



Monitoring report form (Version 03.1)

Monitoring report

Title of the project activity	Sanquhar and Delta Small Hydro Power Projects
Reference number of the project activity	0751
Version number of the monitoring report	1.0
Completion date of the monitoring report	31/1/2013
Registration date of the project activity	11/12/2006
Monitoring period number and duration of this monitoring period	3 rd (First and Last Days included (01/09/09 – 31/12/10))
Project participant(s)	Hydro Power Free Lanka (Pvt) Ltd (Sri Lanka) VOLTALIA (Switzerland)
Host Party(ies)	Sri Lanka
Sectoral scope(s) and applied methodology(ies)	1. Energy Industries (renewable - / non – renewable sources) AMS-1.D. Version 09
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	5,489 tCO ₂ e / 365 Days * 487 Days = 7,323 tCO ₂ e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	9,653 tCO ₂ e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

This monitoring Report Presents the details of two small – scale, run of river hydropower plants in Sri Lanka, owned by Hydro Power Free Lanka (Pvt) Ltd. Each plant has an installed capacity of 1.6 MW. Sanquhar was commissioned in December 2003 and Delta was commissioned in April 2006. HPFL Signed the agreement with the Authorities in September 2000 to implement these sites and construction at Sanquhar was commenced in April 2001. The construction for Delta commenced November 2004. The sites are located at Sanquhar and Delta Tea estate respectively, in the Central Province, in Kandy District. Both Estates operated by Pussellawa Plantation Limited under a long term lease from the Sri Lankan Government.

The Electricity from the Hydro Power Plants is being sold to the monopoly government – owned electricity utility in Sri Lanka, the Ceylon Electricity Board (CEB) under a standard Power Purchase Agreement for renewable energy generators under 10MW, including small hydro power. Due to CEB Policies and Procedures, operation of the hydro power plant results in a displacement of electricity from the highest marginal cost thermal power stations.

Payment by CEB is for actual Electricity Generated by the Small Hydro Power facility at a rate reflecting Avoided Energy costs of operating their highest cost Thermal Power stations to produce the same amount of power.

The Existing Marginal Thermal Power Plants in Sri Lanka operate on Fuel Oil or Diesel and the share of Fossil Fuel based Thermal Power is expected to increase dramatically over next ten years, primarily through an expansion of Coal – Fired Plants. Small Hydropower projects are not factored into the main annual base case Electricity supply – demand forecasts of the CEB Expansion Plan.

Applying the Simplified methodologies specified for small – scale CDM Projects supplying renewable energy to a Grid, the project will result in an annual emission avoidance of 0.6816 KG of CO₂ equivalent per kWh generated (kg CO₂/kWh). Annual emissions reductions for the project are per 5,489 tCO₂e per year in average, achieved by displacing fossil fuel based generation from the national grid.

Table 1: Summary of Baseline and Project Scenarios

Baseline Scenario	Project Scenario
Generation of 9.58GWh/year of Electricity from Fuel and Diesel based generating sources.	Generation of 9.58 GWh/year of Electricity from a zero emissions small – scale project

The project is helping Sri Lanka to fulfill its goals of promoting Sustainable Energy Development. Specially, the Project:

- Increase Employment with Skills development opportunities for Local people during Construction and Operation Phases of the Project. This will occur in an area where reliable sources of Employment scarce.
- Contribution to roads maintenance and repairs as the project obtains economic stability.
- Improve Local Community through various development Programs.
- Diversifies sources of Electricity Generation.
- Helps Sri Lankan Government to achieve its commitment to environmentally and economically sustainable development by providing Private Sector support for Renewable Energy Technologies.

Other Project benefits include reductions in NO_x and SO_x Pollution from burning Fossil Fuels.

Total emission reduction achieved for the Monitoring Period of 01/09/09 to 31/12/10 is 9,653 tCO₂e.

A.2. Location of project activity**Sanquhar Hydro Power Plant**

The Site is Located in Sanquhar Estate in the District of Kandy. The Project is using the Flow from Galatha Oya on its Lower Section. The Project can be accessed through Gampola – Nuwara Eliya Road, turning into Sanquhar Estate after passing Atabage Village and Driving down to the River.

