



**Monitoring report form
(Version 05.01)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	ÇAKIRLAR 17.0 MW Run Off River Hydro Power Plant (in the following: Çakırlar HPP)	
Reference number of the project activity	GS 917	
Version number of the monitoring report	09	
Completion date of the monitoring report	04/04/2017	
Monitoring period number and duration of this monitoring period	1 st Periodic Monitoring Report 01/03/2013 – 31/05/2016	
Project participant(s)	ANADOLU ELEKTRİK ÜRETİM ve TİCARET A.Ş (Anadolu hereafter)	
Host Party(ies)	Turkey	
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	Sectoral Scope 1, Energy Industries	
Selected methodologies	Methodology for grid-connected electricity generation from renewable sources",ACM0002 version 13.0.0	
Selected standardized baseline	Energy Industries and ACM0002 "Consolidated baseline	
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	104,814 (tCO ₂ e)	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	0	95,664 (tCO ₂ e)

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

ANADOLU ELEKTRİK ÜRETİM ve TİCARET A.Ş.(ANADOLU, hereafter) has installed a runoff-river hydropower plant near Murgul creek in Artvin, The project aimed the installation of a 17.0 MW runoff-river hydropower electricity plant (HEPP) near Egrisu, Soval, Kopurten and Suluduz brooks in Artvin, Turkey. The project activity was started at May 1st, 2007. The construction was finished by August 2009 and the commissioning took place the next month on September 2, 2009. The purpose of the project is to generate electricity and to feed it into the public grid. Cakirlar HEPP was registered as a Gold Standard Voluntary Emission Reduction (GS-VER) project in order to facilitate the project implementation by means of financial inflows coming from the credits sale. Due to its significant contribution in diminishing carbon emissions and protecting the climate as well as due to some significant additionality issues discussed further below, this project fulfilled the requirements of the Gold Standard rigorously. The project was not rejected by another GHG program before. In addition, the project highly supports the sustainable economic development in the region.

The project helps Turkey to stimulate and commercialise the use of grid connected renewable energy technologies and markets. It demonstrates the viability of run-off river hydro power plants which supports improved energy security, improved air quality, alternative sustainable energy futures, improved local livelihoods and sustainable renewable energy industry development. The specific goals of the project accomplished in this monitoring period are:

- reducing greenhouse gas emissions in Turkey compared to business-as-usual scenario,
- helping to stimulate the growth of run-off river hydro power industry in Turkey,
- creating local employment during the construction and the operation phase of the plant,
- reduce other pollutants resulting from fossil fuel dependent power generation industry in Turkey, compared to business-as-usual scenario,
- helping to reduce Turkey's increasing energy deficit and
- diversifying the electricity generation mix and reducing import dependency.

The project contributed to sustainable development in Turkey in following ways:

- Hydropower presents various environmental benefits compared to other primary energy sources: hydro energy does not result in emissions of pollutants into the atmosphere nor does it emit residuals that can have negative impact on soil, water etc. As a renewable energy source hydro energy can be used without putting the supply of primary energy sources in danger for future generations. The proposed project also contributed to reduction in emissions other than GHG, such as sulphur dioxide, nitrogen oxides and particulates.
- Cakirlar HEPP resulted in extra employment – the realisation of the project resulted in increased jobs in the local area, especially during the construction phase. Construction materials for the foundations, cables and access roads have been preferentially sourced locally.

ANADOLU, as the project developer, from the very beginning was committed to providing sustainability through environmental protection as well as social development and community support. Based on the information collected during various unofficial and unstructured stakeholder participation meetings conducted by the project owner in the region and the Sustainable Development Matrix (for details see section D) were prepared. The results of the in-depth assessment of environmental and social impacts confirm the positive influence of the project on all domains of environment and social support.

The actual crediting period for the project was from 17/08/2012 to 16/08/2019 (both days are included). However, due to a delay that occurred during the conversion of the project form another standard to the Gold Standard, the actual crediting starts as of 01/03/2013 as the subject

monitoring period is between 01/03/2013 and 31/05/2016, both days included. The amount of GHG emission reductions reported in the subject monitoring period is 95,664 (tCO₂e).

Implementation of the project consisted of construction of the following main items:

- Four weirs, where water from the river is diverted into conveyance pipes;
- Total length of the conveyance pipes is 8,888 m.
- Power house with Pelton type turbines;

In the power house, two vertical shaft Pelton turbines were installed, each 8.519 MW (total capacity 17.0 MW). The efficiency of the turbines is 90.5% when 4 jets are in operation. There are two generators attached to the facility. Generators have power factor of 0.8309 d/d, a frequency of 50 Hz and an output of 7.6 MVA.

The construction finished by August 2009 when the plant is commenced, the entire net electricity production is expected to be some 59.928 GWh per year. The estimated amount of emission reductions due to the realization of the proposed clean energy project is 32,203 tons CO₂ per annum.

Also, the plant load factor of the project is calculated as follows:

$$[59,928 \text{ MWh/yr}] / [17.0 \text{ MW}] / [8,760 \text{ hours/yr}] = 40.24\%$$

For drinking water supply, irrigation or electricity generation purposes, water can be obtained from appropriate parts of rivers by an intake structure. Characteristics of river basins, hydrologic factors of regions and specifications and amount of sediment in rivers can affect type of water intake structure. The most commonly used water intake structure is "direct water intake". In this structure, tyrol type regulators are used.

The project has four diversion weirs: Kunsu, Eğrisu, Suludüz and Köpürten. As indicated above type of these regulators is tyrol type regulator and the project does not include water reservoirs or dams. These type hydroelectric power plants do not have regulation capacity or they have only daily regulation capacity. Therefore, the power density of project has not been calculated.

