



## Monitoring report form (Version 03.2)

### Monitoring report

|  |   |
|--|---|
| <b>Title of the project activity</b>   | Hapugastenne and Hulu Ganga Small Hydropower Projects   |
| <b>Reference number of the project activity</b>  | 0085  |
| <b>Version number of the monitoring report</b>   | 5   |
| <b>Completion date of the monitoring report</b>  | 01/04/2014  |
| <b>Registration date of the project activity</b>   | 30/10/2005  |
| <b>Monitoring period number and duration of this monitoring period</b>   | Fourth<br>01/10/2008 to 31/12/2009 (Both days included)   |
| <b>Project participant(s)</b>  | Eco Power (Private) Ltd. (EPL)  |
| <b>Host Party(ies)</b>   | Sri Lanka   |
| <b>Sectoral scope(s) and applied methodology(ies)</b>  | Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)<br>Type I: Renewable energy projects<br>Category D: Renewable Electricity Generation for a Grid<br>Methodology: AMS-I.D, version 5, "Renewable electricity generation for a grid" |
| <b>Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD</b>           | 62,347 t CO <sub>2</sub>  |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period</b>                                      | 55,448 t CO <sub>2</sub>  |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)</b>        | 55,448 t CO <sub>2</sub>  |
| <b>Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).</b> | 0   |

**SECTION A. Description of project activity****A.1. Purpose and general description of project activity**

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***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  | 14/08/2001            |
| Hapugastenne Phase II | 09/09/2002            |
| Hulu Ganga Phase I    | 03/06/2003            |
| Hulu Ganga Phase II   | 25/10/2006            |

***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 55,448 tCO<sub>2</sub> over the monitoring period of 01 October 2008 to 31 December 2009.

**A.2. Location of project activity**

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- 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° 42.1' / Latitude E 80° 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° 23.5' / Latitude E 80° 44.8'

Hulu Ganga Phase II Small Hydropower Project  
Longitude N 7°23.3' / Latitude E 80° 44.5'

**A.3. Parties and project participant(s)**

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

**A.4. Reference of applied methodology**

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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**

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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

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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  | 14/08/2001            |
| Hapugastenne Phase II | 09/09/2002            |
| Hulu Ganga Phase I    | 03/06/2003            |
| Hulu Ganga Phase II   | 25/10/2006            |

### B.2. Post registration changes

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

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During this monitoring period, CEB did not issue the statement for electricity imported through Hulluganga I & II metering point at monthly intervals as indicated in the monitoring plan. CEB started issuing the regular monthly bills of electricity imported for Hulu Ganga I & II from May 2009.

For Hulu Ganga I & II, the import readings for the period from October 2008 to April 2009 were issued through a consolidated import bill via letter dated 26 June 2009 and the monthly values have been obtained by apportioning the value at the end of April 2009. 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.

A request of approval for post registration changes with reference number PRC-0085-002 was submitted to CDM EB and the PRC was approved on 18 March 2014<sup>1</sup>.

#### B.2.2. Corrections

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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<sup>2</sup>.

- 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.
- 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.
- 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.
- 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:

<sup>1</sup> <http://cdm.unfccc.int/PRCContainer/DB/prcp202561634/view>

<sup>2</sup> <http://cdm.unfccc.int/Projects/DB/SGS-UKL1125677521.56/view>

For transportation-related emissions:

Fuel for transportation \* 2.68  
(litres of fuel) (kg CO<sub>2</sub>/litre)

For small engine-related emissions (cement mixer and generator):

Fuel for operation \* 2.68  
(litres of fuel) (kg CO<sub>2</sub>/litre)

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<sub>2</sub> indicated in the registered PDD.

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

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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**

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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) |
|-----------------|---|--------------------------------|
| Hapugattenne 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**

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There is no change in start date of crediting period.