Delta Hydro Power Plant

The Site is Located in Delta Estate in the District of Kandy. The Project is using the Flow from Attabage Oya in its Upper Section. The Project can be accessed through Gampola – Nuwara Eliya Road, turning into Delta Estate at Delpitiya Junction and Driving down the River.

Table 2: Location of Intake and Power House of the Project

Project	Intake Location			Power House Location		
	East	North	Elevation	East	North	Elevation
Sanquhar	80°35'906"	07°06'950"	620 m	80°35'906"	7°06'950"	526 m
Delta	80°39'63"	07°07'54"	1080 m	80°40'40"	7°06'93"	866 m

A.3. Parties and project participant(s)

Name of Party Involved (Host) indicates a Host Party	Private and/or Public entity(ies) Project Participants (As Applicable)	Kindly indicate if the Party involved wishes to be Considered as Project Participant (Yes/No)
Sri Lanka (Host)	Private Entity – Hydro Power Free Lanka (Pvt.) Ltd	NO
Switzerland	VOLTALIA	NO

A.4. Reference of applied methodology

Project Category Title: Category I.D. 1: Energy industries (renewable - / non – renewable sources)

Reference: Appendix B of the Simplified Modalities and Procedures for Small – Scale CDM Project activities, Category AMS – 1.D Version 09.

A.5. Crediting period of project activity

The crediting Period of the project is from 01/01/2004 to 31/12/2010 (Renewable)

SECTION B. Implementation of project activity**B.1. Description of implemented registered project activity**

Small – Scale Project Activity

Type (i): Renewable Energy Projects

Category (i). D: Renewable Energy Generation for a Grid

Technology: The Project uses Run – Of – River Hydropower Technology.

Plant: Sanquhar Hydro Power Plant

The Plant will harness the Flow of Galatha Oya between the 620 m Elevation (Intake) and 526 m Elevation (Power House).

The Civil Structures at the Site consist of a gated Weir designed to Store 3000 m³ of Water, a Penstock, a Powerhouse and a Tailrace. The Powerhouse is located 1000 m from the Weir. The Penstock consists of one Mild Steel Pipe of 1.1 m diameter.

Length of Transmission Line is 800 m.

Daily Containment Run-Of-River Hydro Generation Facility.

Turbine Supplier is Hydro Power S.A., France

Installed Capacity - 1.6 MW

Head - 98 m

Number of Units - 1 Horizontal Francis at 750rpm

Generator Voltage - 660 v

Power Line - 33 kV

Plant: Delta Hydro Power Plant

The Plant will harness the Flow of Atabage Oya between the 1,080 m Elevation (Intake) and 863 m Elevation (Power House).

The Civil Structures at the Site consist of a gated Weir, a Canal, a Penstock, a Powerhouse and a Tailrace. The Powerhouse is located 2,280 m from the Weir. The Penstock consists of Glass Reinforced Polymer (GRP) Pipe of 0.8 m and 0.6 m diameter. Length of the Penstock is 1,080 m. Length of the Channel is 1,200 m.

Length of Transmission Line is 4500m.

Daily Containment Run-Of-River Hydro Generation Facility.

Turbine Supplier is HPP France

Installed Capacity - 1.6 MW

Head - 220 m.

Number of Units - 1 Vertical Pelton 3 Jet Running at 750rpm.

Generator Voltage - 660 v

Power Line - 33 kV

Most of the equipment used in the Projects are developed and Manufactured outside the Host Country and some are Innovations for Sri Lanka like the use of GRP pipe for Small Hydro Power Project. The transfer of Know – How has been realized with training abroad and visit from the manufacturer representative. This technology used in Small Hydro Project is safe for the Environment and a well proven Technology.