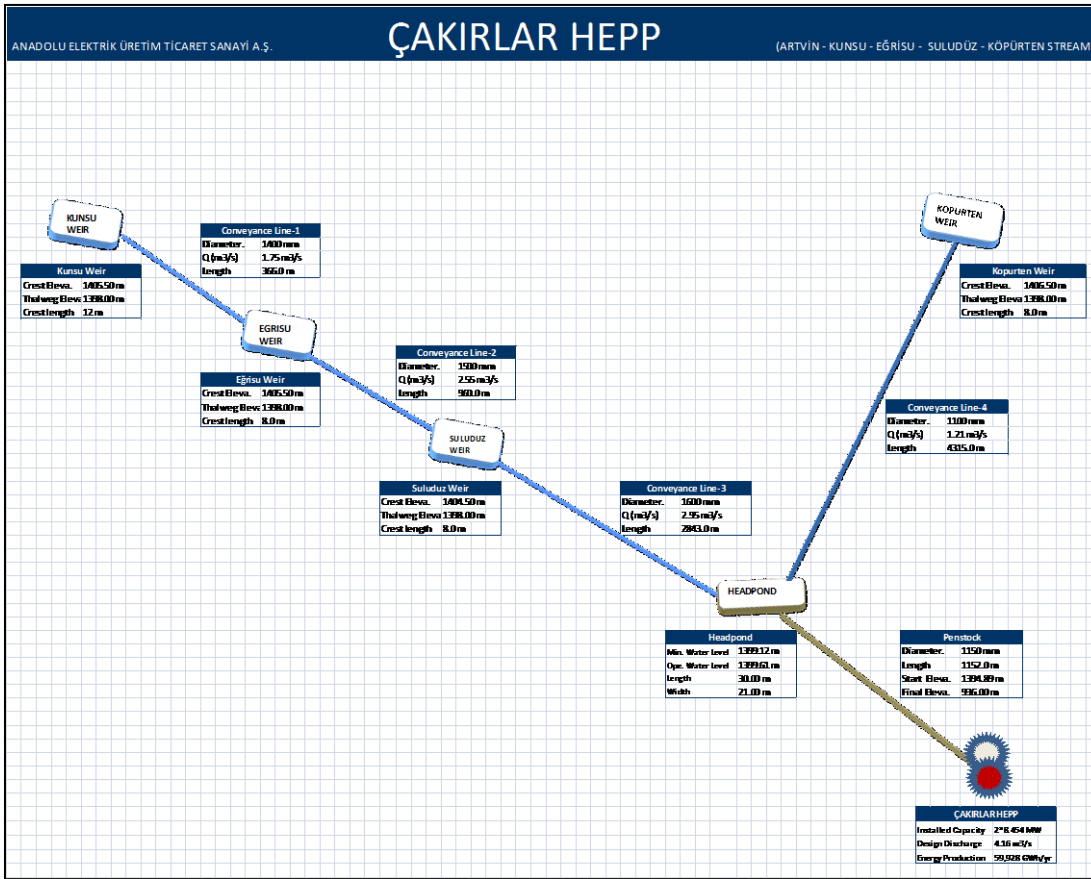
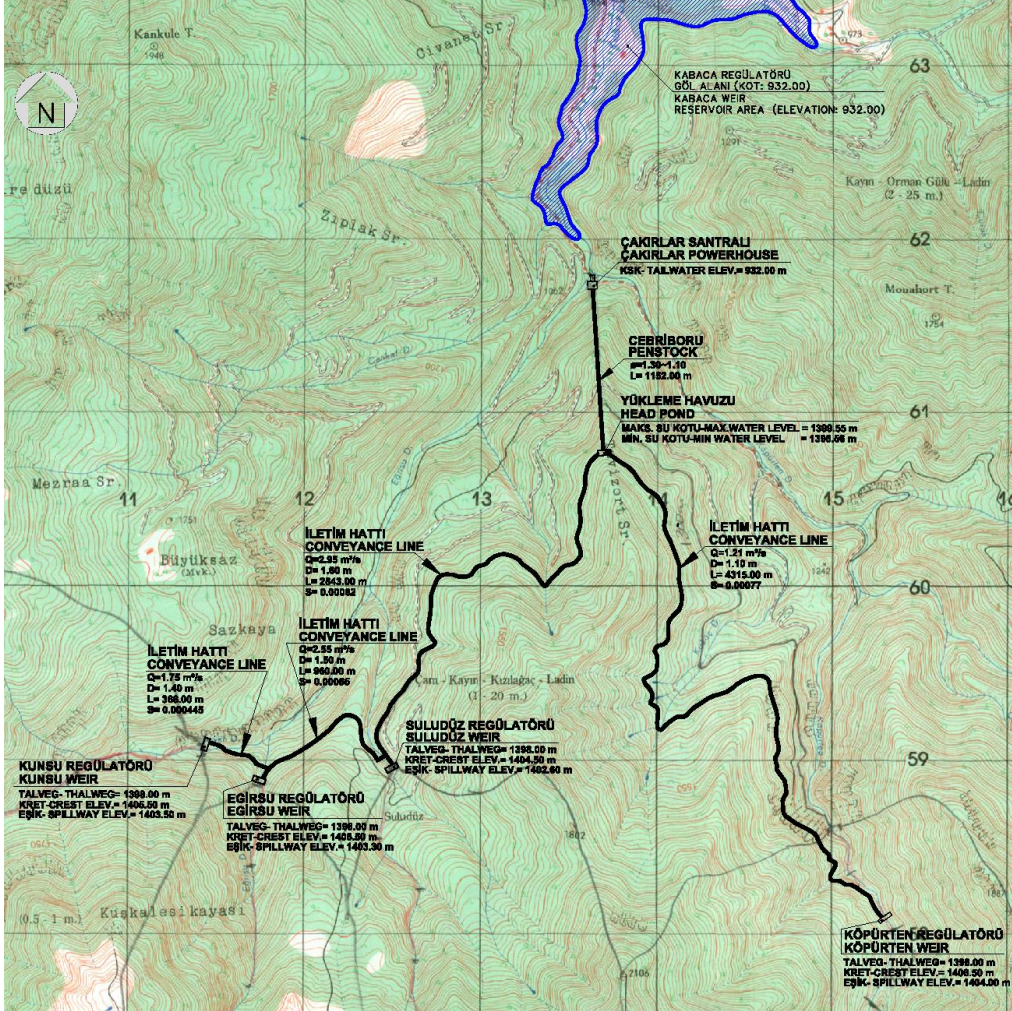


Figure 3: Site Scheme

A.2. Location of project activity

Çakırlar HEPP is located in the Black Sea Region of Turkey. The project is in Eastern Black Sea basin, within the province of Artvin. The project is on the Murgul creek. The geographical location of the project on Turkey map is 41° 08' 21'' - 41° 09' 23'' North, and 41° 31' 05'' - 41° 33' 54'' East.



