AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), TURKEY

2ND MONITORING REPORT

Project Title	AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey
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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Akcay Hes Elektrik Üretim A.Ş. installed AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey with 28.78 MW runoffriver hydropower electricity plant (HEPP) at the end point of Bozdoğan – Akçay Left Coast Main Irrigation Channel in Aydin, Turkey. The expected life time of the project is minimum 40 years which corresponds to the duration of the licence obtained from EMRA. Project is a grid connected renewable power generation project which adds electricity capacity from hydro power sources which otherwise would have been generated by the fossil fuel fired power plant.

The plant uses the water left from the channel to generate electricity, before conveying water to the Akcay river bed. Therefore, the project activity of AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey does not include any reservoir area or diversion weir. The project not only produces electricity from water, but also plays a role of conveying water to the river bed as a part of the irrigation channel. There is no dam within the context of project activity.

Implementation of the project consists of construction of the following main items: Penstock with length of 380.00 m.; Power house with Francis type turbines. In the power house, three vertical shaft Francis turbines is installed, two 11.60 and one 5.58 MW (total capacity is 31.98 MWm/28.78 MW). It generates electricity by using the potential energy of the water reaching the loading dock from the irrigation channel with 3 vertical Franchis hydraulic turbines. The first-hand turbines which are used in the project are supplied from Hangzhou Yatai Hydro Equipment Completing Co., Ltd., China. The efficiency of the turbines is 93% and there are three generators attached to the facility. The properties of the turbines and generators are given in the table below.

Table 1. Equipment properties

	Unit 1	Unit 2	Unit 3
Turbine type	HLA630-LJJ-135	HLA630-LJJ-135	HLA630-LJJ-94
Turbine rated output	12890 kw	12890 kw	6200 kw
Turbine max output	12890 kw	12890 kw	6200 kw
Turbine product no	ND200804801	ND200804802	ND200804803
Generator type	SF11600-12/3100	SF11600-12/3100	SF5580-8-/2600
Generator product no	ND200804801	ND200804801	ND200804801
Generator specification	GB/T7894-2001	GB/T7894-2001	GB/T7894-2001

The net electricity production (delivered to the grid after losses and consumption in the plant) from the plant is estimated to be 76.915 GWh per annum. On the other hand, net generation achieved during this monitoring period is 59.786 GWh per annum. Moreover, 49,610.2 tonnes of CO2 emission was expected to be reduced according to PD but the annual emission reduction for this monitoring period

has been calculated as 38,561 tonnes of CO2. This means that project reduced 22% less CO2 than estimated value.

The project milestones are provided in the table below:

Table 2. Project implementation milestones

Milestone	Date/ Explanation
Generation License (Final Amendment Date)	24/11/2003
Loan Agreement (Investment Decision Date)	09/2008
Construction start	05/2008
VCS Registration date	19/11/2013
Commissioning of the Project (Project Start Date)	14/08/2009
First Monitoring Period	14/08/2009-30/04/2013
Second Monitoring Period	01/05/2013-13/08/2019

Table 3. Project generation and emission reductions in the monitoring period

Expected annual generation	76.915 GWh
Generated electricity during monitoring period (75.4 months)	375,654.07 MWh during monitoring period and generated electricity for per annum for this monitoring period is 59,786 MWh
Generated net emission reductions during monitoring period	242,293 tonnes CO_2 during monitoring period and emission reduction per annum is 38,561 tonnes CO_2 May-Dec 2013 vintage: 35,713 tonnes CO_2 Jan-Dec 2014 vintage: 29,352 tonnes CO_2 Jan-Dec 2015 vintage: 75,681 tonnes CO_2 Jan-Dec 2016 vintage: 28,917 tonnes CO_2 Jan-Dec 2017 vintage: 23,058 tonnes CO_2 Jan-Dec 2018 vintage: 20,079 tonnes CO_2 Jan-Aug(13^{th}) 2019 vintage: 29,493 tonnes CO_2

As confirmed by the project owner and also meteorological data, the precipitation was higher than the average in 2015.[1] The HEPPs are affected such conditions dramatically. Therefore, the electricity generation and thereby emission reduction is high in the year 2015.

