Monitoring report form

(Version 05.1)

MONITORING REPORT		
Title of the project activity	ÇATALOLUK HEPP	
UNFCCC reference number of the project activity	GS872	
Version number of the monitoring report	06	
Completion date of the monitoring report	22.12.2016	
Monitoring period number and duration of this monitoring period	Monitoring period # 2 40 months between 01/06/2012 – 30/09/2015	
Project participant(s)	BEYTEK Elektrik Üretim AŞ GTE Carbon	
Host Party	Turkey	
Sectoral scope(s)	Sectoral Scope 1 "Energy Industry – Renewable Sources "	
Selected methodology(ies)	Methodology applied: AMS I.D., version16;	
Selected standardized baseline(s)	-	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	According to PDD, 17,467 tons CO2 annually and 58,223 tons CO2 emission reduction is expected for 40 months of this monitoring period	
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 30 September 2015	GHG emission reductions or net GHG removals by sinks reported from 1 June 2012 onwards
	46,168 tons CO2	

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

The Cataloluk HEPP has been developed by Beytek Elektrik Uretimi AS, which is the one of the largest and most credible companies of Turkey. Such projects gap some of the national energy deficit, contribute the development of local industries as it allows the use of cheaper energy for industrialists and gain advantage in a competitive environment.

The Cataloluk Regulator and Hydroelectric Power Plant is a run-off-river type project located on Tekir Creek at about 55 km north of Kahramanmaras Province and 40 km south of Göksun District. Proposed project consists of a hard-fill weir located at 823.5m altitude and 17m height from the thalweg level whereas the powerhouse is located at about 724.5 m altitude.

License application for the Hydro Electric Power Plant was made to the Energy Market Regulatory Authority and the Production License was awarded in accordance with the Electricity Market Law (No: 4628) for a period of 44 years by the decision numbered EU/2303-2/1560 on November 11th, 2009 . Project has commissioned in April 2010.

Other Project elements include conveying channel (1447.6m) and tunnel (1252.4 m), forebay and penstock, which provide a gross elevation difference of about 114.5m, powerhouse and two horizontal Francis type turbines each having 2*4.77MWe (2*4.92MWm) capacity. The energy generated at Cataloluk HEPP is transmitted to the Çaglayan 31.5/154kV switchyard station.

The installed capacity of the plant is designed as 9.54MWe. Therefore, the project is expected to generate about 31.99 GWh electricity and reduce about 17,467 tCO2 emissions annually through replacing the electricity that would need to be supplied via the National grid in the absence of the project activity.

The project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants connected to Turkish National Power Grid. Although GS requirements state one site visit for every three year term after first two years, this monitoring period includes 40 months between 01/06/2012 – 30/09/2015 since annual actual electricity generation (25,367 GWh) is remarkably lower than the annual estimated value (31,99 GWh) which is due to lower flow than expected. Hence, monitoring period was lasted to reduce the loss of project owner. Net electricity generation during monitoring period has been calculated as 84,558 MWh or 84.558 GWh whereas net emission reduction is 46,168 tons CO_2 (tons of carbon dioxide equivalents and 13,850 tCO2 annually). Therefore, annual electricity generation becomes 25.367 GWh. Lower electricity generation and emission reduction compared to expected values are due to lower flow than expected. Consequences of this situation are also discussed in "Monitoring of Sustainable Development Parameters – No:2" part of the document where the justification of minimum flow is also mentioned.

Environmental and social measures identified in the feasibility report and pre-EIA has been applied for the proposed project and details have been defined in Gold Standard Passport Document. In addition, financial model, expert reports, PTD, AGI maintenance document could be checked from the Markit Financial system.

Proposed project has been initially implemented by Guvenen AŞ with an estimated cost of 11M USD in feasibility report. However, due to unexpected costs of construction, the investment amount has increased more than two folds and as a result the project has stopped due to financial difficulties. Alter, project has been purchased by Beytek Elektrik Üretim AŞ in 10/07/2009, considering carbon revenue, and completed by Beytek on 01/04/2010 as it was also stated in the previous validated monitoring report. Milestones for Çataloluk HEPP project is shown in Table 1 below which was implemented in line with the registered GS documents and monitoring plan. SD monitoring plan has been given in more detail in section…..

Milestone	Date
License Issuance	25/05/2005
Start of Construction	09/03/2006
EM Equipment Purchase Contract	09/08/2007
Revised Feasibility Report	01/08/2008
Forest Permission	31/12/2008
Protocol for Sales Negotiations	04/05/2009
Certification Offer and Agreement	18/06/2009
Transfer of Project Shares to Beytek*	10/07/2009
Subcontractor agreement (Transmission Line)	02/10/2009
Water Right Utilization Agreement	18/12/2009
EIA Exemption Letter	30/12/2009
System Connection Approval	15/02/2010
Commissioning Date	07/04/2010
Validation Report	27/10/2011
GS Registration Date	09/09/2011
1st Monitoring Period	01/04/2010 – 30/05/2012

*Date of investment decision

Table 1. Milestones for Cataloluk HEPP

A.2. Location of project activity

Host Party	Turkey
Region/State/Province	Mediterranean/Kahramanmaraş Province
City/Town/Community	Göksun District
Physical/Geographical location	Tekir Creek

The project consists of a weir and a powerhouse. Related coordinates are given in Table below.