MR-FORM



Figure 1: Project Location on Turkey Map

Figure 2: Site Layout

A.3. Parties Project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	ANADOLU ELEKTRİK ÜRETİM ve TİCARET A.Ş (Private Entity)	No

A.4. Reference of applied methodology and standardized baseline

Applied approved baseline and monitoring methodologies:

- Approved consolidated baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, version 13.0.0

Used tools:

- “Tool for the demonstration and assessment of additionality” version 06.0.0
- “Tool to calculate the emission factor for an electricity system” version 02.2.1

For more information regarding the methodology please refer to: <http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT>

A.5. Crediting period of project activity

Crediting period of the project is 7 years which is twice renewable. Crediting period is from 17/08/2012 to 16/08/2019 (both days are included). However, due to a delay that occurred during the conversion of the project from another standard to the Gold Standard, the actual crediting starts as of 01/03/2013. As the project was registered at the Gold Standard on 25/02/2015, the starting date of the monitoring period complies with the Gold Standard protocol of monitoring period to be commenced two years prior to the registration.

A.6. Name and Contact Information of responsible persons/ entities

Contact person	NARINÇ ATAKAN
Title	Assistant Manager
Salutation	Ms.
Last name	ATAKAN
Middle name	-
First name	NARİNC
Department	ENERGY TRADE
Direct tel.	+90 212 939 6730
Personal e-mail	natakan@gamaenergy.com

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

Cakirlar HEPP project entailed the construction and operation of a 17.00 MW hydroelectric power plant, the construction of weirs, conveyance pipes and powerhouse. The project activity was started at May 1st, 2007. The construction was finished by August 2009 and the commissioning took place the same month on September 2, 2009. The project consists of hydro power plant with two turbines of 8.519 MW. The first-hand turbines which were used in the project were supplied from Vatech Bouvier Hydro SAS, France. The turbines were Pelton type with vertical axis. The net electricity production (delivered to the grid after losses and consumption in the plant) from the plant is estimated to be 59.928 GWh per annum. The quantity of electricity required for operation of plant is about 640 MWh annually which is at a negligible level.

The technology used in the plant is a state-of-the-art technology with extensive automatization. There is no new technology which is expected to replace the plant's technology in the short run. The project does not need extensive initial training and maintenance efforts in order to work as presumed during the project period. Necessary trainings to the plant staff have been delivered by the supplier in line with the agreement between the project owner and the supplier.

The economic life of an HEPP in Turkey is assumed as 50 years¹. However, it is recommended to renew the equipment in every 20 years².

B.2. Post-registration changes

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

There has not been any revisions in the monitoring plan.

B.2.2. Corrections

N/A

B.2.3. Changes to start date of crediting period

Crediting period of the project is 7 years which is twice renewable. Crediting period is from 17/08/2012 to 16/08/2019 (both days are included). However, due to a delay that occurred during the conversion of the project from another standard to the Gold Standard, the actual crediting starts as of 01/03/2013.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

N/A

¹ http://ekutup.dpt.gov.tr/enerji/oik585.pdf_page_4.25

² http://ekutup.dpt.gov.tr/enerji/oik585.pdf_page_4.26

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

N/A

B.2.6. Changes to project design of registered project activity

N/A

B.2.7. Types of changes specific to afforestation or reforestation project activity

N/A

B.3. Request for deviation applied to this monitoring plan

N/A

B.4. Notification or approval of requests

N/A

SECTION C. Description of the monitoring system

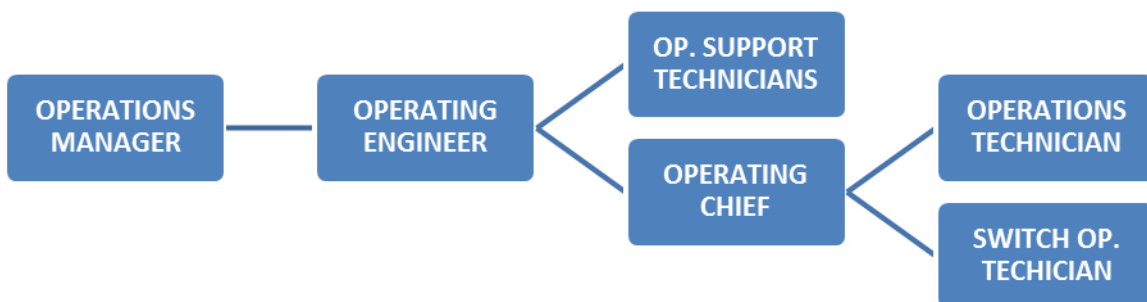


Figure 3: Organizational Structure Chart

Additionally, the emission factors were calculated ex-ante for the total crediting period of seven years. The combined margin will be recalculated through ACM0002, any time the crediting period is renewed.

The only data to be monitored was the amount of electricity fed into the grid:

ID Number	Data Variable	Source of Data	Data Unit	Measured (m) Calculated (c) Estimated (e)	Recording Frequency	Proportion of data to be monitored	How will the data be archived? (electronic or paper)	Comment
1. EGfacility,y	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Project Activity site	MWh/yr	m	Continuous measurement and monthly recording	100%	Electronic and paper	The data will be obtained from the PMUM records.

Table 5: Data to be Monitored and Monitoring Process

Metering:

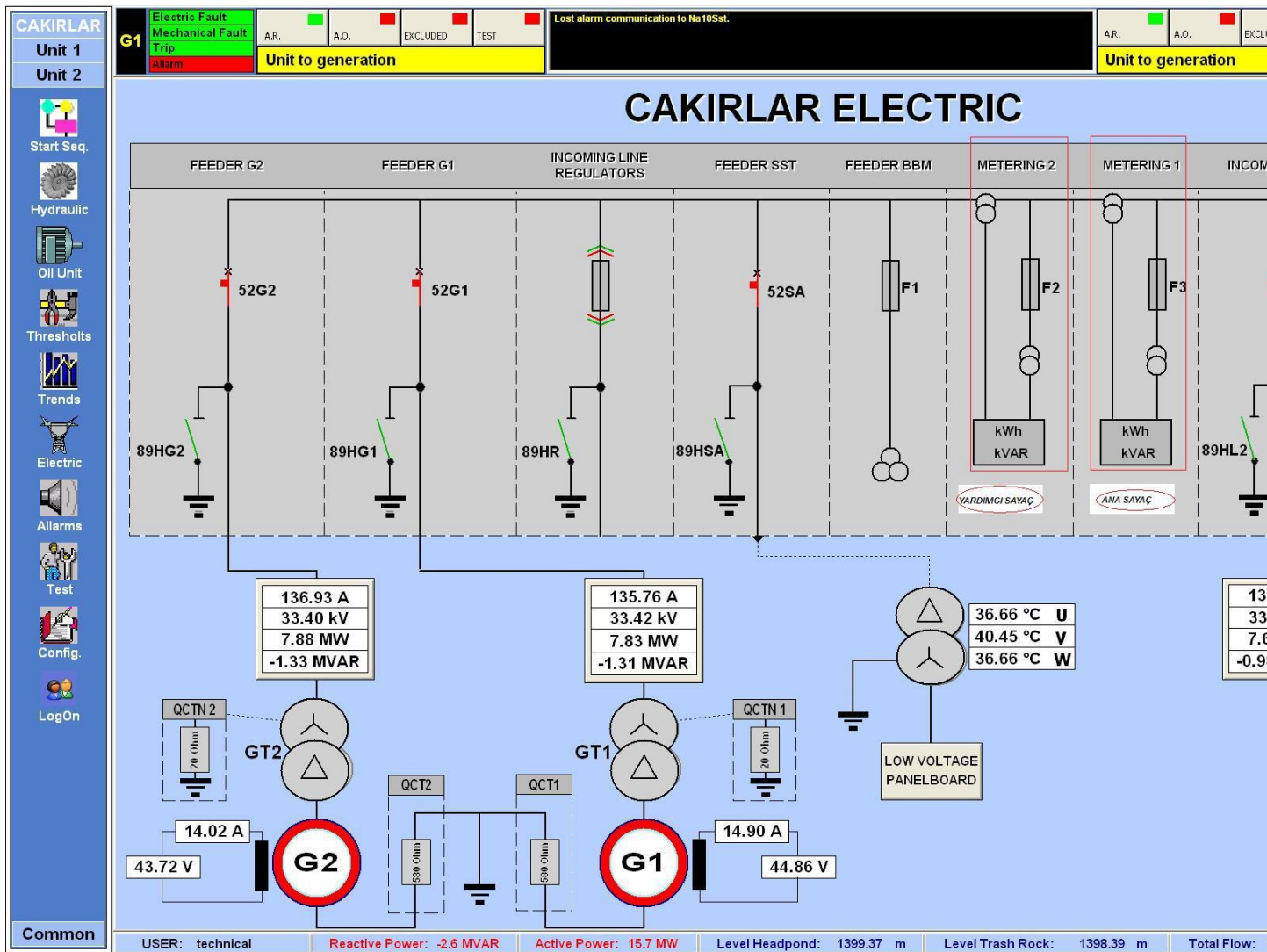
The meters measure the electricity delivered to the grid and also the electricity traction from the grid. Based on these measurements, the net electricity supplied to the grid³ was calculated from the PMUM records and this amount determined the emission reduction figures. Please note that PMUM was replaced by EPIAS⁴ as of July 2015, another semi-governmental body, to bridge buyers and sells also to maintain the grid control, the same responsibilities that PMUM carried out formerly.

As the necessary baseline emission factors are all defined ex ante, the only information to be monitored is the amount of electricity fed into the grid by Çakırlar HPP. The data was taken from the PMUM (Market Financial Settlement Center) and EPIAS records. According to the registered PDD of the project PMUM and when applicable EPIAS records have been assumed as the default data source for the evaluation of the emission reduction and the measurement records have been used to cross-check.

At renewable energy plants, usually, there is a single meter dedicated for measuring the import from the grid. Yet, Çakırlar HEPP does not have such meter. The plant imports from the grid, unmetered, while supplying the grid with electricity. Hence, the amount of electricity imported from the grid is accounted as part of the difference between the electricity supplied to the grid and the net electricity delivered to the grid. Please see the line diagram of plant metering for Çakırlar HEPP below. Also please note that the project owner strongly intends to alter this situation to install a new meter dedicated for measuring the import from the grid for the use by the plant, as soon as possible. Currently, both meters, meter 1 and 2, work at the same time to measure the electricity from both turbines jointly and as they are two-way meters, gross and net production are recorded by both of them.

³ $EG_{Facility,y} = EG_{Export,y} - EG_{Import,y}$

⁴ <https://www.epias.com.tr/>



Meter	Location	Function
Meter 1	Switchboard room, board 1	Main two-way meter for gross and net electricity production. Metering the electricity from two generating units jointly as located post-turbines.
Meter 2	Switchboard room, board 2	Back up two-way meter for gross and net electricity production. Metering the electricity from two generating units jointly as located post-turbines.

Figure 4: Plant metering line diagram and metering explanatory table

Data Cross-checking, Reporting and Archiving :

As description above all production figures which are subject to sales to the grid are agreed with PMUM. These figures can be accessed from PMUM's and EPIAS web site by the seller. Therefore, net electricity production figures announced by PMUM and later by EPIAS have been used in emission calculation figures. These figures have also been cross checked with the production and internal electricity usage figures provided from the OSF forms which are provided to the company by TEIAS after the remote measurement of the meters. Copies of OSF forms and PMUM and EPIAS records have been collected and stored in the plant. The measurement records which show the monthly electricity generations and imports of the project have been provided by the plant manager of Çakırlar HPP. The monthly meter reading documents (settlement

notifications of PMUM) are stored by Anadolu Elektrik Üretim A.Ş. and TEIAS. Monthly data from TEIAS are stored electronically on TEIAS website and this data can be accessed by login of Project Developer⁵.

