



Monitoring Report #1

Version 1

Project	SIRMA Run-of-river hydro project
Plant Design Capacity	5.88 MW
Date / Version of Monitoring Report	02 June 2011 / Version 3
Monitoring Period	07 June 2009– 31 December 2010
Underlying PD	Version 5 from 28 February 2010
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presented by:

Mr. Ramazan ASLAN

FutureCamp İklim ve Enerji Ltd. Şti. (Carbon Consultant)

Çetin Emeç Blv. No:19/18, 06460 Ankara - Turkey

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1 Documentation structure and reference

This report has been prepared for the first verification of emission reductions at SIRMA Run-of-river hydro project. As basic documentation for verification it refers to:

CDM approved baseline and monitoring methodology AMS-I.D: "Grid-connected renewable electricity generation", version 16, which is used in the PD.

VCS Project description (PD): "Sirma run-of-river hydro project" , version 5, dated 28 February 2010.

Extracted measurement data and the project calculation tool where all relevant calculations are presented in a transparent way.

2 General project and monitoring information

2.1 Project background

"Sirma run-of-river hydro project" is a 5.88 MW small-scale run-of-river hydro power plant. It started electricity production in 7 June 2009. Produced electricity is being fed into the national grid. The project generates a substantial emission reduction by bringing carbon neutral electricity production to the Turkish grid.

Table 1 below illustrates the project implementation as of 7 June 2009.

Table 1: Status of implementation

Activity	Date
Start of plant operation	07 June 2009
First project monitoring period	07 June 2009 – 31 December 2010
Onsite validation and first verification	08 October 2010

2.2 Monitoring background

The purpose of this monitoring report is to provide relevant information about GHG emission reductions achieved during the defined monitoring period by SIRMA Run-of-river hydro project. It describes the implementation of all monitoring steps and provides a summary of the calculations of emission reductions.

2.3 Monitoring Parameters

The only parameter to be monitored for first verification is electricity generation. All other parameters have been determined during project validation.

Table 2: Monitoring Parameter

Data / Parameter:	EG_{facility,y}
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data to be used:	The data from the Electricity Meters are the basis for the settlement notification of PMUM. Data are gathered electronically from the meters by TEIAS and stored in secured website of PMUM, which is accessible to project developer with a private password. For monitoring, the monthly settlement notification of PMUM shall be used as source of data.
Value of data applied for the purpose of calculating expected emission reductions	23,230 MWh/year
Description of measurement methods and procedures to be applied:	Two electricity meters will be placed (one main and one reserve) at the substation. These meters are sealed by distribution company and intervention by project proponent is not possible. Measured hourly and readings monthly. Monthly settlement notifications of PMUM consist hourly electricity production and withdrawn from the grid. Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid will be calculated by electricity supplied minus electricity withdrawn which will be taken from monthly settlement notifications.
QA/QC procedures to be applied:	Cross check measurement results with internal records for electricity generated shall be applied. On redundant metering and high data quality please also refer to the text passage on data quality management in section 3.2 above [of the PDD].
Any comment:	

2.4 Applied Calculations

Baseline emissions are calculated as per AMS-I.D., formula 1:

$$BE_y = EG_y \times EF_{grid,CM,y} \quad (1)$$

Where:

BE_y Baseline emissions in year y (tCO₂/yr).

EG_y Electricity supplied by the project activity to the grid (MWh).

$EF_{grid,CM,y}$ Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"; validated value = **0.5502 tCO₂/MWh**.

Emission reductions achieved by the project activity are calculated as per formula 13 of AMS-I.D.:

$$ER_y = BE_y - PE_y - LE_y \quad (13)$$

Where:

ER_y Emission reductions in year y (tCO₂/yr).

BE_y	Baseline emissions in year y (tCO ₂ /yr).
PE_y	Project emissions in year y (tCO ₂ /yr); validated value = 0.
LE_y	Leakage emissions in year y (tCO ₂ /yr); validated value = 0.

2.5 Applied Monitoring Data

For monitoring of electricity generation, the monthly settlement notifications of PMUM is used. The data from the Electricity Meters are the basis for these notifications. Monthly settlement notifications of PMUM is submitted to DOE for verification.

There are two meters in the distribution centre (one of them is a spare meter). A further meter, located in the power plant, is used for checking purposes only. There has been no problem with the meters.