B.2. Post registration changes**B.2.1. Temporary deviations from registered monitoring plan or applied methodology**

N/A

B.2.2. Corrections

N/A

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

N/A

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

N/A

B.2.5. Changes to start date of crediting period

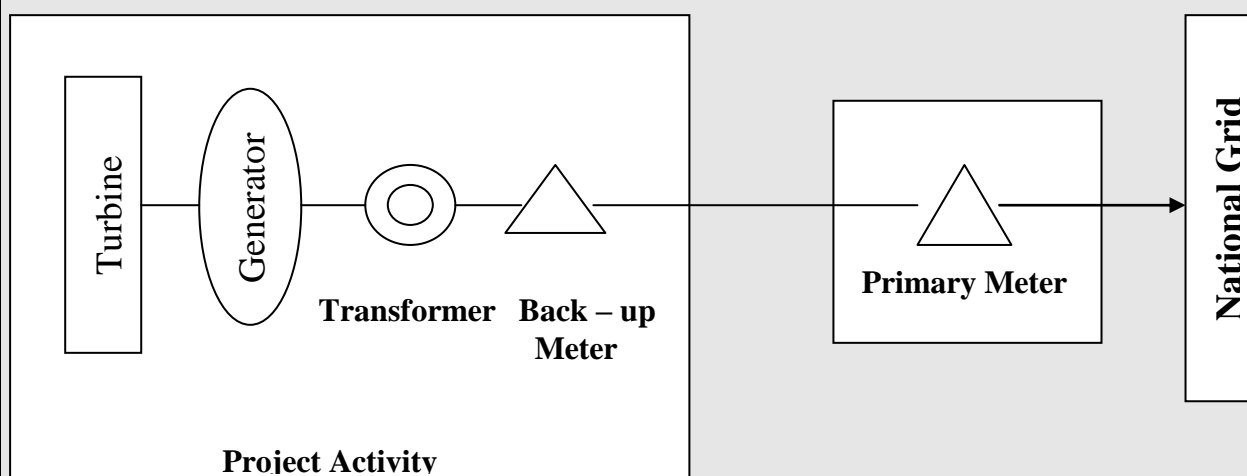
N/A

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

N/A

SECTION C. Description of monitoring system

Pursuant to the simplified monitoring methodology used for the project the only variable that requires monitoring is the actual generation of electricity supplied from the project to Grid. This is done as follows.

Monitoring System

Upon completion of construction, the CEB has carried out independent testing on the facility before granting approval for commissioning. And they have installed and maintain primary meter measure electricity passing to the grid to enable correct payment to Hydro Power Free Lanka Limited. The metering equipment is located adjacent to the plant and is sealed.

CEB read the meter at the end of each month for determination of the electrical energy delivered to and accepted by under the terms of the SPPA. The power plant is automatic and plant in charge takes periodic readings. For any technical issues they contact electromechanical engineer and any other matter to Operational Manager over the phone. Hydro Power Free Lanka (Pvt) Ltd, Project Director is regularly inspecting all the activities to ensure all the said practices are performed according to the given guidelines.

Other than Meter reading of CEB, HPFL is following Data management plan.

Table 3

Task	Sanquhar		Delta	
	Designation	Others	Designation	Others
Measuring the hourly production data	Plant In Charge	These will be recorded for the use of Company Records.	Plant In Charge	These will be recorded for the use of Company Records.
Monitoring the Hourly production data	Plant In Charge		Plant In Charge	
Calculating the daily production data	Plant In Charge		Plant In Charge	
Monitoring the Daily production data	Plant In Charge		Plant In Charge	
Calculating the Annual production data	Plant In Charge		Plant In Charge	
Training of monitoring Personnel	Project Director/ Manager - Operations		Project Director/ Manager – Operations	

And all the records which used for calculating CER would be kept as follows.