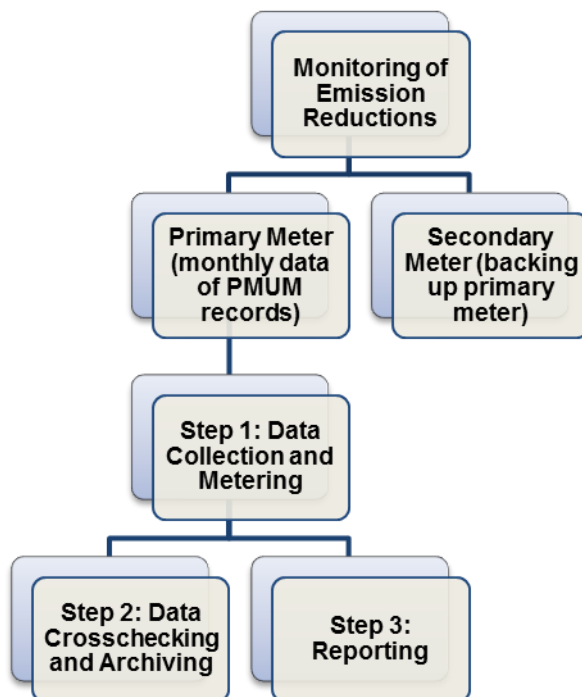


Figure 4: Line diagrams showing all relevant monitoring points

Calibration Procedures:

As the meters were sealed by TEIAS, Project Participant cannot intervene with the devices by themselves. TEIAS performs a regular maintenance on a regular basis and the main responsible for calibration. There are two meters; one main meter and one control meter. *The main meter of Elster brand (Serial No. 374150) has the Accuracy: 0.2s-1. The control meter is also the Elster brand (Serial No. 374149) and also has the Accuracy: 0.2s-1. Both meters, main and control, are controlled by the grid company and calibration process is maintained by another third party under the control of TEIAS. Additionally, the recalibration of these equipments will be done in line with the equipment requirements but re-calibration periods are defined by national metrology institutes country by country. In Turkey, the periodical check for the meters is 1 year as stated in Article 3.3 of the TEIAS System Usage Agreement. If there is a measuring difference between these meters (main and back up meters) and one of the parties (TEIAS or the company) requests for calibration of the meters, in this case, the meters will be calibrated (TEIAS System Usage Agreement, Art 3, B./2./b)⁶ without waiting for the periodical check. This calibration process is made by an accredited party under the control of TEIAS. The company is not responsible for calibration of the meters in Turkey according to the local standards*

The initial calibration process was done by TEIAS on July 3rd,2009 . On the other hand, no differences between the meters occurred since the initial calibration, second calibration was performed on November 1st , 2013. The last calibration was performed after that date. The calibrations are performed only by TEIAS and with respect to their schedule they perform regular calibrations. There has been no other calibration since then.

⁵ <http://pmum.teias.gov.tr/UzlasmaWeb/>

⁶ <http://eud.teias.gov.tr/SKAM/SKAornek.pdf>

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:	EF
Unit:	tCO ₂ e/MWh
Description:	Emission factor of the Turkish grid
Source of data:	Çakırlar HPP PDD registered under GS 917 (GS)
Value(s) applied:	0.537
Purpose of data:	Baseline emission calculation
Additional comment:	The emission factor of the Turkish grid is calculated ex-ante and has been fixed for the first crediting period.

D.2. Data and parameters monitored

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

Data / Parameter:	Electricity Production / EGfacility,y				
Unit:	MWh				
Description:	Quantity of net electricity delivered to the grid				
Measured/ Calculated / Default:	Measured				
Source of data:	EPIAS, formerly PMUM (Market Financial Settlement Center) records (Meter reading records-OSF forms for cross-checking of main meters)				
Value(s) of monitored parameter: Gross electricity generation (GG) Net Electricity Generation (NG)	178,860 MWh (GG) (178,150 MWh) (NG)	2013 50,572 MWh (GG) (50,373 MWh) (NG)	2014 52,547 MWh (GG) (52,350MWh) (NG)	2015 49,403 MWh (GG) (49,211 MWh) (NG)	2016 26,337 MWh (GG) (26,216 MWh) (NG)

Monitoring equipment:	<p>There are two meters that provide high accuracy and stability. The first one is the main meter (<i>Serial No. 374150</i>) and the second one is control meter (<i>Serial No.374149,</i>). Both meters were supplied from Elster Group. <i>and have Accuracy: 0.2s-1</i>) Please see the table below for the technical specifications of the meters :</p> <table border="1" data-bbox="592 349 1329 853"> <tr> <td>Brand</td> <td>Elster</td> </tr> <tr> <td>Model</td> <td>Alpha A1500</td> </tr> <tr> <td>Serial Numbers</td> <td>*Main meter : 374150 (Control meter:374149)</td> </tr> <tr> <td>Accuracy</td> <td>0.2s – 1</td> </tr> <tr> <td>Current</td> <td>1A</td> </tr> <tr> <td>Voltage</td> <td>3*58/100V</td> </tr> <tr> <td>Explanation</td> <td>The frequency of the calibration is annual although EPIAS the grid managing authority specifies the dates by plant and the frequency can change. There has not been any calibration since Nov 1, 2013.</td> </tr> </table>	Brand	Elster	Model	Alpha A1500	Serial Numbers	*Main meter : 374150 (Control meter:374149)	Accuracy	0.2s – 1	Current	1A	Voltage	3*58/100V	Explanation	The frequency of the calibration is annual although EPIAS the grid managing authority specifies the dates by plant and the frequency can change. There has not been any calibration since Nov 1, 2013.
Brand	Elster														
Model	Alpha A1500														
Serial Numbers	*Main meter : 374150 (Control meter:374149)														
Accuracy	0.2s – 1														
Current	1A														
Voltage	3*58/100V														
Explanation	The frequency of the calibration is annual although EPIAS the grid managing authority specifies the dates by plant and the frequency can change. There has not been any calibration since Nov 1, 2013.														
Measuring/ Reading/ Recording frequency:	EPIAS, formerly PMUM, records (for sold electricity) provides the exact electricity generation of the facility and the imports from the grid. The electricity meters have been controlled and maintained by the grid owner. The quantity of net electricity delivered to the grid has been cross checked with the monthly meter reading records.														
Calculation method (if applicable):	The net electricity of the facility is the difference of the electricity exported to the grid and imported from the grid.														
QA/QC procedures:	Cross check measurement results with monthly meter readings records .														
Purpose of data:	Used for baseline emission														
Additional comment:	n.a.														