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

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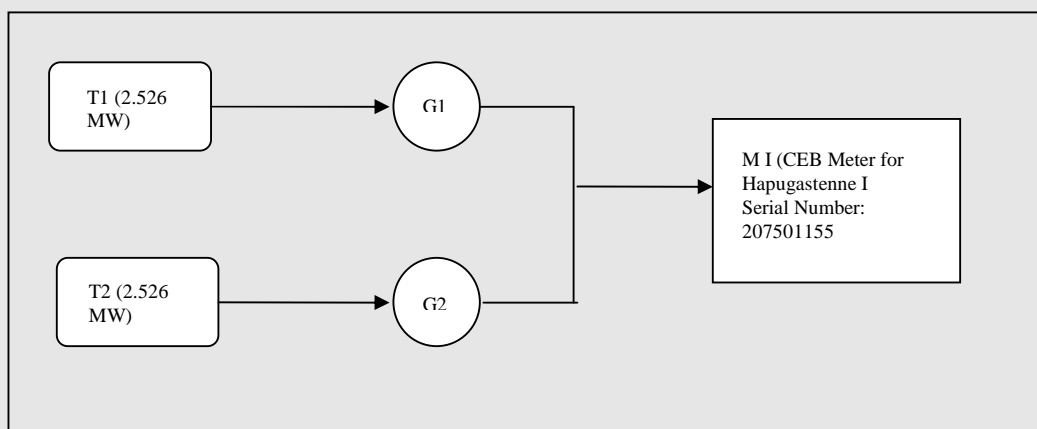
Not applicable.

**SECTION C. Description of monitoring system**

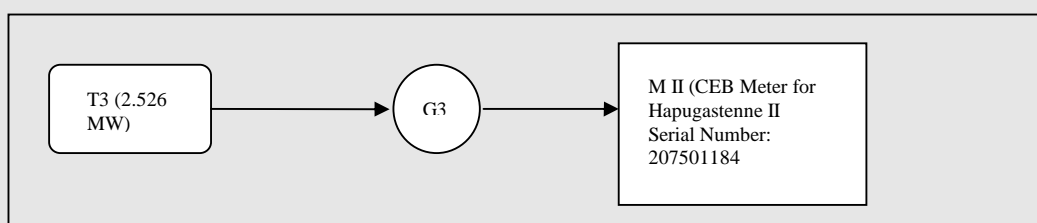
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In respect of electricity supplied to the grid and electricity consumption from the grid, no special procedures were necessary to be implemented because the meter readings to determine this supply/consumption were read by an independent third party,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

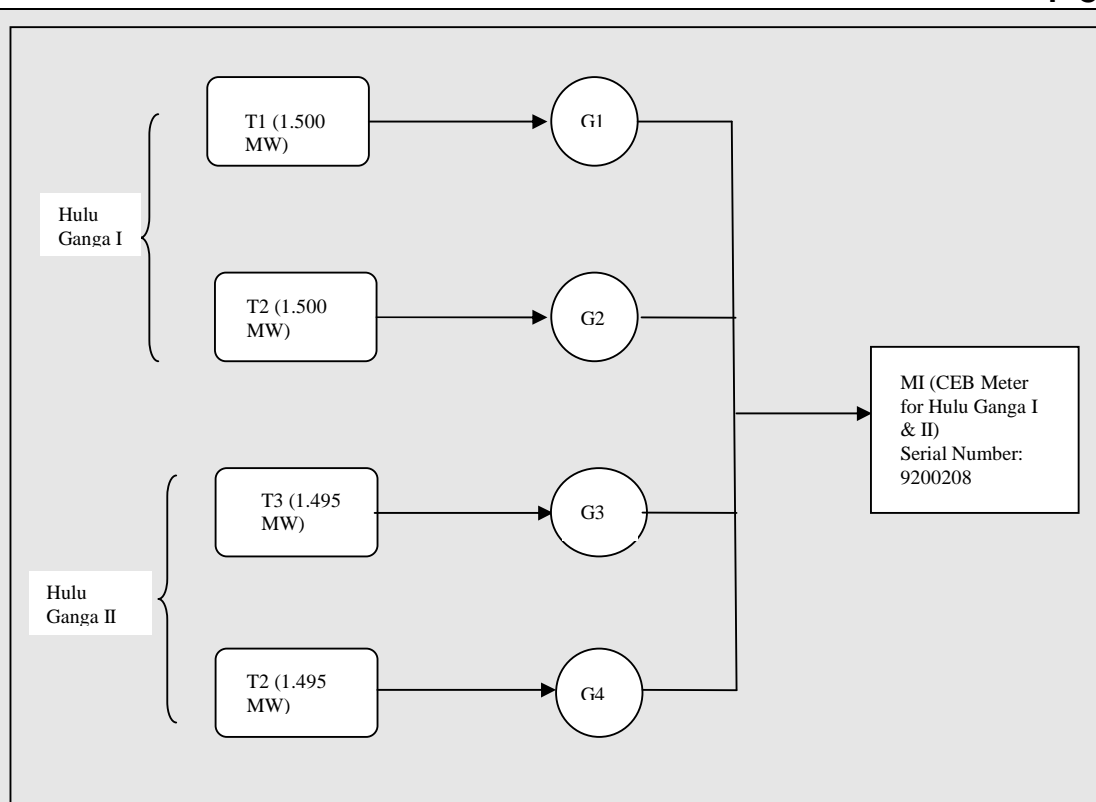
In respect of monitoring of environmental parameters the Senior Manager – Operations of the company has been specifically tasked with ensuring the regular checks of erosion and sediment are carried out and also to arrange for the test reports required as part of environmental monitoring.