Table 4

Data Type	Data Variable	Data Unit	Recording	Proportion Monitored	Data to be Achieved	Achieve to be Kept	Location
Electricity Generated from Sanguhar	Metered electricity supplied to the grid	kWh	Monthly	100%	Electronically and paper Records	Ten Years after CER	Head Office
Electricity Consumed from Grid to Sanguhar	Metered electricity imported from the grid	kWh	Monthly	100%	Electronically and paper Records	Ten Years after CER	Head Office
Electricity Generated from Delta	Metered electricity supplied to the grid	kWh	Monthly	100%	Electronically and paper Records	Ten Years after CER	Head Office
Electricity Consumed from Grid to Delta	Metered electricity imported from the grid	kWh	Monthly	100%	Electronically and paper Records	Ten Years after CER	Head Office

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

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EFy
Unit:	tCO2/MWh
Description:	Emission Factor of Sanquhar & Delta Small Hydro Power Projects
Source of data:	Registered PDD
Value(s) applied:	0.6816
Purpose of data:	The data is used for baseline emission calculations
Additional comment:	The value is calculated ex-ante and is fixed during the crediting period.

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data / Parameter:	EGy			
Unit:	KWh			
Description:	Net Electricity Supplied to the Grid in Year 'Y'			
Measured/ Calculated / Default:	Measured by the Monitoring Meter			
Source of data:	Monthly Records			
Value(s) of monitored parameter:	9,653			
Monitoring equipment:	Sanquhar		Delta	
	Serial Number	9200207	Serial Number	208196326
	Accuracy Class	1	Accuracy Class	1
	Date of Calibration in 2009	22/12/2009	Date of Calibration in 2009	16/07/2009
	Valid Until	21/12/2010	Valid Until	15/07/2010
	Date of Calibration in 2010	08/12/2010 New meter installed on same date with serial Number of 9201418	Date of Calibration in 2010	18/08/2010. New meter installed on sale date with serial Number of 209040538
	Valid Until	07/12/2011	Valid Until	17/08/2011
	Calibration frequency	Annually	Calibration frequency	Annually
	Calibration entity	Ceylon Electricity Board	Calibration entity	Ceylon Electricity Board
	Serial Number	9200207	Serial Number	208196326
	Accuracy Class	1	Accuracy Class	1

Measuring/ Reading/ Recording frequency:	Continuous Measurement, Monthly Reading
Calculation method (if applicable):	The net electricity is the difference between electricity exported to the grid and electricity imported from the grid. Calculation formula as follows. $EG_y = EG_{\text{export},y} - EG_{\text{import},y}$
QA/QC procedures:	The meter reading is carried out by the representative of the Ceylon Electricity Board which appears in the sales invoice which is certified by Area Engineer of Ceylon Electricity Board. Measuring Meter is installed by the Ceylon Electricity Board and they are calibrated by them annually.
Purpose of data:	Baseline Emission Calculations
Additional comment:	N/A

D.3. Implementation of sampling plan

N/A

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 Emission (BE_y in tCO₂e) is calculated as the net electricity supplied by the project activity to the Grid. (EG_y in KWh) multiplied by the product of the baseline emission factor (EF_y in tCO₂e/MWh):

$$BE_y = EG_y \times EF_y \quad (1)$$

Where

- BE_y - Baseline emission in year y (tCO₂)
 EG_y - Net electricity supplied to the grid during the monitoring period in year y (MWh)
 EF_y - Emission factor of the grid in year y (tCO₂e/MWh) (0.6816 tCO₂e/MWh, as calculated Ex – ante in the registered PDD and will not be updated during the first crediting Period.

Table 5 – Sanquhar Mini Hydro Plant

Date	Electricity exported to the Grid (KWh)	Electricity imported from the Grid (KWh)	Net Electricity Supplied (EG _y) (KWh)
01/09/09 – 30/09/09	594,240	1,320	592,920
01/10/09 – 31/10/09	849,720	600	849,120
01/11/09 – 30/11/09	736,020	780	735,240
01/12/09 – 31/12/09	828,060	660	827,400
01/01/10 – 31/01/10	342,120	2,520	339,600
01/02/10 – 28/02/10	102,780	2,820	99,960
01/03/10 – 31/03/10	0	2,040	-2,040
01/04/10 – 30/04/10	0	0	0
01/05/10 – 31/05/10	403,080	840	402,240
01/06/10 – 30/06/10	199,380	3,000	196,380
01/07/10 – 31/07/10	0	3,960	-3,960
01/08/10 – 31/08/10	342,300	2,520	339,780
01/09/10 – 30/09/10	510,060	1,800	508,260
01/10/10 – 31/10/10	737,100	1,080	736,020
01/11/10 – 30/11/10	753,600	1,320	752,280
01/12/10 – 31/12/10	816,820	360	816,460
Total	7,215,280	25,620	7,189,660