Data / Parameter:	Installed capacity
Unit:	W
Description:	Installed capacity of the power plant
Measured/ Calculated / Default:	Project site
Source of data:	Supplier information on the equipment
Value(s) of monitored parameter:	17,000 W
Monitoring equipment:	Supplier information on the related equipment and the existence of the equipment will be checked
Measuring/ Reading/ Recording frequency:	Every year based on verification frequency
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check measurement results with monthly meter readings records .
Purpose of data:	Used for baseline emission
Additional comment:	n.a.

Data / Parameter:	Air Quality (1)
Unit:	Measured dust emission level in the site in case of complaint
Description:	Run off river plants are zero emission projects yet there could be dust arising especially during the construction of the plants.
Measured/ Calculated / Default:	Measured by parties accredited by the Ministry of Environment and Urbanization in case of complaints by the residents,
Source of data:	Measurements for dust emissions and grievance mechanism to check the complaints
Value(s) of monitored parameter:	Dust emission level in ppm, no measurement in the monitoring period as there were no complaints about the dust emission.
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Regular checks with grievance mechanism based on the forms available to be filled by the residents and controlled by the village governor. Immediate area dust emission measurement in case of complaint.
Calculation method (if applicable):	n.a
QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	

Data / Parameter:	Water Quality and Quantity (2)
Unit:	Service fees paid to the Municipality in TL (Turkish Lira) for the service provided
Description:	The project owner guarantees to collect all domestic waste water in septic tanks for water quality assurance and get it transported by the municipality to the nearest city site, Murgul.
Measured/ Calculated / Default:	n.a.
Source of data:	Municipality service records
Value(s) of monitored parameter:	The service fees paid to Murgul Municipality approximately every six months
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	n.a.
QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	

Data / Parameter:	Water Quality and Quantity (3)
Unit:	Lt/sec

Description:	The project owner guarantees to comply with the ‘minimum water rule’ of State Water Works (DSI) and the 150 lt/sec stated by the Environmental Due Diligence Report, whichever is the highest. Average water flow and the actual water flow between the regulator and the tail race (m ³ /sec) comparisons are based on records on all four tributary streams of Çakırlar River (Egrisu, Köpürten, Kunsu, Suludüz,).
Measured/ Calculated / Default:	Measured
Source of data:	State Water Works (DSI) measurements
Value(s) of monitored parameter:	The minimum water released by the plant is above 150 lt/sec at all times during the monitoring period within statistical significance. (The outcome parameter is a t-square statistical analysis of probability of significance for all streams. The result is, based on statistical analysis, the released water from the plant is both above the 150 lt/sec and “minimum 10 percent rule”, an estimated rule by the Environmental Due Diligence study and 150 lt/sec)
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Daily
Calculation method (if applicable):	n.a.
QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	The minimum water is defined as at least 10% of the average water flow in the last decade. ⁷ . Yet, in the scope of Çakırlar HEPP Project, minimum flow rate which guarantees habitat quality and prevents critical oxygen and chemical concentrations is 70 L/s for Kunsu stream, 30 L/s for Eğrisu and Köpürten streams and 20 L’s for Suludüz stream.(total 150 L/s) These values are calculated using Tennant Method by experts for the Environmental Due Diligence Report. The environmental flow is adequate and no drying of the watercourse observed.” Also depth of stream bed is measured between 0.15-0.50 m after water discharge from regulators. These values are enough for the maintenance of aquatic organisms present in the area. (Çakırlar (Artvin) Run-of-the-river Small HEPP (17MW) Environmental Due Diligence Report, 4 th March 2013,pg 15) Impact area: The impact area is between the regulator and the tail race. Baseline: Natural flow of river, discontinuous in summer months.

Data / Parameter:	Biodiversity (4)
Unit:	Lt/sec
Description:	The project owner guarantees to comply with the ‘minimum water rule’ of State Water Works (DSI) and the 150 lt/sec stated by the Environmental Due Diligence Report, whichever is the highest. Average water flow and the actual water flow between the regulator and the tail race (m ³ /sec) comparisons are based on records on all four tributary streams of Çakırlar River (Egrisu, Köpürten, Kunsu, Suludüz,).

⁷ http://www.dsi.gov.tr/ska/yonetmelik_tamami.htm

Measured/ Calculated / Default:	Measured
Source of data:	State Water Works (DSI) measurements.
Value(s) of monitored parameter:	The minimum water released by the plant is above 150 lt/sec at all times during the monitoring period within statistical significance. (The outcome parameter is a t-square statistical analysis of probability of significance for all streams. The result is, based on statistical analysis, the released water from the plant is both above the 150 lt/sec and “minimum 10 percent rule”, an estimated rule by the Environmental Due Diligence study and 150 lt/sec)
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	n.a.
QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	The minimum water is defined as at least 10% of the average water flow in the last decade. ⁸ . Yet, in the scope of Çakırlar HEPP Project, minimum flow rate which guarantees habitat quality and prevents critical oxygen and chemical concentrations is 70 L/s for Kunsu stream, 30 L/s for Eğrisu and Köpürten streams and 20 L's for Suludüz stream.(total 150 L/s) These values are calculated using Tennant Method by experts for the Environmental Due Diligence Report. The environmental flow is adequate and no drying of the watercourse observed.” Also depth of stream bed is measured between 0.15-0.50 m after water discharge from regulators. These values are enough for the maintenance of aquatic organisms present in the area. (Çakırlar (Artvin) Run-of-the-river Small HEPP (17MW) Environmental Due Diligence Report, 4 th March 2013,pg 15) Impact area: The impact area is between the regulator and the tail race. . Baseline: Natural flow of river, discontinuous in summer months.

Data / Parameter:	Quality of Employment (5)
Unit:	Number of employees to be trained

⁸ http://www.dsi.gov.tr/ska/yonetmelik_tamami.htm

Description:	The project proponent aims for improvement of safety for labour providers. The project trained all employees both on construction and operation of the plant for technical matters such as operation of the plant, health and safety measures and maintenance. During the monitoring period, the employees were provided with the trainings below; 1. Health and Safety (all 20 employees) in 12 Feb 2014, 6 Jun 2015 and 2 Apr 2016 2. Emergency Management (all 20 employees) in 4 Apr 2014, 5 Mar 2015 and 4 Apr 2016 3. Fire Extinguishing Methods (all 20 employees) in 12 Apr 2014, 14 Mar 2015 and 8 Apr 2016 4. Power House Equipment Management (operators) in 11 Apr 2014, 7 Mar 2015 and 11 Apr 2016 5. Power House Maintenance (operators) in 11 Apr 2014, 12 Mar 2015 and 9 Apr 2016 6. Power generation monitoring equipment (operators) in 22 Apr 2014, 18 Mar 2015 and 11 Apr 2016 7. First Aid (all 20 employees) in 5 Apr 2014, 21 Mar 2015 and 18 Apr 2016
Measured/ Calculated / Default:	Measured
Source of data:	The number of trainings and attendance of employees have been monitored by documents (Training Records).
Value(s) of monitored parameter:	All of the 20 employees have been trained for the operation of the plant during the first monitoring period.
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	n.a.
QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	Training certificates or other appropriate evidences are provided to the DOE.