	Longitude	Latitude
Weir	E 36°38'29.04	N 37°50'42.95
Powerhouse	E 36°39'37.48	N 37°49'19.35"

Table2. Project Coordinates

Figure 1. Cataloluk Hepp Location

A.3. Parties and 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)*	BEYTEK Elektrik Üretim AŞ GTE Carbon A.Ş..	No

A.4. Reference of applied methodology and standardized baseline

The UNFCCC approved simplified baseline and monitoring methodology "AMS I.D version 16" which was released on 30/10/2009 was applied for the project activity. Moreover, ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", Version 12.3.0[1] is used for the project emissions calculations which is referred in AMS I.D version 16 in page 7.

ACM0002 refers to the following tools:

- "Tool for the demonstration and assessment of additionality", Version 05.2[2] and,
- ''Tool to calculate the emission factor for an electricity system'', Version 01.1[3].

A.5. Crediting period of project activity

Project uses renewable crediting period. Crediting period of the project is 7 years between 07/04/2010 and 06/04/2017. This crediting period is the first crediting period for this project. Moreover, this monitoring period is the second monitoring period in this crediting period covering the dates between 01/06/2012 – 30/09/2015 as it is also indicated in the first page of this report.

A.6. Contact information of responsible persons/entities

Project Participants	Role/Responsibilities	Contact Information
Beytek Elektrik Uretimi AS	Owner of the VER rights of the project. Construction and Operation of the power plant in line with regulations. Implementation of monitoring plan and collecting and archiving monitoring data	Enver Kayalı Çağlayan Köyü Mah. Kahramanmaraş Merkez, Kahramanmaraş Phone: +90 344 262 20 10 E-Mail: cekayali@mogulsb.com
GTE Carbon	Development of project documents. Managing validation and verification	M.Kemal Demirkol Ehlibeyt Mahallesi 1259 sk 7/2 Balgat Cankaya Ankara

[1] https://cdm.unfccc.int/filestorage/N/F/9/NF9EDAOV5K382HW0JR14GS7XYQUMCP/EB47_repan07_ACM0002_ver10.pdf?t=aFF8bzcwZ3dhfDDhTl4bSCQecQlFRPgFeJko

[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf

	processes for the project.	TURKEY Tel:90 312 472 35 00 Fax: 90 312 472 33 66 E-mail: gte@gtecarbon.com

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

The Cataloluk HEPP has been developed by Beytek Elektrik Uretimi AS. It is a run-off-river type project. The proposed project is located on Tekir Creek at about 55 km north of Kahramanmaras Province and 40 km south of Göksun District. In this scope a hard-fill weir located at 823.5m altitude and 17m height from the thalweg level whereas the powerhouse is located at about 724.5 m altitude. Total installed power of the facility has been 9.54MWe.

Project has started operation in 01/04/2010. There is only one project site as defined above.

Technical characteristics of Cataloluk HEPP have been summarized in table below.

LOCATION:	Tekir Creek, Göksun District
DESIGN DISCHARGE:	10 M^3/SEC
LENGTH OF CONVEYANCE CHANNEL:	1.45 KM
LENGTH OF CONVEYANCE TUNNEL:	1.25 KM
GROSS HEAD:	114.5 M
TOTAL INSTALLED CAPACITY:	9.54 MWe (2×4.77MWe)
NUMBER OF UNITS:	2 EACH
TURBINE TYPE:	FRANCIS TYPE – HORIZONTAL AXIS
TURBINE MANUFACTURER:	WKV
NUMBER OF PENSTOCKS:	1
LENGTH OF PENSTOCKS:	193 M
AVERAGE ANNUAL POWER GENERATION:	31.99 GWH
GRID CONNECTION	THE GRID CONNECTION WILL BE PROVIDED BY MEANS OF ENERGY TRANSMISSION LINE TO THE YUKARI CAGLAYAN STATION (154/34.5 KV) WHICH IS OWNED BY TEIAŞ.

Table3. Characteristics of Çataloluk HEPP

During this (second) monitoring period, project has generated less electricity than expected due to low rate of flow as it was also mentioned in Section A1. However, there was not any event or situation that may prevent applicability of methodology during this monitoring period.

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

As per the registered monitoring plan, environmental flow releases from the river bed should be recorded by DSI gauging stations and used for demonstration of release of flow from the weir. DSI gauging station data was gathered. Same records were also gathered from Akım Elektronik Ltd who is equipment seller & maintenance company. Monthly maintenance and data collection has been signed with this company also during the first crediting period to avoid any problems such as data lost.

B.2.2. Corrections

No correction has been made. To ensure proper functioning of the gauging device, a monthly maintenance agreement has been signed with a service company for future monitoring and verification.

