

VOLUNTARY EMISSION REDUCTION PROJECT



MONITORING REPORT

KARGILIK 24 MW HYDROPOWER PLANT, TURKEY

Preparation Date: 08/08/2010
Monitoring Period: 01/01/2009 - 31/03/2011
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Monitoring Report

Title of the Project Activity: *KARGILIK 24 MW HYDROPOWER PLANT, TURKEY*
Scope: *Voluntary Emission Reduction Project*
Standard: *Voluntary Carbon Standard (VCS) 2007.1*
Project Type: *Large Scale Renewable Energy Project*
Reference: *Project Design Document*
Period: *01/01/2009 – 31/03/2011*

Project Background

The *KARGILIK 24 MW HYDROPOWER PLANT, TURKEY* Project is a renewable energy project located in *Turkey*. The Project Activity has been validated by the DOE according to the *VCS 2007.1*. Further background on this Project Activity can be found in the PDD and associated Project documents.

This report is the 2nd monitoring report of the Project Activity for the *periodic VCU* issuance.

Project Participants

Project Participants of the Project are:

Company Legal Name	Role
<i>Tektug Elektrik Uretim A.S.</i>	<i>Project owner</i>
<i>Mavi Sürdürülebilir Kalkınma Proje ve Danışmanlık Hiz. Ltd. Sti.</i>	<i>Carbon Consultant</i>

Monitoring Background

Emission reductions have been calculated in the *Section 4 “GHG Emission Reductions”* of the VCS PDD. The methodology used for calculations is the *UNFCCC methodology ACM0002, Consolidated Methodology for Grid-Connected Electricity Generation from Renewable Sources*. The grid emission factor has been calculated with the *Tool to calculate the emission factor for an electricity system*.

The monitoring has been explained in the *Section 3 “Monitoring”* of the VCS PDD. Accordingly, a monitoring spreadsheet has been prepared for annual monitoring purposes. The filled-in spreadsheet has been submitted to the verifying DOE as a separate file and is also attached to the Annex of this report.

There is no remaining open issue to monitor after the completion of Project validation. The crediting period of the Project started on March 28th, 2006.

According to the validated PDD, the following parameters are to be monitored:

- *Net electricity generation of the Project [MWh]*
-

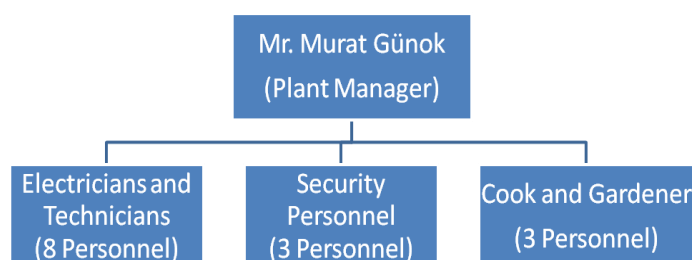
Management and operational system

On behalf of the project participants, Mrs. Elvan Tugsuz Guven from Ciltug Isi San. Tic. A.S. is responsible for the preparation of the monitoring report. This task includes accessing the PMUM settlement web site with a unique ID and password and printing the monthly reports for the crediting period prior to verification. These reports will then be used to fill in the summary table, which is the final document for calculating total emission reductions, basis for VCS VCUs. Both the scans of monthly PMUM reports and the summary Excel table will be prepared/organized by Mrs. Elvan Tugsuz Guven (board member of the Project owner) and submitted to the verifying DOE for verification. The responsibilities include:

- Ensuring the information flow between the project owner company and the DOE,
- Proper implementation of the monitoring plan,
- Management of the monitoring and verification procedures.

Mr. Murat Günok is the plant manager, responsible for monitoring issues on site. Mr. Murat Günok in the name of the Project owner is also responsible for coordinating the necessary maintenance and calibration procedure with TEIAS.