Table 6 – Delta Mini Hydro Plant

Date	Electricity exported to the Grid (KWh)	Electricity imported from the Grid (KWh)	Net Electricity Supplied (EG _y) (KWh)
01/09/09 – 30/09/09	516,256	193	516,063
01/10/09 – 31/10/09	444,293	296	443,997
01/11/09 – 30/11/09	648,979	125	648,854
01/12/09 – 31/12/09	625,049	93	624,956
01/01/10 – 31/01/10	266,197	90	266,107
01/02/10 – 28/02/10	122,916	199	122,717
01/03/10 – 31/03/10	1,179	1,096	83
01/04/10 – 30/04/10	141,457	996	140,461
01/05/10 – 31/05/10	553,304	170	553,134
01/06/10 – 30/06/10	522,705	261	522,444
01/07/10 – 31/07/10	633,489	148	633,341
01/08/10 – 31/08/10	517,622	478	517,144
01/09/10 – 30/09/10	521,169	392	520,777
01/10/10 – 31/10/10	492,941	430	492,511
01/11/10 – 30/11/10	428,070	371	427,699
01/12/10 – 31/12/10	542,528	528	542,000
Total	6,978,154	5,866	6,972,288

Table 7 – Total Production

Date	Electricity exported to the Grid (KWh)	Electricity imported from the Grid (KWh)	Net Electricity Supplied (EGy) (KWh)
01/09/09 – 30/09/09	1,110,496	1,513	1,108,983
01/10/09 – 31/10/09	1,294,013	896	1,293,117
01/11/09 – 30/11/09	1,384,999	905	1,384,094
01/12/09 – 31/12/09	1,453,109	753	1,452,356
01/01/10 – 31/01/10	608,317	2,610	605,707
01/02/10 – 28/02/10	225,696	3,019	222,677
01/03/10 – 31/03/10	1,179	3,136	-1,957
01/04/10 – 30/04/10	141,457	996	140,461
01/05/10 – 31/05/10	956,384	1,010	955,374
01/06/10 – 30/06/10	722,085	3,261	718,824
01/07/10 – 31/07/10	633,489	4,108	629,381
01/08/10 – 31/08/10	859,922	2,998	856,924
01/09/10 – 30/09/10	1,031,229	2,192	1,029,037
01/10/10 – 31/10/10	1,230,041	1,510	1,228,531
01/11/10 – 30/11/10	1,181,670	1,691	1,179,979
01/12/10 – 31/12/10	1,359,348	888	1,358,460
Total	14,193,434	31,486	14,161,948

Based on formula (1) mentioned above, the baseline emission is calculated as follows:

$$BE_y = EG_y \times EF_y = 14,161.95 \text{ MWh} \times 0.6816 \text{ tCO}_2\text{e/MWh} = 9,653 \text{ tCO}_2\text{e}$$

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

As a run – of river hydro power project, the Project activity emission is zero.
 $PE_y = 0$

E.3. Calculation of leakage

No leakage is considered in the Project.
 $Ly = 0$

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 ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO ₂ e)
Total	9,653	0	0	9,653

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 ₂ e)	$5,489/365 \times 487 = 7,323$	9,653

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

The emission reduction during the Monitoring Period (01/09/2009 – 31/12/2010) is 9,653 tCO₂, which is higher than the emission reduction estimated in the registered PDD because higher water availability.

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 ₂ e)	01/01/04 – 30/04/07 – 8,932 01/05/07 – 31/08/09 – 11,043 01/09/09 – 31/12/10 – 9,653 01/01/11 – 31/12/12 – 8,217 Total - 37,845	01/01/13 – 31/01/13 - 437

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Document information

Version	Date	Description
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.

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