B.2.3. Changes to start date of crediting period

No change has been made on applied methodology or monitoring plan.

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

Although, PDD section 7.1 indicates that monthly records is gathered from meters located at the project site and signed by TEİAŞ and plants manager, net electricity generation records were gathered from EPIAS, which is a TEIAS association in fact, and its' records are conservative than the site records. ..

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

SECTION C. Description of monitoring system

Monitoring is a key procedure to verify the real and measurable emission reductions from the proposed project. To guarantee the proposed project's real, measurable and long-term GHG emission reductions, the monitoring plan is established. Project has been registered as a GS-VER project. In addition to the parameters monitored in PDD, there exist sustainable development indicators as given in GS passport document.

In order to demonstrate the emission reduction, only the required data is the net electricity delivered to the grid by the project activity.

Although, PDD section 7.1 indicates that monthly records signed by TEİAŞ and plants manager net electricity generation records were gathered from EPIAS which is a TEIAS association and its' records are conservative than the site records which are can also be used for for billing purposes. Therefore, no new additional protocol was needed for monitoring emission reduction. Power Plant Manager was responsible for the electricity generated, gathering all relevant data and keeping the records.

Generation data collected during crediting period was submitted to GTE Carbon who was responsible for calculating the emission reduction subject for verification. Generation data was used to prepare monitoring reports which is used to determine the vintage from the project activity. These reports were submitted to the duly authorized and appointed Designated Operational Entity (DOE) during each verification period.

Verification Team is composed from;

Plant Manager: Overall responsibility of compliance with VER monitoring plan

Electrical Engineer: Responsible for day to day running of plant, recording and monitoring of relevant data and periodic reporting
Accounting Manager: Responsible for keeping data about power sales, invoicing and purchasing.
GTE Carbon: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of metering devices and data monitoring were carried out according to the regulations and control process of TEIAS. Two metering devices (one of them used as spare) were used for monitoring the electricity generated by the power plant. Readings were done using main metering device and spare metering device was used for comparison only. Related figure to understand the recording and grid connection line are shown below.

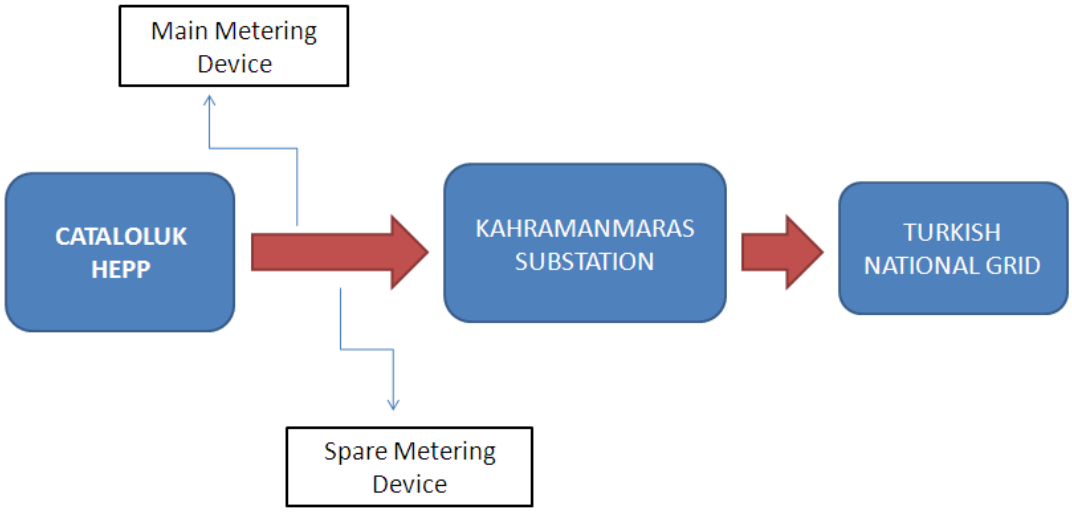

Figure 2.Cataloluk HEPP Meters and Connection Diagram

All data will be kept for at least two years after the crediting period for QA/QC purposes. Calibration of the metering devices is made on 01/07/2009 and sealed before the commissioning of the power plant. According to the related regulation on calibration of metering devices, next calibration will be done in 2019 and so there is no need to provide any calibration study in this monitoring period. The maintenance and test study on metering devices are done and controlled by TEIAS yearly and when there is an inconsistency between two devices (main and spare one).

The lake area at maximum height has been defined in the project documents. Although it is not possible to exceed maximum lake area, as the excess water can spill over the weir, the water level and maps of reservoir area were used to monitor the maximum area covered.

The monitoring system organization chart is shown in figure below, in which the authority and responsibility of project management are defined.