The following is the organizational scheme of the Kargılık Hydro Power Plant:



Contact Details of Ms Elvan Güven:

Organization:	Tektug Elektrik Uretim Anonim Sirketi
Street/P.O.Box:	Ataturk Bulvari No.89/3
Building:	
City:	Gaziantep
State/Region:	
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Telephone:	+90 342 2300325
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E-Mail:	tektug@tektug.com
URL:	http://www.ciltug.com/
Represented by:	
Title:	Board Member
Salutation:	Mrs.
Last Name:	Tugsuz Guven
Middle Name:	
First Name:	Elvan
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	eguven@ciltug.com

Mavi Consultants provide consulting services for the project owner during these tasks according to the data collected, acquired, generated and provided by the project owner.

Monitoring Period:

Monitoring Period for the prepared monitoring report is **01/01/2009 – 31/03/2011** inclusively.

Monitoring Frequency / Data recording and aggregation:

The data generation information is stored by PMUM, the financial settlement centre of TEIAS (the national grid operator). The website of PMUM (<http://dgpys.teias.gov.tr/dgpys>) is accessible to Project owner with their unique user ID and password. The Project owner can access and monitor the electricity generation data 24 hours a day. Once accessed, the Project owners are able to call electricity generation and consumption reports of their own projects. The same reports are used by the Project owner for invoicing purposes. The electricity generation data are reported on a monthly basis. The procedure involves the following:

1. Accessing the website of PMUM (<http://dgpys.teias.gov.tr/dgpys>) using the user ID and password assigned to the Project owner,
2. Accessing the electricity generation and consumption report for each month covering the monitoring period,
3. Exporting these monthly reports in electronic format (*pdf or print-screen) and in printed hardcopies.

There are two measurement devices; the primary measurement device and a secondary (i.e. back-up or check-meter) measurement device for quality assurance, to be used if the primary meter fails. Both the primary and back-up measurement devices measure and store the aggregate total electricity import and export for all of the turbines, real-time. The SCADA system also stores various data (e.g. electricity generated by each turbine, energy supplied etc.) electronically.

The invoices are kept by the Project owner as hardcopies. Furthermore, the PMUM system stores the reports electronically, which is accessible to the Project owner whenever necessary. After the monthly reports are obtained from PMUM, data are aggregated using a separate spreadsheet. The monthly generation and consumption data are entered to the spreadsheet, which automatically calculates the emission reductions during the monitoring period. This spreadsheet file is sent to the DOE separately and attached at the end of the monitoring report. The procedure of data generation, aggregation, calculation and reporting are managed by the responsible person.

Measuring/ Reading/ Recording frequency: The primary and back-up measurement devices measure, read and record various data such as electricity generated and consumed, There is no sampling involved.

There are two measurement devices continuously measuring and recording electricity generation and consumption of the Project activity. The primary measurement device is used for invoicing, and the secondary measurement device is used for quality control and back-up purposes. Both measurement devices comply with industry standards, UNFCCC and national requirements. This ensures the quality and continuity of monitored data.

TEIAS personnel monthly perform on-site measurements for both the primary and secondary (back-up) measurement devices on the first days of the month. The reading involves obtaining the recorded values that were measured until 24:00 of the last day of the preceding month. Based on this reading, a protocol is prepared by TEIAS on site and then signed by both parties each month. The

invoice is then prepared by the Project owner and delivered to TEIAS. The monthly measurement device readings are transferred and stored in the web server of PMUM (the financial settlement agency of TEIAS). The monthly measurement device reading protocols are stored as hardcopy by the Project owner. The electronic reports are stored by TEIAS and are accessible by the Project owner by any time. This ensures that the monitored data is stored both by the Project owner and the TEIAS PMUM system, both as hardcopy and softcopy, ensuring its security and quality. Independent from PMUM, the Project owner stores the hardcopies of the monthly protocols until at least 2 years after the end of the crediting period.

The Power Export and Import data are based on protocols signed by TEIAS and the Project owner. These protocols are used as the basis of PMUM reports and invoicing. Therefore this data source is of high quality.

The baseline calculations are carried out electronically with a spreadsheet; therefore the calculations are transparent, traceable and of high quality.