***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**

|                          |   |
|--------------------------|---|
| <b>Data / Parameter:</b> | <b>EF<sub>y</sub></b>                                   |
| Unit:                    | kgCO <sub>2</sub> /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/<br>Calculated /<br>Default:   | Measured  |                 |                 |
| Source of data:   | Monthly statements on net electricity supplied to the grid  |                 |                 |
| Value(s) of<br>monitored<br>parameter:  | 23,747,748 (on which emission reductions have been calculated)  |                 |                 |
| Monitoring<br>equipment:  | The data has been measured continuously using calibrated meter and recorded on a monthly basis from the monthly statements. |                 |                 |
| Measuring/<br>Reading/<br>Recording<br>frequency:   | Monthly   |                 |                 |
| Calculation method<br>(if applicable):  | -   |                 |                 |
| QA/QC procedures:   | The bi-directional meter used to measure the electricity output has been calibrated as follows:                             |                 |                 |
|   | Meter and Accuracy  | Calibrated on   | Valid Till      |
|   | Meter (new)- 1%   | 05 January 2008 | 4 January 2009  |
|   | Serial Number:  | 6 November 2008 | 5 November 2009 |
|   | 207501155   | 3 June 2009     | 2 June 2010     |
|   | The old meter was replaced on 5 January 2008 with a new calibrated meter of accuracy class 1%.                              |                 |                 |
| The data is cross-checked with the invoices raised by the PP on CEB (Ceylon Electricity Board). |   |                 |                 |
| Purpose of data:  | Calculation of Baseline Estimations   |                 |                 |



|                     |   |  |
|---------------------|---|--|
| Additional comment: | 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. |  |
|---------------------|---|--|

| <b>Data / Parameter:</b>                          | <b>Hapugastenne Phase II Net electricity output (H2-mmyy-kWh)</b>  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
|---|--|-----------------|--------------------|---------------|------------|-----------------|-----------------|----------------|-----------------------------|-----------------|-----------------|--|-------------|-------------|
| Unit:   | kWh  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Description:                                      | Hapugastenne Phase II project net electricity output   |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Measured/<br>Calculated /<br>Default:             | Measured   |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Source of data:                                   | Monthly statements on net electricity supplied to the grid   |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Value(s) of<br>monitored<br>parameter:            | 20,767,363 (on which emission reductions have been calculated)   |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Monitoring<br>equipment:                          | The data has been measured continuously using calibrated meter and recorded on a monthly basis from the monthly statements.  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Measuring/<br>Reading/<br>Recording<br>frequency: | Monthly  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Calculation method<br>(if applicable):            | -  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| QA/QC procedures:                                 | <p>The bi-directional meter used to measure the electricity output has been calibrated as follows:</p> <table border="1"> <thead> <tr> <th>Meter and Accuracy</th> <th>Calibrated on</th> <th>Valid Till</th> </tr> </thead> <tbody> <tr> <td>Meter (new)- 1%</td> <td>05 January 2008</td> <td>4 January 2009</td> </tr> <tr> <td>Serial Number:<br/>207501184</td> <td>6 November 2008</td> <td>5 November 2009</td> </tr> <tr> <td></td> <td>3 June 2009</td> <td>2 June 2010</td> </tr> </tbody> </table> <p>The old meter was replaced on 5 January 2008 with a new calibrated meter of accuracy class 1%.</p> <p>The data is cross-checked with the invoices raised by the PP on CEB (Ceylon Electricity Board).</p> |                 | Meter and Accuracy | Calibrated on | Valid Till | Meter (new)- 1% | 05 January 2008 | 4 January 2009 | Serial Number:<br>207501184 | 6 November 2008 | 5 November 2009 |  | 3 June 2009 | 2 June 2010 |
| Meter and Accuracy                                | Calibrated on  | Valid Till      |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Meter (new)- 1%                                   | 05 January 2008  | 4 January 2009  |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Serial Number:<br>207501184                       | 6 November 2008  | 5 November 2009 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
|   | 3 June 2009  | 2 June 2010     |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Purpose of data:                                  | Calculation of Baseline Estimations  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |
| Additional comment:                               | 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.  |                 |                    |               |            |                 |                 |                |                             |                 |                 |  |             |             |