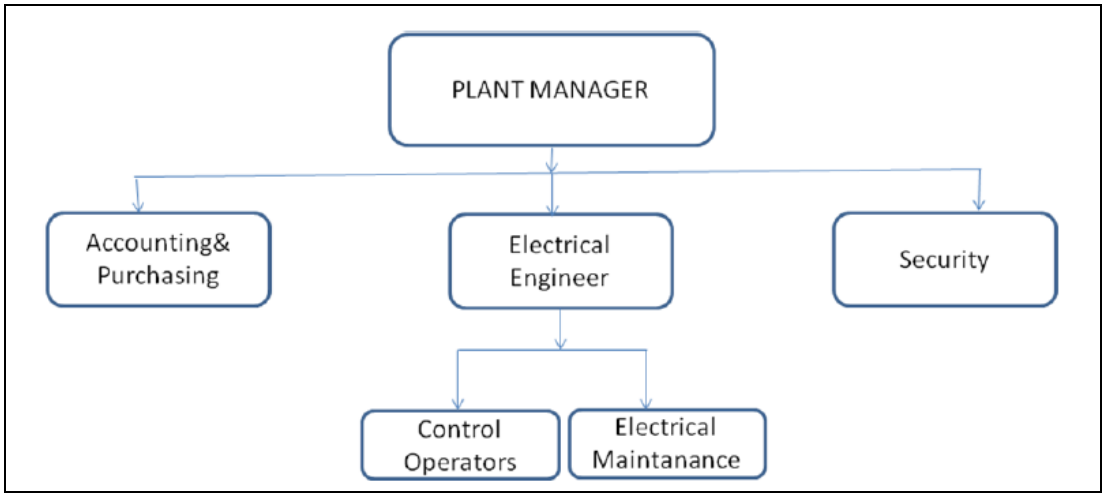

Figure 3. Operational structure of Cataloluk HEPP

SECTION D. Data and parameters

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

Data / Parameter:	**EG_y**
Unit:	GWh
Description:	Net Electricity delivered to the grid by the Cataloluk HEPP in year y
Source of data :	Feasibility Report for Çataloluk HEPP
Value(s) applied:	31.99 GWh
Purpose of data	Data used for emission reduction calculation.
Additional comment	-

Data / Parameter:	**EGy, Total**
Unit:	GWh
Description :	Net Electricity delivered to the grid by power plants in Turkey in year 2008
Source of data :	http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.htm
Value(s) applied:	189,761.9 GWh
Purpose of data	Data used for emission reduction calculation (for calculation of OM, Net-to-Gross electricity ratio and share of low-cost must-run sources
Additional comment	-

Data/parameter:	**EFCO2, i, y i**
Unit	tCO_2/TJ
Description	CO2 emission factor of fossil fuel type “i” in year “y”
Source of data	-For EF of fossil fuels, IPCC values at the lower limit have been used.

Value(s) applied)	**Fuel Source** / **EF(tCO_2/Tj)** Coal 89.5 Lignite 90.9 Fuel Oil 75.5 Diesel 72.6 LPG 61.6 Naphta 69.3 Natural Gas 54.3
Choice of data or measurement methods and procedures	According to ACM0002, IPCC default values at lower limit of 95% confidence interval can be used. Although, the actual emission reduction is expected to be higher due to high EF of fuel consumed in existing power plants, IPCC values have been used for conservativeness as requested by the methodology.
Purpose of data	Data is used for baseline/project emission calculations.
Additional comments	N/A

Data/parameter	**$FC_{i,y}$**
Unit	Tons or 1000 m3 for gases
Description	Amount of fuels consumed by thermal power plants for electricity generation in terms of fossil fuel type i in year y
Source of data	http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.htm (Fuels Consumed In Thermal P.Ps In Turkey By The Electricity Utilities (2006-2014)
Value(s) applied)	See Annex 3 of the PDD
Choice of data or measurement methods and procedures	Data is chosen for the country specific calculation for the OM value. Also, see Annex 3 of the PDD
Purpose of data	Data is used for OM calculation
Additional comments	N/A

Data/parameter:	**GE**
Unit	%
Description	Generation efficiency of thermal power plants
Source of data	Annex I- Tool to calculate the emission factor for an electricity system
Value(s) applied)	See Annex 3 of the PDD
Choice of data or measurement methods and procedures	Data is chosen for the country specific calculation for the BM value.

Purpose of data	Data used for BM calculation
Additional comments	N/A

Data/parameter:	**NCV**
Unit	Tj/kt
Description	Net Calorific Values of Fuel combusted in power plants.
Source of data	http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.h
Value(s) applied)	See Annex 3 of the PDD
Choice of data or measurement methods and procedures	Data is chosen to exact calculation of the project emission caused by the specific combustion features of fuel type in this project.
Purpose of data	Data used for OM and BM calculation
Additional comments	N/A