[1] http://212.174.109.9/FILES/arastirma/yagis-degerlendirme/2015-2016alansal.pdf, Figure 17

Table 4. Technical Properties of AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey

LOCATION	AKCAY CREEK, WITHIN THE BOUNDARIES OF AYDIN PROVINCE
TOTAL INSTALLED CAPACITY	28.78 MW
NUMBER OF UNITS	3
TURBINE CAPACITY	11.60 MW (one) / 5.58 MW (two)
TURBINE TYPE	FRANCIS TYPE – VERTICAL
TURBINE MAKE	Hangzhou Yatai Hydro Equipment Completing Co., Ltd., China.
LENGTH OF PENSTOCK	380.00 M
AVERAGE ANNUAL POWER GENERATION	76.915 GWh

The main goals of the AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey project include;

- Using Turkey's hydroelectric potential to meet the increasing demand for electricity and contributing toward the guarantee of Turkey's energy security.
- Increase the share of run of river type HEPPs in the mix of electricity generation in Turkey, reduce dependency on imported fossil fuel and as a consequence provide a tangible reduction in GHG emissions.
- Contribute to economic development by creating direct and indirect job opportunities during the construction and operation phases.

1.2 Sectoral Scope and Project Type

This is a voluntary project, but it follows the CDM rules. The approved baseline and monitoring methodology for large-scale project activities ACM0002-Version.10.0: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" is applied.

Proposed project activity is categorized in the sectoral scope 1 “Energy Industry – Renewable -/Non-renewable Sources” according to the UNFCCC definition[2]. Project is not a part of grouped project.

1.3 Project Proponent

Organization name	AKÇAY HES ELEKTRIK URETIM A.S.
Contact person	Seçkin Demiryapan
Title	-
Address	Şehit Nevres Bulvarı, No:10, Kat:7 Deren Plaza Montrö / İZMİR TURKEY
Telephone	+90 232 463 98 11
Email	seckin.demiryapan@endaenerji.com.tr

1.4 Other Entities Involved in the Project

Project Consultant

Organization name	GTE KARBON SÜRDÜRÜLEBİLİR ENERJİ EĞİTİM DANIŞMANLIK VE TİCARET A.Ş
Contact person	M. Kemal DEMİRKOL
Title	Director
Address	MAIDAN - Mustafa Kemal Mah. 2118. Cad. No: 4 C Blok 42 06510 Cankaya - Ankara – TURKEY
Telephone	+90 312 514 63 63
Email	kemal@gte.com.tr

[2] http://cdm.unfccc.int/DOE/scopes.html

1.5 Project Start Date

Project start date is 14/08/2009 (The commissioning date of the project)

1.6 Project Crediting Period

First crediting period includes the dates of 14/08/2009 – 13/08/2019 (both dates included). Crediting period will be valid for 10 years. It is a renewable type crediting period and will be renewed two more times in the project cycle.

1.7 Project Location

The project is located in the Aegean Region of Turkey, within the province of Aydin. The project is on the Akcay creek. The altitude at the location is 65.00 m. Headpond coordinates are 615 038 E, 4 182 935 N while plant building coordinates are 615 459 E, 4 183 125 N.[3]

