to the project activity.

E.3. Calculation of leakage

>>
There are no leakage emissions associated.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total	75,313	299	0	75,014

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	87,177	75,014

E.6. Remarks on difference from estimated value in registered PDD

>>
The actual emissions achieved are 75,014 tCO_2e for the current monitoring period as compared to estimated 87,177 in the revised PDD. Thus the achieved emission reductions are less than the estimated emissions in registered PDD because of the lower power factor achieved.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	75,014	0

- - - - -

Document information

Version	*Date*	*Description*
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: issuance
Keywords: monitoring report, performance monitoring