D.2. Data and parameters monitored

<table>
<tr><td>Data/Parameter</td><td>EG_y</td></tr>
<tr><td>Unit</td><td>GWh</td></tr>
<tr><td>Description</td><td>Net Electricity generated and delivered to the grid by the Cataloluk HEPP in year ly</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Calculated from measurements of metering.</td></tr>
<tr><td>Source of data</td><td>Metering devices located in the transformer center whose responsibility is belonged to TEIAS. Metering devices used in power plant site was used to crosscheck the data of meters using in transformer center.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th colspan="2">Net Electricity Production (GWh)</th></tr>
<tr><td>2012 (7 months) (01/06/2012-31/12/2012)</td><td>10,237</td></tr>
<tr><td>2013 (12 months) (01/01/2013-31/12/2013)</td><td>29,152</td></tr>
<tr><td>2014 (12 months) (01/01/2014-31/12/2014)</td><td>13,246</td></tr>
<tr><td>2015 (9 months) (01/01/2015-30/09/2015)</td><td>31,923</td></tr>
<tr><td>Total (MWh)</td><td>84,558</td></tr>
<tr><td>Total (GWh)</td><td>84,56</td></tr>
</table>

In addition to the data in table above, 25.367 GWh can be noted as the actual and average annual electricity generation.</td></tr>
<tr><td>Monitoring equipment</td><td>EGy calculation is used by EPIAS (which is one of the TEIAS association) records which are more conservative than the site records. ID specifications of the metereing device using at transformer center are;
ENTSO-E Kodu: 40Z000000017761N
ID : 17761
Main-meter
Model: Actaris – Type: SL7000
Serial Number: 37119418
Sensitivity: Class 1
Back-up mater
Model: Actaris – Type: SL7000
Serial Number: 46033916
Sensitivity: Class 1

Moreover, two meters (Elster A1500) are in use in project site whose serial numbers are 00391095 2009 (main meter) and 00391097 2009 (auxiliary meter) are present at site and the records are gathered monthly. Records of these meters are used to compare the records of meters at transformer center.</td></tr>
</table>

Measuring/Reading/ Recording frequency	Continuous measurement / Monthly recording
Calculation method (if applicable)	Net generation is calculated via subtracting internal consumption from gross generation.
QA/QC procedures	Maintenance and calibration of the metering devices (located at thetransformation center) has been made on 25/02/2010 and sealed by TEIAS. In case of significant different between two devices, maintenance will be done before waiting for periodical maintenance according to regulations of TEIAS. No maintenance/calibration has been required during monitoring period. Meters used in the plant is 0.5S class. As per the regulations, meters should not require calibration before 10 years. First index report of the meters provided to DOE. Specification sheet of meters are also provided to DOE.
Purpose of data	Used in emission reduction calculations
Additional comment	-

Data/Parameter	CapPJ
Unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Measured/Calculated /Default	Data from project site
Source of data	Project site
Value(s) of monitored parameter	2*4.77MWe (9.54MWe)
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Yearly
Calculation method (if applicable)	N/A.
QA/QC procedures	-
Purpose of data	Used in project emission calculation
Additional comment	-

Data/Parameter	APJ
Unit	m2
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Measured/Calculated /Default	Measured from topographical maps
Source of data	Project Site
Value(s) of monitored parameter	256,555.96
Monitoring equipment	N/A
Measuring/Reading/ Recording frequency	Yearly
Calculation method (if applicable)	N/A.
QA/QC procedures	-
Purpose of data	Used in project emission calculation
Additional comment	Maximum area is already calculated in feasibility report and considered in calculations. Annual measurements are not expected to be higher than this value.

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 *ex-ante* emission reductions (*ERy*) are calculated as follows:

$$ERy = BEy - PEy - LEy$$

Where:

ERy = Emission reductions in year *y* (tCO_2)
BEy = Baseline emissions in year *y* (tCO_2)
PEy = Project Emissions in year *y* (tCO_2)
LEy = Leakage emissions in year *y* (tCO_2)

Baseline emissions
Baseline emission is calculated according to the formula

$$BE_y = EG_y \times EF_y$$

Where:

EGy = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid.

EFy = Emission factor calculated according to selected methodology. Emission factor has been calculated ex-ante in PDD which is also used in calculating the baseline emissions. EF value used is 0.546 tCO_2/MWh

As it can be seen detail in excel spread sheet used for calculations;

EGy = 84,558 MWh or 84.558 GWh for the 40 months (this monitoring period)

EFy = 0.546 tCO_2/MWh

Therefore;

BE_y = 46,168 tonnes CO_2 for the 40 months (this monitoring period)

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

The proposed project activity involves the generation of electricity by a hydroelectric power plant which has power density higher than $10W/m^2$ therefore emissions from reservoir is ignored as per the applied methodology.

The UNFCCC approved simplified baseline and monitoring methodology AMS I.D., version 16[4] was applied for the project activity.