|                                       |   |  |
|---------------------------------------|---|--|
| <b>Data / Parameter:</b>              | <b>Hulu Ganga Phase I &amp; II Net electricity output (HG1-mmyy-kWh and HG2-mmyy-kWh)</b> |  |
| Unit:                                 | kWh   |  |
| Description:                          | Hulu Ganga Phase I and Hulu Ganga Phase II project net electricity output                 |  |
| Measured/<br>Calculated /<br>Default: | Measured  |  |
| Source of data:                       | Monthly statements on net electricity supplied to the grid                                |  |

|   |   |                  |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
|---|---|------------------|--|--------------------|---------------|------------|---|--------------|------------------|---|-------------------|------------------|--|------------------|------------------|
| Value(s) of monitored parameter:                    | 20,750,113 (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 generation was 20,807,958 kWh and was adjusted with the accuracy of 2% of electricity meter due to delay in calibration.   |                  |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
| QA/QC procedures:                                   | <div>The bi-directional meter used to measure the electricity output has been calibrated as follows:</div> <table><tr><td>Meter and Accuracy</td><td>Calibrated on</td><td>Valid Till</td></tr><tr><td>Meter (replaced) – 2%<br/>Serial Number:<br/>59801518</td><td>1 March 2007</td><td>29 February 2008</td></tr><tr><td>Meter (New) - 1%<br/>Serial Number:<br/>9200208</td><td>27 November 2008*</td><td>26 November 2009</td></tr><tr><td></td><td>13 November 2009</td><td>12 November 2010</td></tr></table> <div>The data is cross-checked with the invoices raised by the PP on CEB (Ceylon Electricity Board).</div> <div>* The old meter was replaced with a new calibrated meter of accuracy class 1%.</div> <div>There is a gap of 9 months in the calibration of which 2 months (October and November 2008) fall in the current monitoring period. The electricity export has been reduced while electricity import has been increased by the accuracy of the meter.</div> |                  |  | Meter and Accuracy | Calibrated on | Valid Till | Meter (replaced) – 2%<br>Serial Number:<br>59801518 | 1 March 2007 | 29 February 2008 | Meter (New) - 1%<br>Serial Number:<br>9200208 | 27 November 2008* | 26 November 2009 |  | 13 November 2009 | 12 November 2010 |
| Meter and Accuracy                                  | Calibrated on   | Valid Till       |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
| Meter (replaced) – 2%<br>Serial Number:<br>59801518 | 1 March 2007  | 29 February 2008 |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
| Meter (New) - 1%<br>Serial Number:<br>9200208       | 27 November 2008*   | 26 November 2009 |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
|   | 13 November 2009  | 12 November 2010 |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
| Purpose of data:                                    | Calculation of Baseline Estimations   |                  |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |
| Additional comment:                                 | 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.   |                  |  |                    |               |            |   |              |                  |   |                   |                  |  |                  |                  |

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.

#### A) Hapugastenne Phase I and II Plants

##### 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  | 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 |

#### 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       | Payee                                    | Nature of Expenditure       | Amount (LKR) |
|------------|--|-----------------------------|--------------|
| 29/10/2008 | Village Development Society-Keeriwandala | Road development            | 50,000       |
| 04/02/2009 | Village Development Society-Keeriwandala | Road development            | 50,000       |
| 24/07/2009 | Sri Neegrodaramaya, Gallalla, Rathnapura | New constructions at temple | 50,000       |
| 24/09/2009 | Rathgala Viddalaya                       | Prizes - New Year Festival  | 4,800        |
| 07/10/2009 | Pradesiya Saba -Rathnapura               | Community welfare           | 50,000       |

#### B) Hulu Ganga Phase I and II Plants

##### 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   | September 2008 and August 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 August 2009     |
| Ecology            | Flora and fauna   | Within the courses of Hulu Ganga below the diversion point.  | April 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 |

##### 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       | September 2008 and August 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 August 2009     |
| Ecology            | Flora and fauna    | Within the courses of Moragaha Oya below the diversion point.  | April 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 |