The SCADA system enables real time monitoring and analysis of data (also for each turbine) and provides support for maintenance. This system automatically records all electricity generation data for each single turbine 7/24. This ensures that extraordinary parameters can be identified quickly. This system improves the quality control and minimizes any operational risks.

The switchgear station, where the measurement instruments are read periodically by TEIAS, is only accessible to TEIAS. The Project owner is able to monitor the electricity generation data by the use of a SCADA system, however it has no control over, or access to the measurement devices and cannot perform any type of maintenance or calibration.

Emergency procedures for the monitoring system:

In case of an organisational change within the Project owner, a qualified person will be assigned for carrying out and management of the monitoring and verification procedures.

In case of a fire, earthquake or other similar emergency situation, the electricity data after the settlement with TEIAS will be valid, i.e. the electricity generation and consumption figures used for invoicing purposes during or after the emergency will be used for the calculation of emission reductions.

In case the PMUM report cannot be reached on the internet, the monthly generation protocols signed by both the Project owner and TEIAS are to be used. These protocols are the source of the PMUM data and provide the same values, under normal circumstances, in hardcopy format. Therefore this is conservative.

In other unforeseen cases, the emission reductions will be calculated in a conservative manner in agreement with relevant UNFCCC guidance, rules and conditions. Although the SCADA data is normally not used for monitoring, it is of high quality and can principally be used for monitoring purposes in case of emergencies conservatively.

Calibration frequency:

According to the Article 9 of the relevant regulation¹, periodical inspections of “gauges for electric, water, coal gas, natural gas and, current and voltage measuring transformers will be made once in 10 years”. This is in line with the monitoring plan and national requirements. TEIAS will decide when to carry out the next calibration. The Project owner has no control over or access to the measurement devices and is *not* entitled to perform any type of maintenance or calibration.

Date of last calibration:

The metering devices has been calibrated on 10.12.2010 by TEIAS. Please see the table below for details. The calibration has been made since the metering devices have been changed only because of the decision to switch to another brand (the brand TEIAS approves).

Serial No.	Device Model	Producer	Model Year	Calibration Date
53077750	SL761B071	ACTARİS	2010	10.12.2010
53077751	SL761B071	ACTARİS	2010	10.12.2010
53077752	SL761B071	ACTARİS	2010	10.12.2010
53077753	SL761B071	ACTARİS	2010	10.12.2010

Responsible personnel for calibration: TEIAS is responsible for monitoring and ensuring that the measurement devices satisfy the requirements. TEIAS is also responsible of the calibration of the measurement devices. In case of any detected problem (e.g. failure of one of the measurement devices, inconsistency between the readings of the primary and the back-up meter etc.), the plant manager Mr. Murat Günok in the name of the Project owner is responsible for coordinating the necessary maintenance and calibration procedure with TEIAS.

Accuracy & Validity: The technical specifications and the calibration procedure are in agreement with the national regulations and the monitoring plan.

According to the “Communiqué for Measurement Devices used in the Electricity Market”, Article 11, the measurement devices used for power plants are subject to the following requirements:

Capacity of the circuit, where the meter is connected	Larger than 100 MVA	Between 100 and 10 MVA (inclusive)	Less than 10 MVA
Active energy meters	IEC-EN 60687 0.2S class	IEC-EN 60687 0.5S class	IEC-EN 60687 0.5 class
Reactive energy meters	**IEC-EN 61268 0.2S class	**IEC-EN 61268 0.2S class	**IEC-EN 61268 0.2S class

The Project capacity falls into the second category.