Table 3: Meter Characteristics

MAIN	
Manufacturer	Elster
Serial No	00368721-2008 Alpha A1500
Type	A1500-W045-741-OLS-1165X-V3H00
Frequency	50 Hz
Current	5 A
Voltage	58/100 V
Accuracy Class	0.5s

SPARE	
Manufacturer	Elster
Serial No	00368720-2008 Alpha A1500
Type	A1500-W045-741-OLS-1165X-V3H00
Frequency	50 Hz
Current	5 A
Voltage	58/100 V
Accuracy Class	0.5s

Only for the period between June 2009 and November 2009, for the electricity amount withdrawn from the grid, the monthly meter readings are used. Monthly meter readings for that period is submitted to DOE for verification.

Calculation of emission reductions is being realized on basis of the monitoring plan in the presented PD (Version 5) and the formulae presented above. Methodological basis to the design is AMS-I.D. (Version 16).

2.6 Data Quality and Management

The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers.

According to Article 2 of the Communiqué for meters in electricity market¹: "The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained Type and System Approval certificate from the Ministry of Trade and Industry." Therefore, Ministry of Trade and Industry (Ministry) is responsible for control and calibration of the meters.

¹ See, <http://www.epdk.org.tr/english/regulations/electric/meters.doc>

Paragraph b of Article 9 of the "Regulation of Metering and Testing of Metering Systems"² (Regulation) of Ministry states that: " b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years." Therefore periodic calibration of the meters will be done every 10 years.

According to Article 67 (page 20) of the same regulation, calibration shall be done in calibration stations which have been tested and approved by Ministry of Trade and Industry. Article 64 of Regulation clearly states how calibration of the meters shall be performed.

According to Article 3 of System Usage Agreement³ between Beyobası Enerji Üretimi A.Ş. and distribution company (AYDEM) stipulates other than periodic tests: If a party alleges the meters are not working appropriately tests of the meters will be done in presence of both parties. If, after controls, it is seen that the meter is not working appropriately, the measurements of reserve meters are taken into account beginning from the last measurement value when both meters are reading the same (page 3, 2-c)

2.7 Roles and Responsibilities

The HPP is operated and owned by Beyobası Enerji Üretimi A.Ş.

Data cross checking is conducted by operational personnel. Thus meter values at the connection point in the distribution centre, relay values and power meter values in the power plant are compared on a regular basis.

List of the personnel in charge of Sirma HPP operation are listed below. Technicians are working in shift and in addition to the operational issues of the plant they are responsible from reporting of daily production of the plant to the plant manager. Plant manager reporting to Mr. Mustafa Kemal Güngör, who has the overall responsibility of the plant, daily and monthly for the production and operation of the power plant. Technicians are reading meters in the plant and SCADA system every hour and writing the figures to a hard copy template. This figures are also transferred to an excel sheet in computer hence data are stored as hard and soft copies in the plant.

All data monitored under the monitoring plan will be kept in electronic form and hard copy for 2 years after the end of the last crediting period.

SIRMA HPP PERSONNEL LIST		
NO	NAME – SURNAME	Title / Responsibility
1	Mustafa Kemal Güngör	Electric & Electronic Engineer – Overall responsibility of the plant
2	Alparslan ASTEPE	Electric & Electronic Engineer – Plant manager Operational Responsibility of the plant
3	Özkan AVCI	Electrical Technician – Operation of the plant
4	Murat GEBEŞOĞLU	Electrical Technician - Operation of the plant
5	Mutlu KÖSEOĞLU	Electrical Technician - Operation of the plant
6	Taner ONBAŞIOĞLU	Mechanical Technician - Operation of the plant
7	Şakir ÇELTİKLİOĞLU	Security Staff – Security of the Plant
8	Nizamettin KAYA	Security Staff - Security of the Plant

² See, http://www.sanayi.gov.tr/download/osgm/olcu_alemleri_muayene_yonetmelik.zip , page 2

³ See, <http://www.teias.gov.tr/sistemkullanim1.doc> , page 3, 2-b)

O&M is being done by Beyobasi Enerji Uretimi A.S. (in short: Beyobasi)

The VCS project proponent, Beyobasi, is involved in the engineering tasks of the project and also responsible party for the management of the VER project.

2.8 Contact Information

For contact with regard to the VCS project please refer to the directions of Akfen below.