- For calculation of the emission factor of Turkish Grid, "Tool to Calculate the Emission Factor for an Electricity System", ver. 2 has been used

- Tool for the demonstration and assessment of Additionality" version 5.2

The power density of the project activity (PD) is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity (W/m^2)
Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

For proposed project HEPP,

Cap_{PJ} = 9.540 000 W

[4] http://cdm.unfccc.int/UserManagement/FileStorage/SJI52M6QXGKFNOZABTHDYPU789EV3C

Cap_{BL} = 0.0 W
A_{PJ} = 256,555.96(m^2)[5]
A_{BL} = 0.0 (m^2)

Therefore PD is calculated as;

$$PD = \frac{9540000 - 0}{256555.96 - 0}$$

$$PD = 37.18\ W/m^2$$

Since power density is higher than 10W/m2, project emissions are determined as "0" as per the methodology (ACM0002, version 10, pages 6-7).

$$PE_y = 0$$

E.3. Calculation of leakage

In the methodology "ACM0002 version 10", it is stated that "The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction, fuel handling (extraction, processing, and transport), and land inundation" (page 10). Since there was no application similar with the applications mentioned in the sentence above, emissions from leakage is also considered as "0" for this monitoring period.

$$LE_y = 0$$

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	46,168	0	0	5,590 tCO2	40,579 tCO2	46,168 tCO2

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 (tCO_2e)	58,223 (for 40 months of this monitoring period)	46,168 (June 2012-September 2015)

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

[5] Cataloluk Reservoir Map

In registered PDD, annual estimated electricity generation and net emission reduction values are 31,99 GWh and 17,467 tCO2 respectively. However, annual and actual electricity generation and net emission reduction values are 25,367 GWh and 13,850 tCO2 respectively. Moreover, total electricity generation and net emission reduction (for all of this (II) monitoring period) values are 58,223 GWh and 46,168 tCO2 respectively. In fact there is 20 % difference between both annual estimated & actual and total estimated & actual (all of this (II) monitoring period) electricity generation and net emission reduction values. . Actuals values are lower than estimated values due to the generation data since the generation is dependent on water speed estimation which is a natural phenomenon and cannot be estimated with 100% accuracy.

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

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	GTE Carbon
Street/P.O. Box	Ehlibeyt Mah 1259. Sk. Balgat
Building	7
City	Ankara
State/Region	-
Postcode	06520
Country	Turkey
Telephone	(0090) 312 472 35 00
Fax	(0090) 312 472 33 66
E-mail	gte@gtecarbon.com
Website	www.gtecarbon.com
Contact person	
Title	Managing Director
Salutation	Mr
Last name	Demirkol
Middle name	Kemal
First name	Mehmet
Department	Management
Mobile	
Direct fax	(0090) 312 472 33 66
Direct tel.	(0090) 312 472 35 00 - 19
Personal e-mail	kemal@gtecarbon.com

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	BEYTEK Elektrik Üretim A.Ş (Project Owner)
Street/P.O. Box	Çağlayan Köyü Mah. Kahramanmaraş Merkez
Building	27
City	KAHRAMANMARAŞ
State/Region	-
Postcode	68100
Country	Turkey
Telephone	(0090) 344 262 20 10
Fax	-
E-mail	cekayali@mogulsb.com
Website	-
Contact person	
Title	Manager
Salutation	Mr
Last name	KAYALI
Middle name	-
First name	Enver
Department	Management
Mobile	-
Direct fax	-
Direct tel.	(0090) 344 262 20 10
Personal e-mail	cekayali@mogulsb.com

Monitoring of Sustainable Development Parameters

No		**1**
Indicator		Air Quality
Mitigation measure		N/A
Chosen parameter 1.1		SO_2 emissions by thermal power plants
Current situation of parameter 1.1		Plant is operational and has started contributing to the air quality. Total SO_2 emission related to electricity generation is about 936.51 Gg in 2007 according to National Inventory of Turkey[6]. Considering that electricity generation in 2007 is 183,339.7 GWh[7], SO_2 emission per MWh is calculated as 5.11 kg/MWh.
Future target for parameter 1.1		SO_2 emission reduction corresponding to 25.367 GWh (yearly) generation is calculated as 0.16 ton per year.
Actual Value For Parameter 1.1		In parallel to the electricity generation 84,558 MWh or 84.558 GWh), actual SO_2 emission reduction has been realized as about 431.93 tonnes during 40 months of this monitoring period and 129.58 tonnes yearly.
Chosen parameter 1.2		NOx emissions by thermal power plants
Current situation of parameter 1.2		Plant is operational and has started contributing to the air quality. Total NO_x emission related to electricity generation is about 202.09 Gg in 2007 according to National Inventory of Turkey. NO_x emission per MWh is calculated as 1.1 kg.
Future target for parameter 1.2		NOx emission reduction corresponding to 25.367 GWh (yearly) generation is calculated as 0.032 ton per year.
Actual Value For Parameter 1.2		In parallel to the electricity generation 84,558 MWh or 84.558 GWh, actual NO_x emission reduction has been realized as 93.21 tonnes during 40 months of this monitoring period and 27.96 tonnes yearly.
Way of monitoring	How	Electricity generated by Cataloluk HEPP, NO_X and SO_2 emission data from GHG inventory of Turkey is used as reference in calculation of the emission reduction.
	When	Yearly
	By who	Project developer

No	2
Indicator	Water Quality and Quantity
Mitigation measure	Release of minimum flow to protect aquatic life.
Chosen parameter	Flow rate of water released
Current situation of parameter	Natural flow of river course
Future target for parameter	Minimum flow record recommended by the expert (0.739 m^3/s) will be used

<table>
<tr><td colspan="2"></td><td>after issuance of the certificates for first verification period.</td></tr>
<tr><td colspan="2">Actual Value For Parameter</td><td>Actual value of environmental flow after project side is recorded by DSI. In fact, DSI outsources flow measurement from third parties such as “Akım Elektronik Ltd” and check the measurements at random periods. That is why the flow measurement data is gathered from Akım Elektronic Ltd.