[3] Akçay Final Feasibility Report, page 2/116

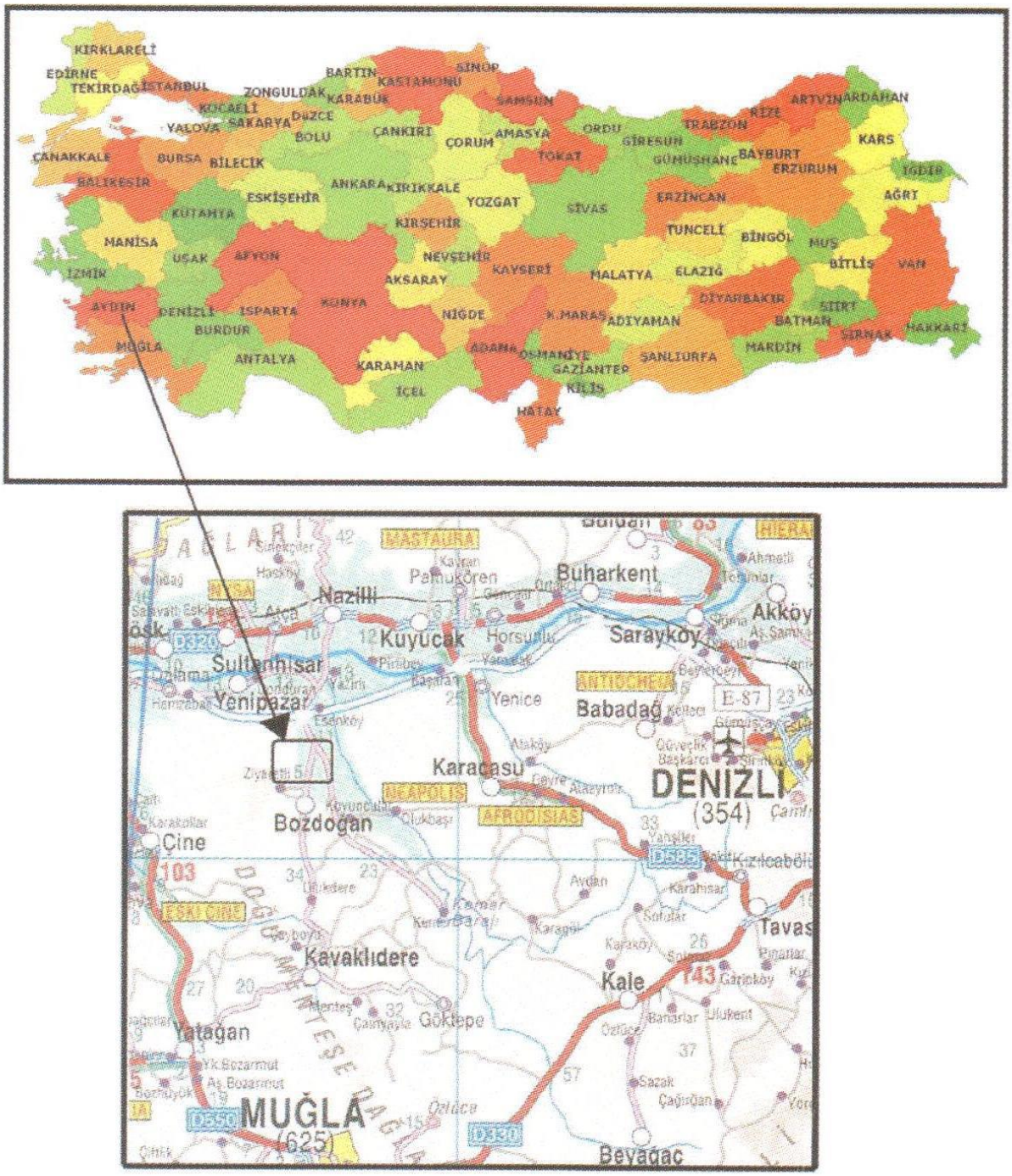

Figure 2. Location of the project on the map

1.8 Title and Reference of Methodology

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, Version 10.

ACM0002 refers to the following tools:

- “Tool for the demonstration and assessment of additionality”, Version 05.2, and

- “Tool to calculate the emission factor for an electricity system”, Version 01.1.

1.9 Participation under other GHG Programs

The project is not registered or seeking registration under other GHG programmes.

1.10 Other Forms of Credit

Project does not produce other kinds of environmental credits.

1.11 Sustainable Development

The project helps Turkey to stimulate the commercial application of grid connected renewable energy technologies and markets. It is also a crucial sample of establishing the feasibility of larger grid connected small to medium scale runoff-river HEPPs as a tool to support energy security, improved air quality, alternative sustainable energy, improved local source of income and sustainable renewable energy industry development. The project highly supports the sustainable economic development in the region. It has significant contribution in diminishing carbon emissions and protecting the climate compared to the business-as-usual scenario. It created employment during the construction and the operation phase of the plant. Therefore, the project has positive influences on sustainable development and contributes to UN sustainable development goals (SDG) 13, 8 and 7.

- Climate Action (SDG 13): Renewable energy power plants will contribute to “Emission Reductions or Removals and/or Adaptation to Climate Change” by reducing CO2 emissions caused by fossil fuel-fired power plants that are displaced due to the project activity. The project has been reduced CO2 emissions in an amount of 242,293 tonnes in the whole monitoring period.
- Decent Work and Economic Growth (SDG 8): The project will generate employment and income. The project has been created permanent job opportunity for 13 people.
- Affordable and Clean Energy (SDG 7): Increasing the number and percentage of renewable energy power plants will provide substantial increase in the share of renewable energy in the global energy mix and ensure universal access to affordable, reliable and modern energy services. The project has generated 375,654.07 MWh in the whole monitoring period.