Sources: <http://www.epdk.gov.tr/documents/10157/326b88e3-e36f-4d7c-af43-1f8b5959a203>

¹ “Measurement and Measuring Tools Inspection Regulation”, Date: 24/07/1994, Official Gazette Number: 22000

Quality Assurance and Quality Control

The data are of high quality and accuracy in agreement with the monitoring plan stated in the VCS PDD. Data quality is ensured due to following reasons:

- The monitoring plan involves net electricity generation of the power plant, a parameter which can be measured with high certainty. This enables a straight forward, simple monitoring scheme, which is easy to employ in the project owner company.
- The measurement device has higher accuracy than UNFCCC-requirements and it has a backup measurement device just in case of failure.
- The data used in the monitoring plan (PMUM data) stem from TEIAS's (public transmission line operator) web-based information source, PMUM. This ensures high reliability and accountability, as well as ensures long-term storage of the electricity generation data.
- Archiving of data is carried out by PMUM and the project participant itself also archives the measurement data for at least 2 years, as requested by UNFCCC.
- 100% of the data are monitored. No sampling is done. This enables collection of precise data with high certainty.
- Measurement is conducted according to latest industry standards and technologies using high-end equipment.
- The agreement between the project participant and TEIAS regulates emergency measures in case of unexpected events like measurement device failure, etc. and the project is controlled and operated with sophisticated softwares and equipment.
- The measurement devices are calibrated by TEIAS, which guarantees high accuracy. During the monitoring period, the monitoring devices have been modified, which has no impact on the quality and accuracy of the emission reductions data.
- The project is managed on site by a project manager, who is in close contact with project owner's headquarters in Gaziantep, Turkey. Responsibilities, authorities and the organizational structure in the company are well defined.
- The project participant has no control over the PMUM web-site based data nor the two measurement devices, which are sealed by TEIAS. Therefore, the measurement is done without any access of project participants and the readings are done by TEIAS.

Monitoring Results

Monitoring Period :

The monitoring period is from 01/01/2009 to 31/03/2011 inclusively.

Emission Reductions:

The Project resulted in the following emission reductions during the monitoring period;

Vintage	Emission Reductions [tCO ₂]	Period
2009	56,011	01/01/2009 – 31/12/2009
2010	53,564	01/01/2010 – 31/12/2010
2011	15,740	01/01/2011 – 31/03/2011

Presentation of the Monitoring Results:

All monitoring data are available on the spreadsheet “VCS-MR2-Kargilik.xls” file. This file includes a worksheets for the whole monitoring period. The monthly electricity generation and consumption data of the Project are stored in the same worksheets and the emission reductions are calculated with the emission factor calculated in the PDD. As explained in the PDD, the generation and consumption data are acquired from the web portal (PMUM) of the public electricity buyer TEIAS, which are also submitted to the DOE as evidence along with the spreadsheet file.

Calculation Methodology

Emission reductions are calculated based on the following formulae:

1. Emission Reductions = Baseline Emissions – Project Emissions – Leakage
Project Emissions and Leakage are zero according to the used methodology.
2. Baseline Emissions = Net Electricity Generated * Grid Emission Factor
3. Net Electricity Generated = Gross Electricity Generated – Electricity Consumed

The following calculation steps are applied for calculating the emission reductions;

1. The grid emission factor is taken from the baseline calculations as a constant parameter.
2. Amount of gross electricity generated and gross electricity consumed by the Project are obtained from the public grid operator TEIAS’s web portal PMUM.
3. Monthly PMUM data are aggregated in a spreadsheet. As the available data have a breakdown into 3 time periods during day (T1, T2, T3 for peak, normal and low demand periods), the monthly data are stored accordingly.
4. The net electricity generation is found by:
 - a. Subtracting monthly gross consumption from the monthly gross generation for each of the daily time periods T1, T2 and T3
 - b. Adding up the T1, T2 and T3 net electricity generation breakdowns for each month to obtain the annual net electricity generation.
 - c. Multiplying the annual net electricity generation with the grid emission factor.

Note: The PMUM system pricing and reporting format changed as of 01.12.2009. Until this date, the PMUM monthly generation reports were prepared with a power export and import breakdown into 3 time slots during the day (T1, T2, T3 denoting peak, normal and low demand periods). According to the monitoring plan, the monthly power export and import was supposed to be calculated by adding these three time slots. As of 01.12.2009, this is not necessary anymore, simplifying the procedure. During the monitoring period, the pricing mechanism has been changed to an hourly basis, instead of 3 time slots. Therefore, the total daily and monthly generation data are available in the PMUM reports after this date, eliminating the need of adding them up, as was explained in the monitoring plan.