#### Employment Details – Hulu Ganga Phase I and II Plants

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

#### Community Development Expenditure – Hulu Ganga Phase I and II Plants

| Date       | Payee                    | Nature of Expenditure               | Amount (LKR) |
|------------|--------------------------|-------------------------------------|--------------|
| 24/11/2008 | Kosgama Development Fund | Village development (school/temple) | 200,000      |

#### 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<sub>2</sub> per kWh.

#### Electricity Output – Hapugastenne Phase I Plant

| Month       | Electricity Output (kWh) | Source (Invoice Nos raised for CEB) | Consumption from Grid (kWh) | Net Electricity Output (kWh) |
|-------------|--------------------------|-------------------------------------|-----------------------------|------------------------------|
| <b>2008</b> |                          |                                     |                             |                              |
| October     | 1,773,770                | 4035                                | 2,001                       | 1,771,769                    |
| November    | 1,103,330                | 4036                                | 3,263                       | 1,100,067                    |
| December    | 1,892,130                | 4037                                | 843                         | 1,891,287                    |
| <b>2009</b> |                          |                                     |                             |                              |
| January     | 72,350                   | 4038                                | 8,055                       | 64,295                       |
| February    | 6,617                    | 4040                                | 7,099                       | (482)                        |
| March       | 586,583                  | 4041                                | 5,214                       | 581,369                      |
| April       | 1,028,422                | 4042                                | 2,831                       | 1,025,591                    |
| May         | 1,203,330                | 4043                                | 4,403                       | 1,198,927                    |
| June        | 3,594,088                | 4044                                | 13                          | 3,594,075                    |
| July        | 1,724,020                | 4045                                | 1,071                       | 1,722,949                    |

|              |                   |      |               |                   |
|--------------|-------------------|------|---------------|-------------------|
| August       | 1,681,080         | 4046 | 575           | 1,680,505         |
| September    | 2,828,800         | 4047 | 26            | 2,828,774         |
| October      | 2,191,280         | 4048 | 46            | 2,191,234         |
| November     | 1,964,710         | 4049 | 361           | 1,964,349         |
| December     | 2,133,091         | 4050 | 52            | 2,133,039         |
| <b>Total</b> | <b>23,783,601</b> |      | <b>35,853</b> | <b>23,747,748</b> |

#### Electricity Output – Hapugastenne Phase II Plant

| Month        | Electricity Output (kWh) | Source (Invoice Nos raised for CEB) | Consumption from Grid (kWh) | Net Electricity Output (kWh) |
|--------------|--------------------------|-------------------------------------|-----------------------------|------------------------------|
| <b>2008</b>  |                          |                                     |                             |                              |
| October      | 1,576,590                | 5035                                | 10                          | 1,576,580                    |
| November     | 1,328,250                | 5036                                | 216                         | 1,328,034                    |
| December     | 1,622,810                | 5037                                | 178                         | 1,622,632                    |
| <b>2009</b>  |                          |                                     |                             |                              |
| January      | 1,050,160                | 5038                                | 176                         | 1,049,984                    |
| February     | 524,090                  | 5040                                | 38                          | 524,052                      |
| March        | 719,980                  | 5041                                | 938                         | 719,042                      |
| April        | 1,421,321                | 5042                                | 73                          | 1,421,248                    |
| May          | 1,273,681                | 5043                                | 91                          | 1,273,590                    |
| June         | 1,674,708                | 5044                                | 27                          | 1,674,681                    |
| July         | 1,452,570                | 5045                                | 128                         | 1,452,442                    |
| August       | 1,455,060                | 5046                                | 143                         | 1,454,917                    |
| September    | 1,591,800                | 5047                                | 170                         | 1,591,630                    |
| October      | 1,458,800                | 5048                                | 260                         | 1,458,540                    |
| November     | 1,595,010                | 5049                                | 487                         | 1,594,523                    |
| December     | 2,025,680                | 5050                                | 212                         | 2,025,468                    |
| <b>Total</b> | <b>20,770,510</b>        |                                     | <b>3,147</b>                | <b>20,767,363</b>            |