2 SAFEGUARDS

2.1 No Net Harm

There is no negative harm caused by the project implementation. Instead, it has several positive contributions both environmentally and socially. It used renewable energy, generates clean electricity and also provides job opportunities. The wastes that can be generated from the site are handled according to the national regulations.

One harm might be resulted from the domestic solid waste, wastewater and waste oil. However, all those wastes are handled according to the relevant regulation. Domestic solid wastes are kept at the site and collected by the municipality in regular periods. Domestic wastewater is, on the other hand, collected in a septic tank and disposed via sewage truck. Waste oil is disposed by the authorized disposal companies.

Another point might be the fish species which live in the river that the project is installed. However, the project does not include regulator etc. within its structure. It is located at the end of the 48 km long irrigation canal through which water is directed from the Kemer Dam and Kemer Regulator under DSI control. Fish passes are a system applied in regulator structures, not in power plants. Therefore, there is no fish passage within the context of the project.

For the reason explained above, life water control is made by DSI from Kemer Regulator. All of the water that is discharged to the canal by DSI and delivered to Akçay HEPP is already left to the bed. There is no water in the canal that can be left in periods when there is no water came from the Kemer Regulator.

The project design identifies and addresses all social and environmental issues. The project pursues a pre-assessment report approved by the Ministry of Environment where all environmental and social concerns were identified through non-formal meetings and hearings with local stakeholders. The pre-assessment report asserted that all issues were taken into consideration in the project design.

2.2 Local Stakeholder Consultation

Project is operational since 2009 and there is an ongoing communication with locals. Stakeholder consultation has been organized during project design and implementation, details of which is given in PD. The project owner used different channels to invite comments by stakeholders. Most of the meetings were held through the Mukhtar (village governors) and Council of Elderly (İhtiyar Heyeti; the village council) of Osmaniye village, and the officials of Municipality of Nazilli. The project owner visited various households in the project area to comprehend their needs and to identify how the project could assist in meeting the social and economic needs of the community. Due to the fact that the region is the least developed and

most problematic region in terms of geographical conditions, during the construction period, the company helped the residents in the region to mitigate the effects of tough living conditions.

Due to COVID-19 measures, a face- to-face site visit could not be held for project verification. Instead, an online meeting was conducted on 15/03/2021. The participants were site manager, villagers form Osmaniye Neighbourhood, mukhtar, project consultants and DOE. During the meeting, opinions of local people were asked and no grievance were received.

People around the region prefers face-to-face communication. Project manager is accessible by locals all the time. There is no problem encountered about the project/way of communication so far. If there is an input or grievance, locals can express them directly or via mukhtar.

There is no update and/or design change during this monitoring period. Yet, if there was any, project owner would consider the effects of the change on local people and take their opinion into account. There is no grievance received in this monitoring period.

After implementation of the project, no unexpected change has occurred with respect to risks, cost of locals. In terms of regulation, all staff recruited is trained as per the requirements of their assignment and regulations. Trainings include occupational health and safety, environment, fire and urgency, working under high voltage. Details of the trainings organized for staff has been submitted to DOE.

2.3 AFOLU-Specific Safeguards

n/a

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The plant uses the water left from the channel to generate electricity, before conveying water to the Akcay river bed. Therefore, the project activity of AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey does not include any reservoir area or diversion weir. The project not only produces electricity from water, but also plays a role of conveying water to the river bed as a part of the irrigation channel. There is no dam within the context of project activity.

Implementation of the project consists of construction of the following main items: Penstock with length of 380.00 m.; Power house with Francis type turbines. In the power house, three vertical shaft Francis turbines is installed, two 11.60 and one 5.58 MW (total capacity is 31.98 MWm/28.78 MW). It generates electricity by using the potential energy of the water reaching the loading dock from the irrigation channel with 3 vertical Franchis hydraulic turbines. The

first-hand turbines which are used in the project are supplied from Hangzhou Yatai Hydro Equipment Completing Co., Ltd., China.

The project has been in operation since 14/08/2009. Crediting period for the project will be 10 years. First crediting period is 14/08/2009-13/08/2019.

AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey takes the water for production from Kemer Dam, which is under the control of DSİ. Since the primary purpose of the Kemer Dam is irrigation, no water is discharged except the irrigation season in drought periods. AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey is located at the end of this channel.Therefore, AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey can operate only during the irrigation season (April to October) in drought periods. But in rainy periods, water is discharged from the dam under the control of DSI also except the irrigation season. Additionally, 2014, 2016, 2017, 2018 and 2019 years were dry. For these reasons, the realized figure is a bit lower than the estimated figure between May 2013 and August 2019. Apart from this, there is nothing that affected the operation of the plant.

The project consultant has also been changed. Although it is stated as GAIA Carbon Finance (GAIA), the project was shifted to GTE KARBON SÜRDÜRÜLEBİLİR ENERJİ EĞİTİM DANIŞMANLIK VE TİCARET A.Ş later. The company is not a project proponent but rather a consultant.

3.2 Deviations

3.2.1 Methodology Deviations

n/a

3.2.2 Project Description Deviations

Since June 2011, TEIAS started to measure the produced electricity remotely. Therefore, the source of the parameter “Quantity of net electricity generation supplied by the project plant/unit to the grid in year y” which is given as ‘Monthly Meter Reading Protocols’ was then defined as “Market Financial Settlement Center (PMUM) records which includes the exact electricity productions and tractions after June 2011. However, as PMUM system is not active anymore, we have used EPIAS records for EG and ER calculations. The source for the cross-check of the amount of produced electricity is “Monthly Reports of OSF Forms” which are prepared by TEIAS after the remote measurements of the meters and sent to the plant engineer by e-mail at the end of each month.

The project consultant has also been changed. Although it is stated as GAIA Carbon Finance (GAIA), the project was shifted to GTE KARBON SÜRDÜRÜLEBİLİR ENERJİ EĞİTİM

DANIŞMANLIK VE TİCARET A.Ş later (on 25/12/2020). GTE is not a project proponent but the project consultant.

3.3 Grouped Projects

n/a

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	**EFgrid,CMy**
Data unit	tCO2/MWh
Description	Baseline emission factor: the combined emission factor of the project grid system
Source of data	Validated VCS Project Description (Version 07) of the Project.
Value applied	0.645
Justification of choice of data or description of measurement methods and procedures applied	”Tool to calculate the emission factor for an electricity system”
Purpose of Data	baseline emission calculation
Comments	EFgrid,CMy value (0.645 tCO2/MWh) is valid for the duration of the crediting period which is between 14/08/2009 and 13/08/2019 (both dates included)

4.2 Data and Parameters Monitored

Data / Parameter	**EGfacility, y**
Data unit	MWh/year
Description	Quantity of net electricity delivered to the grid
Source of data	EPIAS records and Meter reading records-OSF forms
Description of measurement methods and procedures to be applied	EPIAS records and meter reading records provides the exact electricity generation of the facility and the imports from the grid. According to meter reading protocols, the internal consumption of the facility was subtracted from the gross generation. EPIAS data are used for the quantity of net electricity delivered to the grid, and it has been cross checked with the meter reading records (OSF forms) provided to the company by TEIAS.

<table>
<tr><td>Frequency of monitoring/recording</td><td>Continuous measurement and at least monthly recording</td></tr>
<tr><td>Value monitored</td><td>For 75.4 months period, total generation has been 375,654.07 MWh. Average annually generation corresponds to 59,786 MWh</td></tr>
<tr><td>Monitoring equipment</td><td>Electric meters
On 20/05/2020, the meters have been changed again due to the commissioning of Bozdoğan Transformation Center.

<table>
<tr><td></td><td colspan="2">Feeder 1</td><td colspan="2">Feeder 2</td></tr>
<tr><td></td><td>Main</td><td>Spare</td><td>Main</td><td>Spare</td></tr>
<tr><td>Brand</td><td>EMH</td><td>ITRON</td><td>EMH</td><td>ITRON</td></tr>
<tr><td>Type</td><td>LZQJ-XC</td><td>SL761X071</td><td>LZQJ-XC</td><td>SL761X071</td></tr>
<tr><td>Class</td><td>C (0.5s)</td><td>C (0.5s)</td><td>C (0.5s)</td><td>C (0.5s)</td></tr>
<tr><td>Serial No</td><td>9276783</td><td>84051667</td><td>9276784</td><td>84051668</td></tr>
</table></td></tr>
<tr><td>QA/QC procedures to be applied</td><td>Cross check measurements results with records for sold electricity. Calibration of all the meters is undertaken at required intervals and faulty meters is duly replaced immediately.
Calibration of the meters are valid for 10 years based on related regulation. In addition to the meters which is used for billing purposes, records taken by meters using at project site is used for comparison.