January-July-August-September andOctober- 2014 are the 4 months at when minimum environmental flow were recorded below the value recommended by the expert as it seen in the Table 4 given below. In this table, 1999-2003 electricity generation capacities of each month are also stated which were stated in the feasibility report of the project already. With a closer look to these values, it is clear that January-July-August and September 2014 electricity generation records (in this monitoring period) are below (50% and more) the values studied out in feasibility study of the project. This is the reason why project could not release minimum flowrate.

Table.4
<table>
<tr><td colspan="7">1999-2003 Energy production with monthly flow data for Çataloluk HPP Feasibility Study (MWh)</td><td>Records of this monitoring period at when minimum flow is below the value stated by expert (MWh)</td><td>Min. Flowrate (0.739 m3/s in expert report)</td></tr>
<tr><td>Months</td><td>1999</td><td>2000</td><td>2001</td><td>2002</td><td>2003</td><td>Average</td><td>2014</td><td>2014</td></tr>
<tr><td>October</td><td>639</td><td>610</td><td>825</td><td>495</td><td>756</td><td>665</td><td></td><td></td></tr>
<tr><td>November</td><td>1.088</td><td>489</td><td>829</td><td>639</td><td>866</td><td>782</td><td></td><td></td></tr>
<tr><td>December</td><td>4.565</td><td>846</td><td>1.065</td><td>5.229</td><td>988</td><td>2.539</td><td></td><td></td></tr>
<tr><td>January</td><td>2.555</td><td>1.779</td><td>1.281</td><td>3.756</td><td>2.080</td><td>2.290</td><td>735</td><td>0.66</td></tr>
<tr><td>February</td><td>4.301</td><td>2.845</td><td>1.375</td><td>4.770</td><td>3.629</td><td>3.384</td><td></td><td></td></tr>
<tr><td>March</td><td>5.406</td><td>6.090</td><td>5.129</td><td>6.946</td><td>6.222</td><td>5.959</td><td></td><td></td></tr>
<tr><td>April</td><td>6.652</td><td>6.974</td><td>3.579</td><td>6.874</td><td>6.874</td><td>6.191</td><td></td><td></td></tr>
<tr><td>May</td><td>2.847</td><td>5.696</td><td>2.852</td><td>6.807</td><td>5.740</td><td>4.788</td><td></td><td></td></tr>
<tr><td>June</td><td>941</td><td>1.956</td><td>1.038</td><td>2.590</td><td>2.940</td><td>1.893</td><td></td><td></td></tr>
<tr><td>July</td><td>668</td><td>952</td><td>588</td><td>1.159</td><td>1.136</td><td>900</td><td>287</td><td>0.52</td></tr>
<tr><td>August</td><td>514</td><td>726</td><td>475</td><td>724</td><td>653</td><td>618</td><td>304</td><td>0.45</td></tr>
<tr><td>September</td><td>483</td><td>715</td><td>449</td><td>640</td><td>548</td><td>567</td><td>250</td><td>0.40</td></tr>
</table></td></tr>
<tr><td rowspan="3">Way of monitoring</td><td>How</td><td>The considered minimal water flow has been assessed by independent experts with relevant background and experience. The expert opinion has been provided to the DOE in view of the verification process. The statement by the expert refers to relevant analysis methods including fieldwork and observations and based on credible information on the relevant parameters (seasonal variations of water river regime, etc.). Recommendations on alternatives methods for calculation of minimal flow and fish passage have been implemented by the investor.</td></tr>
<tr><td>When</td><td>Flow will be observed continuously and recorded daily.
Locals will be interviewed to have their opinion.</td></tr>
<tr><td>By who</td><td>Project Owner</td></tr>
</table>

No		3
Indicator		Other Pollutants
Mitigation measure		Waste oil from equipment was handled according to the national regulations. They were collected in leak proof tanks and were handed in licensed collectors.
Chosen parameter		Waste oil: Volume of waste oil
Current situation of parameter		None
Future target for parameter		Waste oil management is going on to be handled according to the national regulations
Actual Value of Parameter		No waste oil has been generated since 16/11/2012. The last document for waste oil management referred to 16/11/2012 for this monitoring period.
Way of monitoring	How	Records for storage or disposal (if any waste oil is generated during verification period) or letter from plant manager.
	When	Annually
	By who	Project Owner

No	4
Indicator	Quality of Employment
Mitigation measure	All recruited technical staff will be trained
Chosen parameter	Number of personnel certified / trained
Current situation of parameter	None as there exist no staff before project implementation.
Future target for parameter	All technicians to be trained for health and safety issues. Additional trainings should either be provided for staff working with high voltage equipment or staff having high voltage equipment certificates should be recruited
Actual Value of Parameter	All of 17 employees were trained on health and safety measures which is indicated in Table 5 below. The certificates for health &safety and training certificates is provided to DOE. In addition, one of the employees of the project, namely Hakan Yüksel has certificate for working on high voltage line. A related document was also provided to DOE.