Data / Parameter:	Livelihood of the poor (6)
Unit:	Amount of financial aid to the social projects and the number of projects in TRY
Description:	The project owner is willing to improve the human and institutional capacity by providing financial aid and contributions in kind to the local people and institutions..
Measured/ Calculated / Default:	n.a
Source of data:	Company records, village accounting records (Bills of financial aids and interviews with the authorised people from the related local institutions)
Value(s) of monitored parameter:	Amount of donation to the four major charitable events (TL),, 8064 TL in cash within the subject monitoring period. Those events are the local library project, agricultural development cooperative, culture and art festival and aid to the local sports club.
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	n.a.

QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	

Data / Parameter:	Quantitative Employment and Income Generation (7)
Unit:	Number of employees hired during the construction and operation of the project
Description:	The company has been provided job opportunities and as a result increase income generation. 20 people have been hired during the subject monitoring period of operation of the power plant and 12 people of them have been hired as local employees from the region
Measured/ Calculated / Default:	n.a.
Source of data:	SGK (Social Security Institution) Records of employees as well as local employees.
Value(s) of monitored parameter:	Local employees, 12 within the monitoring period
Monitoring equipment:	n.a.
Measuring/ Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	n.a.
QA/QC procedures:	n.a.
Purpose of data:	Sustainability monitoring parameters
Additional comment:	

Data / Parameter:	Grievance Mechanism for Stakeholders (8)
Unit:	Number of grievances received for this monitoring period
Description:	Number of complaints from the village and the ratio of resolution
Measured/ Calculated / Default:	n.a
Source of data:	Grievance form at the village governor's office
Value(s) of monitored parameter:	Number of applications for assistance and/or complaints. There were four grievances from the villagers and all were resolved.
Monitoring equipment:	The grievance mechanism as suggested by the Gold Standard is fully functional. A related form is available at the village governor's office and at the village coffee shop is available at all times. The village accounting records and the company records prove that there is positive response to the aid demand of the village for certain social and infrastructure development projects.
Measuring/ Reading/ Recording frequency:	Every year based on verification frequency
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check measures with the village governor
Purpose of data:	Used for environmental and social sustainability

Additional comment:	<p>There have been four (4) applications through the grievance mechanism. All were responded positively by the project owner.</p> <ol style="list-style-type: none"> 1) Financial aid for the village festival dated 10 Sept 2013 (5000 TL was donated by the project owner) 2) Financial aid for the re-pavement of the roads leading to the village dated 15 June 2014 (75000 TL was donated by the project owner) 3) The co-op of the village has a building and its door needs to be renewed dated 17 April 2015. (The project owner replaced the door) 4) The building of the coop has been damaged and needs to be renovated dated 5 June 2015 (The project owner donated 5000 TL for renovating the building)
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Data / Parameter:	Environmental Flow in the Project Area (9)
Unit:	Number of incidents reported
Description:	Number of environmentally disruptive incidents reported.
Measured/ Calculated / Default:	n.a
Source of data:	State Hydraulic Works reports
Value(s) of monitored parameter:	No environmentally disruptive incidents were reported in the project area.
Monitoring equipment:	If any incidents occur about environmental flow, it will be reported to State Hydraulic Works.
Measuring/ Reading/ Recording frequency:	Every year based on verification frequency
Calculation method (if applicable):	N/A
QA/QC procedures:	Cross check measures with the village governor
Purpose of data:	Used for environmental sustainability
Additional comment:	The company will comply with all the rules listed in Table C-2 and in order to mitigate the project effects on environmental flow, all the precautions will be taken by the project owner.

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

The total emission reductions can be calculated with the results of the below described equations. The emission reduction is equal to the baseline emissions minus project emissions and leakage emissions. Leakage emissions in this project are considered to be zero. There are no project emissions in this kind of project. The general equation is as suggested in ACM0002 / Version 13.0.0., emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

ER_y : Emission reductions in year y (t CO₂e/yr)

BE_y : Baseline emissions in year y (t CO₂e /yr)

PE_y : Project emissions in year y (t CO₂/yr)

LE_y : Leakage emissions in year y (t CO₂/yr)

Since PE_y and LE_y are assumed to be 0, emission reductions are equal to baseline emissions.

Baseline emissions

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

Accordingly the baseline emissions BE_y are calculated as following:

$$BE_y = EGPJ_{,y} \times EF_{grid, CM, y}$$

Where:

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

EGPJ_y : Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)

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" (tCO₂/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".

$$EF_{grid,CM,y} = 0.537 \text{ tCO}_2/\text{yr}$$

Applying the above equation to the project data given in table for calculation, baseline emissions in 2013 (since 1st of March), 2014 and 2016 (until the end of May) are as below:

Baseline Emission in 2013:

$$BE_{2013} = 50,373.34 \text{ [MWh]} \times 0.537 \text{ [tCO}_2/\text{MWh]} = 27,050.48 \text{ tCO}_2$$

Baseline Emission in 2014:

$$BE_{2014} = 52,349.82 \text{ [MWh]} \times 0.537 \text{ [tCO}_2/\text{MWh]} = 28,111.85 \text{ tCO}_2$$

Baseline Emission in 2015:

$$BE_{2015} = 49,210.51 \text{ [MWh]} \times 0.537 \text{ [tCO}_2/\text{MWh]} = 26,426.04 \text{ tCO}_2$$

Baseline Emission in 2016:

$$BE_{2016} = 26,216.84 \text{ [MWh]} \times 0.537 \text{ [tCO}_2/\text{MWh]} = 14,077.06 \text{ tCO}_2$$