The meters should also comply with EPDK regulations which define the accuracy class of the meters as 0.2 or 0.5 depending on the capacity of the circuit.

Maintenance and calibration of the metering devices are made by TEIAS. If there is a noticeable difference between the readings of two devices, maintenance and tests of the metering devices and the associated equipment is done before waiting for the periodical maintenance.

In cases where electricity meters are regulated (e.g. the electricity is supplied to the electric grid), the electricity meter is subject to regular maintenance and testing in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements. The calibration of meters, including the frequency of calibration, should be done in accordance with national standards or requirements[4] set by the meter supplier or requirements set by the grid operators. The accuracy class of the meters should be in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements.</td></tr>
</table>

[4] https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5

Purpose of the data	Baseline emission calculations
Calculation method	EGFacility,y=EGexport,y-EGimport,y (Annual electricity generation of the plant is calculated as the sum of the monthly generations obtained from EPIAS records. After deducting the amount of imported electricity from the generated electricity, the net electricity supplied to the grid is evaluated.)
Comments	-

Data / Parameter	**CapPJ**
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Description of measurement methods and procedures to be applied	Supplier information on the equipment
Frequency of monitoring/recording	Yearly
Value monitored	28,780,000 W
Monitoring equipment	N/A
QA/QC procedures to be applied	Supplier information on the related equipment and the existence of the equipment will be checked. Also this information can be checked from EPDK.
Purpose of the data	To check the project's installed capacity
Calculation method	N/A
Comments	No change on the installed capacity with respect to the generation license.

4.3 Monitoring Plan

The purpose of the monitoring plan is to ensure that the monitoring and calculation of emission reductions of the proposed project within the crediting period is complete, consistent, clear and accurate. There are three sets of data to be monitored during the project activity.

The first one is the amount of electricity fed into the grid. There is already an electricity meter installation and these records provided the data for the monthly invoicing to TEIAS which form the basis for EPIAS data. EPIAS data is developed remotely by TEIAS and shows the monthly electricity generation of the company.

The second data to be monitored is the installed capacity of the project activity. The data is monitored from the digital displays on the equipment which show the installed capacity at the time, together with the electricity generation of the facility.

The third data to be monitored is the reservoir area for HEPP projects in general. However, because the subject project use the water left from the irrigation channel and it has no reservoir area, this data is not applicable for the project.

The project is operated by Akçay HES Elektrik Üretim A.Ş. which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines.

VER Team Members are expected to include the following staff of the HEPP:

Plant Engineer: Responsible for the control of the electricity supplied to the grid and imported from the grid with TEIAS. The electricity measurements are made by TEIAS remotely. The plant engineer checks these electricity measurement records and reports to the Operations Manager of the plant.

Accounting Manager: Responsible for keeping data about power sales, invoicing and purchasing.

Operations Manager: the VER coordinator, responsible for developing, executing, analyzing and improving the VER Monitoring/Reporting Procedures.

GTE KARBON SÜRDÜRÜLEBİLİR ENERJİ EĞİTİM DANIŞMANLIK VE TİCARET A.Ş: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

For internal auditing, TEIAS is in charge. Project owner is not responsible for any audit related to electricity meters, etc. In case of any problem with them, teams from TEIAS handle the issue.

In order to demonstrate the emission reduction, only required data is the net electricity delivered to the grid by the project activity. TEIAS has started to extract generation data from the facilities remotely through the EPIAS (previously PMUM system) which forms the basis for the billing.

During the monitoring period EPIAS readings and meter reading records (OSF forms) were used as the source of calculation of electricity generation and emission reductions. Meter reading protocols were compared for cross-check. Generation data collected during crediting period was submitted to GTE KARBON SÜRDÜRÜLEBİLİR ENERJİ EĞİTİM DANIŞMANLIK VE TİCARET A.Ş who is responsible for calculating the emission reduction subject to verification. Generation data were used to prepare monitoring report which was used to determine the vintage from the project activity. This reports was submitted to the duly authorized and appointed Designated Operational Entity 'DOE' before verification period.