Table 5. List of HSE Certification of Employees

Training	Participants	Date	Duration
HSE	Halil Gök	13-14/03/2014	16 hours
HSE	Bayram Şişman	13-14/03/2014	16 hours
HSE	Nurettin Şişman	13-14/03/2014	16 hours
HSE	Zekeriya Kaşık	13-14/03/2014	16 hours
HSE	Hasan Balaban	13-14/03/2014	16 hours
HSE	Cuma Karasu	13-14/03/2014	16 hours
HSE	Ramazan Şişman	13-14/03/2014	16 hours
HSE	Harun Bal	13-14/03/2014	16 hours

		HSE	Hüseyin Erdağlı	13-14/03/2014	16 hours
		HSE	Hakan Yüksel	13-14/03/2014	16 hours
		HSE	Durdu Gişi	13-14/03/2014	16 hours
		HSE	Hacı Hüseyin Karadaş	13-14/03/2014	16 hours
		HSE	Hakan Ertürk	13-14/03/2014	16 hours
		HSE	İbrahim Zengin	14.10.2011	6 hours
		HSE	Metehan Gişi	14.10.2011	6 hours
		HSE	Durdu Mehmet Akçadağ	14.10.2011	6 hours
		HSE	Binnur Gönen	14.10.2011	6 hours
Way of monitoring	How	Through review of employment records and training documents/certificates			
	When	Annually			
	By who	Project Owner			

No	5
Indicator	Quantitative employment and income generation
Mitigation measure	Recruiting staff for plant from the local people
Chosen parameter	Payments made to staff
Current situation of parameter	None as there exist no payment in the baseline situation.
Future target for parameter	Staff planned to be recruited from local people
Actual Value of Parameter	Number of employees recruited on site is 17. 16 employees of total are from nearby settlements. Only Binnur Gönen is not local employee for the project and all the positions of the employees are given in the Table 6 below. Table 6. Positions of the employees at the project site

#	Name of Employee	Position
1	Binnur Gönen	Consultant Engineer
2	Hakan yüksel	Electricity Operator
3	Hüseyin Erdağlı	Mechanics Operator
4	İbrahim Zengin	Electricity Operator
5	Metehan Gişi	Electricity Operator
6	Hüseyin Karadaş	Electricity Operator
7	Durdu Mehmet Akcadağ	Electricity Operator
8	Zekeriya Kasık	Electricity Operator
9	Hakan Ertürk	Security Chef
10	Nurettin Şişman	Security Guard
11	Halil Gök	Security Guard
12	Harun Bal	Security Guard

		13	Ramazan Şişman	Security Guard
		14	Cuma Karasu	Security Guard
		15	Hasan Balaban	Security Guard
		16	Bayram Şişman	Gardener
		17	Durdu Gişi	Cleaning Staff
Way of monitoring	How	Employment records and social security documents are provided to the DOE.		
	When	Yearly		
	By who	Project Owner		

No		6
Indicator		Balance of Payments
Mitigation measure		Not required
Chosen parameter		Currency saving due to avoided fuel import
Current situation of parameter		In 2008, about 21.6 billion m3 natural gas been used[8] for about 98,685.3 GWh electricity generation[9] and about € 11 billion TL has been spent. Source for NG price http://www.esgaz.com.tr/dogalgazfiyatlari.asp
Future target for parameter		Approximately consumption of 7.0 million m^3 of natural gas is expected to be avoided corresponding to 3.6 million TL annually
Actual Value of Parameter		Corresponding to 84.558 GWh electricity generations, projects has prevented natural gas and coal import. Assuming all avoided fuel import is natural gas, it is calculated that 4,-106,-236 million € foreign currency is saved regarding investment date exchange rate and natural gas price.
Way of monitoring	How	Calculating NG and currency saving due to avoided NG import corresponding to electricity generation by proposed project.
	When	Yearly
	By who	Project Owner

[8] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.htm (Türkiye Termik Santrallerinde Kullanılan Yakıt Miktarlarının Üretici Kuruluşlara Göre Dağılımı (2006 - 2014) - Fuels Consumed In Thermal P.Ps In Turkey By The Electricity Utilities (2006-2014))

[9] http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.htm (Türkiye Elektrik Enerjisi Üretiminin Birincil Kaynaklarına ve Üretici Kuruluşlara Göre Dağılımı (2014) - The Distribution of Gross Electricity Generation by Primary Energy Resources and The Electricity Utilities in Turkey (2014))