#### Electricity Output – Hulu Ganga Phase I and II Plants

| Electricity Output - Hind Ganga Phase I and II Plants |                          |  |                             |                                     |   |                                       |                      |                              |
|---|--------------------------|--|-----------------------------|-------------------------------------|---|---------------------------------------|----------------------|------------------------------|
| Month   | Electricity Output (kWh) |  |                             | Source (Invoice Nos raised for CEB) | 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 |                                     |   |                                       |                      |                              |
| 2008  |                          |  |                             |                                     |   |                                       |                      |                              |
| October   | 1,198,500                | 23,970                                 | 1,174,530                   | 6036                                | 798   | 16                                    | 813                  | 1,173,717                    |
| November  | 1,692,120                | 33,842                                 | 1,658,278                   | 6037                                | 798   | 16                                    | 813                  | 1,657,464                    |
| December  | 3,192,080                |  | 3,192,080                   | 6038                                | 798   |                                       | 798                  | 3,191,283                    |
| 2009  |                          |  |                             |                                     |   |                                       |                      |                              |
| January   | 1,099,000                |  | 1,099,000                   | 6039                                | 798   |                                       | 798                  | 1,098,203                    |
| February  | 337,000                  |  | 337,000                     | 6040                                | 798   |                                       | 798                  | 336,203                      |
| March   | 459,000                  |  | 459,000                     | 6041                                | 798   |                                       | 798                  | 458,203                      |
| April   | 439,000                  |  | 439,000                     | 6042                                | 798   |                                       | 798                  | 438,203                      |
| May   | 949,000                  |  | 949,000                     | 6043                                | 3120  |                                       | 3120                 | 945,880                      |

|              |                   |               |                   |      |               |           |               |                   |
|--------------|-------------------|---------------|-------------------|------|---------------|-----------|---------------|-------------------|
| June         | 793,000           |               | 793,000           | 6044 | 120           |           | 120           | 792,880           |
| July         | 897,000           |               | 897,000           | 6045 | 180           |           | 180           | 896,820           |
| August       | 942,500           |               | 942,500           | 6046 | 660           |           | 660           | 941,840           |
| September    | 1,356,500         |               | 1,356,500         | 6047 | 180           |           | 180           | 1,356,320         |
| October      | 1,465,000         |               | 1,465,000         | 6049 | 180           |           | 180           | 1,464,820         |
| November     | 2,830,000         |               | 2,830,000         | 6050 | 60            |           | 60            | 2,829,940         |
| December     | 3,168,460         |               | 3,168,460         | 6051 | 120           |           | 120           | 3,168,340         |
| <b>Total</b> | <b>20,818,160</b> | <b>57,812</b> | <b>20,760,348</b> |      | <b>10,203</b> | <b>32</b> | <b>10,234</b> | <b>20,750,113</b> |

\* The quantity of electricity imported by the Hulu Ganga project is provided by CEB. As reported in the third verification (January 2007 to September 2008), regular monthly import readings were available only from May 2009. The import readings for the period prior to May 2009 were issued by CEB through a letter dated 26 June 2009 and the monthly values have been obtained by apportioning the value at the end of April 2009. 725 units have been taken as the average monthly consumption for the period of October 2008 to April 2009 (current monitoring period). 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.

#### Hapugastenne Phase I

Baseline emissions reduction  $(23,747,748 \times 0.8496) / 10^3 = 20,176 \text{ tCO}_2\text{e}$  (after rounding down)

#### Hapugastenne Phase II

Baseline emissions reduction  $(20,767,363 \times 0.8496) / 10^3 = 17,643 \text{ tCO}_2\text{e}$  (after rounding down)

#### Hulu Ganga Phase I and II

Baseline emissions reduction  $(20,750,113 \times 0.8496) / 10^3 = 17,629 \text{ tCO}_2\text{e}$  (after rounding down)

#### All Plants in PDD

Baseline emissions reduction =  $55,448 \text{ tCO}_2\text{e}$  (after rounding down)

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

>>

There are no project emissions.

### E.3. Calculation of leakage

>>

There are no leakage emissions associated with the project activity.

### 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 <sub>2</sub> e) | Project emissions or actual net GHG removals by sinks (t CO <sub>2</sub> e) | Leakage (t CO <sub>2</sub> e) | Emission reductions or net anthropogenic GHG removals by sinks (t CO <sub>2</sub> e) |
|--------------|--|---|-------------------------------|--|
| <b>Total</b> | 55,448   | 0   | 0                             | 55,448   |

**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 |
|---|--|--|
| <b>Emission reductions or GHG removals by sinks (t CO<sub>2</sub>e)</b> | 62,347<br>(Estimated annual emission reductions as per revised PDD is 49,796 tCO <sub>2</sub> e) | 55,448   |

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

&gt;&gt;

The emission reductions achieved in the monitoring period are 11% lower than the estimation.

**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 |
|---|---|--|
| <b>Emission reductions or GHG removals by sinks (t CO<sub>2</sub>e)</b> | 55,448  | 0  |

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**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).   |
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