ANNEX I – Calculation Of Emission Reductions

Summary of Emission Reductions

Year	Month	Period Start	Period End	Gross Energy Generation, GEG				Self Consumption, SEC				Net Electricity Generation, EG	Emission Factor	Emission Reductions
[YYYY]	[YYYY]	[DD/MM/YYYY]	[DD/MM/YYYY]	T1 [kWh]	T2 [kWh]	T3 [kWh]	T1+T2+T3 [kWh]	T1 [kWh]	T2 [kWh]	T3 [kWh]	T1+T2+T3 [kWh]	[kWh]	[tCO ₂ /MWh]	[tCO ₂]
2009	January	01.01.2009	31.01.2009				7,045,900				13,400	7,032,500	0.616	4,332.02
2009	February	01.02.2009	28.02.2009				12,809,200				700	12,808,500	0.616	7,890.04
2009	March	01.03.2009	31.03.2009				14,940,100				900	14,939,200	0.616	9,202.55
2009	April	01.04.2009	30.04.2009				14,935,160				40	14,935,120	0.616	9,200.03
2009	May	01.05.2009	31.05.2009				13,858,530				2,400	13,856,130	0.616	8,535.38
2009	June	01.06.2009	30.06.2009				6,194,520				9,400	6,185,120	0.616	3,810.03
2009	July	01.07.2009	31.07.2009				3,955,470				11,980	3,943,490	0.616	2,429.19
2009	August	01.08.2009	31.08.2009				2,840,480				10,370	2,830,110	0.616	1,743.35
2009	September	01.09.2009	30.09.2009				2,646,510				11,500	2,635,010	0.616	1,623.17
2009	October	01.10.2009	31.10.2009				2,459,780				14,970	2,444,810	0.616	1,506.00
2009	November	01.11.2009	30.11.2009				4,174,840				15,100	4,159,740	0.616	2,562.40
2009	December	01.12.2009	31.12.2009				5,176,429				18,475	5,157,954	0.616	3,177.30
2010	January	01.01.2010	31.01.2010				13,787,940				1,830	13,786,110	0.616	8,492.24
2010	February	01.02.2010	28.02.2010				12,961,551				465	12,961,086	0.616	7,984.03
2010	March	01.03.2010	31.03.2010				13,335,007				1,799	13,333,208	0.616	8,213.26
2010	April	01.04.2010	30.04.2010				10,644,748				4,591	10,640,157	0.616	6,554.34
2010	May	01.05.2010	31.05.2010				8,659,038				4,415	8,654,623	0.616	5,331.25
2010	June	01.06.2010	30.06.2010				4,274,869				7,585	4,267,284	0.616	2,628.65
2010	July	01.07.2010	31.07.2010				3,152,642				11,330	3,141,312	0.616	1,935.05
2010	August	01.08.2010	31.08.2010				2,471,674				20,565	2,451,109	0.616	1,509.88
2010	September	01.09.2010	30.09.2010				4,457,049				13,306	4,443,743	0.616	2,737.35
2010	October	01.10.2010	31.10.2010				4,247,605				16,000	4,231,605	0.616	2,606.67
2010	November	01.11.2010	30.11.2010				2,386,500				16,843	2,369,657	0.616	1,459.71
2010	December	01.12.2010	31.12.2010				6,684,163				8,837	6,675,326	0.616	4,112.00
2011	January	01.01.2011	31.01.2011				6,004,050				17,920	5,986,130	0.616	3,687.46
2011	February	01.02.2011	28.02.2011				8,256,800				12,130	8,244,670	0.616	5,078.72
2011	March	01.03.2011	31.03.2011				11,323,950				3,550	11,320,400	0.616	6,973.37
2009							91,036,919				109,235	90,927,684		56,011
2010							87,062,786				107,566	86,955,220		53,564
2011							25,584,800				33,600	25,551,200		15,740
Whole Monitoring Period			Total	0	0	0	203,684,505	0	0	0	250,401	203,434,104	0.635	125,315