The baseline emissions for the project activity according to the PDD are included in the following tables:

2013				
CAKIRLAR HEPP (MWh)				
	Electricity Supply (MWh)	Electricity Traction from Grid (MWh)	Net Electricity Delivered to the Grid (MWh)	Emission Reductions (Tons)
Mar-13	3,978.24	13.94	3,964.30	2,129
Apr-13	8,270.22	40.88	8,229.34	4,419
May-13	9,746.81	50.89	9,695.92	5,207
Jun-13	8,071.59	36.63	8,034.96	4,315
Jul-13	5,055.18	14.76	5,040.42	2,707
Aug-13	2,402.62	3.76	2,398.87	1,288
Sep-13	4,667.68	17.74	4,649.94	2,497
Oct-13	5,379.02	17.60	5,361.42	2,879
Nov-13	1,713.97	1.91	1,712.07	919
Dec-13	1,287.06	0.95	1,286.10	691
TOTAL :	50,572	199	50,373	27,050

Table 6: Baseline emissions during this monitoring period (01/03/2013 –31/12/2013)

2014				
CAKIRLAR HEPP (MWh)				
	Electricity Supply (MWh)	Electricity Traction from Grid (MWh)	Net Electricity Delivered to the Grid (MWh)	Emission Reductions (Tons)
Jan-14	968.15	0.51	967.64	520
Feb-14	1,127.61	0.90	1,126.71	605
Mar-14	4,030.41	12.01	4,018.40	2,158
Apr-14	8,721.22	48.49	8,672.73	4,657
May-14	10,087.72	54.34	10,033.39	5,388
Jun-14	7,958.47	35.46	7,923.01	4,255
Jul-14	4,448.66	11.52	4,437.14	2,383
Aug-14	2,034.20	2.55	2,031.65	1,091
Sep-14	2,109.79	3.78	2,106.01	1,131
Oct-14	4,433.83	13.29	4,420.54	2,374
Nov-14	3,646.35	7.93	3,638.42	1,954
Dec-14	2,980.81	6.62	2,974.20	1,597
TOTAL :	52,547	197	52,350	28,111

Table 7: Baseline emissions during this monitoring period (01/01/2014 –31/12/2014)

2015				
CAKIRLAR HEPP (MWh)				
	Electricity Supply (MWh)	Electricity Traction from Grid (MWh)	Net Electricity Delivered to the Grid (MWh)	Emission Reductions (Tons)
Jan-15	1,212.45	0.79	1,211.66	651
Feb-15	811.15	0.41	810.74	435
Mar-15	2,689.41	6.41	2,683.00	1,441
Apr-15	5,725.62	21.48	5,704.14	3,063
May-15	10,917.87	63.55	10,854.33	5,829
Jun-15	9,025.50	44.93	8,980.56	4,823
Jul-15	5,406.63	19.53	5,387.10	2,893
Aug-15	1,758.07	2.31	1,755.76	943
Sep-15	894.10	0.48	893.61	480
Oct-15	5,339.03	20.99	5,318.04	2,856
Nov-15	3,921.71	10.35	3,911.36	2,100
Dec-15	1,701.91	1.69	1,700.23	913
TOTAL :	49,403	193	49,211	26,426

Table 8: Baseline emissions during this monitoring period (01/01/2015 –31/12/2015)

2016				
CAKIRLAR HEPP (MWh)				
	Electricity Supply (MWh)	Electricity Traction from Grid (MWh)	Net Electricity Delivered to the Grid (MWh)	Emission Reductions (Tons)
Jan-16	1,283.75	0.95	1,282.80	689
Feb-16	2,098.29	3.66	2,094.63	1,125
Mar-16	3,727.06	9.08	3,717.98	1,997
Apr-16	8,516.30	45.34	8,470.96	4,549
May-16	10,711.94	62.47	10,649.47	5,719
TOTAL :	26,337	121	26,216	14,077

Table 9: Baseline emissions during this monitoring period (01/01/2016 –31/05/2016)

Please note that until July 2015, the records of production were tracked by PMUM and as of July 2015 by EPIAS.

Date	Electricity Supply (MWh)	Electricity Traction from the Grid (MWh)	Net Electricity Delivered to the Grid (MWh)	Emission Reductions (tCO ₂ e)
01/03/2013 – 31/12/2013	50,572	199	50,373	27,050
01/01/2014 - 31/12/2014	52,547	197	52,350	28,111
01/01/2015 - 31/12/2015	49,403	193	49,211	26,426
01/01/2016 – 31/05/2016	26,337	121	26,216	14,077
Total	178,860	711	178,150	95,664

Table 10: Total emission reductions during the first monitoring period (01/03/2013 –31/05/2016)

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

According to the baseline methodology ACM0002, the GHG emission of the project within the project boundary is zero, i.e. PE_y =0.

E.3. Calculation of leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage does not have to be taken into account and is taken as 0 tCO₂/year.

Then: ER_y= BE_y

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)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	95,664	0	0	0	27,050 (2013) 28,111 (2014) 26,426 (2015) 14,077 (2016)	95,664

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)	104,814	95,664

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

The estimated GHG reduction is more than the actual reduction occurred during the monitoring period because of a two year drought in the region.

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 CO₂e)	Prorated with respect to number of days in the subject monitoring period (tCO ₂ e)	tCO ₂ e
2013	26,998	27,050
2014	32,203	28,111
2015	32,203	26,426
2016	13,411	14,077
Total	104,814	95,664

As seen in the table above, the estimated amount of GHG removals in the PDD was prorated with respect to the number of days corresponding to each year in the monitoring period and then compared to the actual generation of GHG removals. It is seen that, although the estimation is very close to actual reduction in 2013, starting in 2014 the actual generation of GHG removals is less than the generation estimated in the PDD. This continued in 2015 but as the decrease in generation is accounted as a result of some drought started late 2013 in the region. The drought eased down in 2016.⁹

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⁹ <http://www.mgm.gov.tr/veridegerlendirme/yillik-toplam-yagis-verileri.aspx?m=artvin#sfB>

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Responsible person/ entity for completing the CDM-MR-FORM
Organization name	ANADOLU ELEKTRİK ÜRETİM ve TİCARET A.Ş
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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.

<i>Version</i>	<i>Date</i>	<i>Description</i>
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
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 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.