Table 3: Project Contact Data

Organization:	Beyobası Enerji Üretimi A.Ş.
Street/P.O.Box:	Koza Sok.
Building:	No:22 GOP
City:	Ankara
State/Region:	Ankara
Postcode/ZIP:	06700
Country:	Turkey
Personal Contact:	Mustafa Kemal GÜNGÖR
Direct FAX:	0090 0312 441 68 14
Direct tel:	0090 312 408 10 00
Personal e-mail:	akfen@akfen.com.tr; mgungor@akfen.com.tr

3 Monitoring results

3.1 Monitored Electricity Generation/Consumption

Electricity

The net volume of electricity fed into the grid by Sirma project during the first verification period amounts to 13,140.3 MWh.

Table 4: Electricity Fed into Grid - summary

Electricity Fed into Grid [MWh]		
Monitoring Period #1	Thereof in 2009	Thereof in 2010
13,140.3 MWh	6,261.7 MWh	6,878.6 MWh

During operation in the verification period no special events were reported.

3.2 Emission Reductions

Emission Reductions from Sirma project during the first verification period amount to 7,229 tCO₂.

Table 5: Emission Reductions

Emission Reductions [tCO ₂ e] ⁴		
Monitoring Period #1	Thereof in 2009	Thereof in 2010
7,229 tCO₂e	3,445 tCO ₂ e	3,784 tCO ₂ e

3.3 Detailed Monthly Overview

Monthly electricity generation and withdrawn figures are submitted in below table. "Emission Reductions [tCO₂e]" are calculated by multiplying 'Net Electricity Production Fed into Grid [MWh]' with Emission Factor ($EF_{grid,CM,y}$), which is 0.5502.

Table 6: Monthly Electricity Generation and Emission Reduction Figures

Month	Electricity Production Fed into Grid [kWh]	Electricity Withdrawn from Grid [kWh]	Net Electricity Production Fed into Grid [kWh]	Net Electricity Production Fed into Grid [MWh] ⁵	Emission Reductions [tCO ₂ e]
2009 JUNE	609,904.0	1,417.5	608,486.5	608.5	334.8
2009 JULY	2,158,286.0	189.0	2,158,097.0	2,158.1	1,187.4
2009 AUGUST	3,023,718.0	189.0	3,023,529.0	3,023.5	1,663.5

⁴ Annual total amounts are rounded below to integer numbers .

⁵ Inconsistency in annual total amounts are due to rounding.

2009 SEPTEMBER	467,492.0	1,701.0	465,791.0	465.8	256.3
2009 OCTOBER	0.0	2,268.0	-2,268.0	-2.3	-1.2
2009 NOVEMBER	0.0	1,795.5	-1,795.5	-1.8	-1.0
2009 DECEMBER	13,768.9	3,700.4	10,068.5	10.1	5.5
2009 TOTAL	6,273,168.9	11,260.4	6,261,908.0	6,261.9	3,445.3
2010 JANUARY	39,085.2	3,149.0	35,936.2	35.9	19.8
2010 FEBRUARY	1,154,865.6	1,397.8	1,153,467.8	1,153.5	634.6
2010 MARCH	0.0	2,602.8	-2,602.8	-2.6	-1.4
2010 APRIL	358,098.3	1,850.9	356,247.4	356.2	196.0
2010 MAY	363,579.3	1,773.7	361,805.6	361.8	199.1
2010 JUNE	684,255.6	1,195.3	683,060.3	683.1	375.8
2010 JULY	1,352,446.2	57.8	1,352,388.4	1,352.4	744.1
2010 AUGUST	1,882,279.4	38.6	1,882,240.8	1,882.2	1,035.6
2010 SEPTEMBER	994,366.8	703.7	993,663.1	993.7	546.7
2010 OCTOBER	20,516.0	1,841.2	18,674.8	18.7	10.3
2010 NOVEMBER	23,946.3	1,908.7	22,037.6	22.0	12.1
2010 DECEMBER	23,587.2	1,899.1	21,688.1	21.7	11.9
2010 TOTAL	6,897,025.9	18,418.6	6,878,607.3	6,878.6	3,784.6
TOTAL OF MONITORING PERIOD	13,170,194.8	29,679.0	13,140,515.3	13,140.5	7,229.9

Sirma HPP is constructed on irrigation channel and produces electricity only during irrigation season, which is generally from April to September. As there is no electricity generation during remaining months, power plant takes electricity from the grid. This the reason of small minus emission reduction figures for these months.