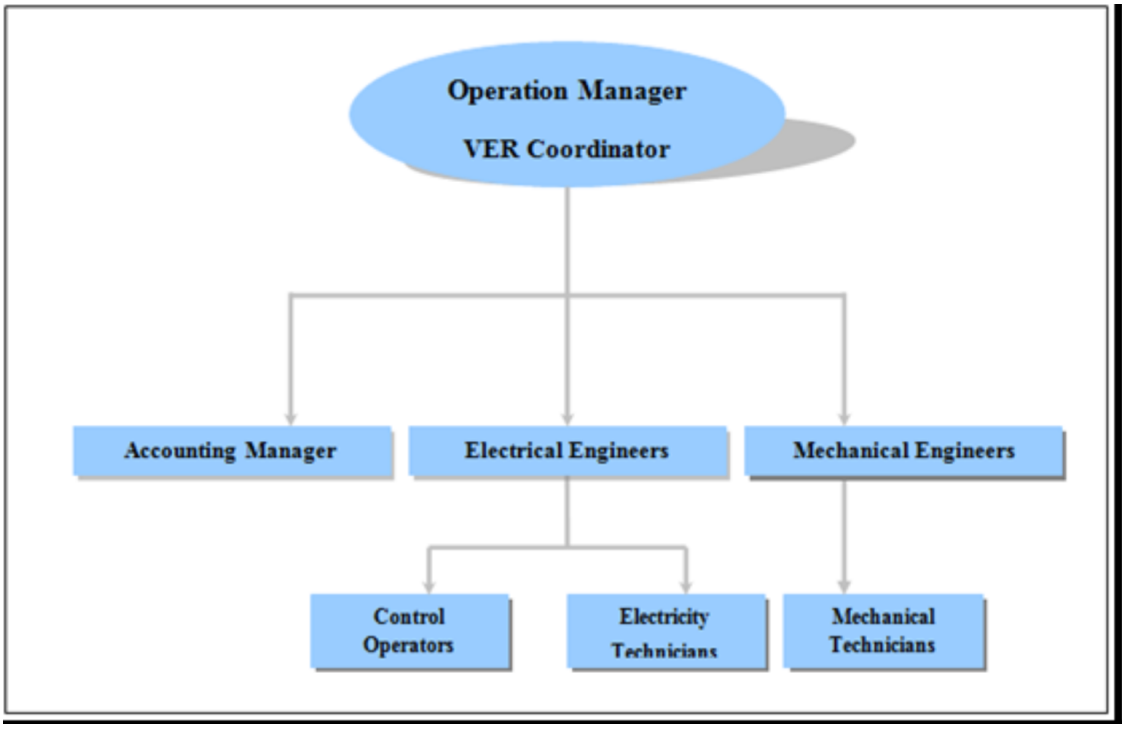

Figure 3. Site organizational chart

Each period, the monitoring report is submitted to DOE for the verification. The report covers the monitoring of grid-connected power generation, check report; report on calculation of the emission reductions and records of monitoring instrument repair and calibration, etc. All data collected as part of monitoring is archived electronically and kept at least for 2 years after the end of the last crediting period. The company establishes a dedicated maintenance system to ensure the data availability for the required period.

In line with the EMRA requirements, the company purchased and installed one unit electricity meter, but since 14th February 2013, company installed an addition unit meter and all measurements are realized by the two unit meters for the AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey. The serial number of the active meter installed on this date was 471186 and the serial number of the spare meter was 471187. Both meters are ELSTER A 1500 type. The accuracy class of the meters is 0.5s.

The serial numbers of the current main meters are 376480 and 471186. The accuracy class of the product production is 0.5s. The serial number of first main meter's back-up is 376486 and the serial number of second main meter's back-up is 471187. According to the test reports of meters, the meters were tested by TEIAS on 11/05/2014.

Table 5. Meter Properties

	Feeder 1	Feeder 2

	Main	Spare	Main	Spare
Brand	ELSTER	ELSTER	ELSTER	ELSTER
Type	A1500	A1500	A1500	A1500
Class	0.5s	0.5s	0.5s	0.5s
Serial No	376480	376486	471186	471187

On 20/05/2020, the meters have been changed again due to the commissioning of Bozdoğan Transformation Center. Detailed info about the meters are given in the table below.

Table 6. Meters Properties

	Feeder 1		Feeder 2	
	Main	Spare	Main	Spare
Brand	EMH	ITRON	EMH	ITRON
Type	LZQJ-XC	SL761X071	LZQJ-XC	SL761X071
Class	C (0.5s)	C(0.5s)	C(0.5s)	C(0.5s)
Serial No	9276783	84051667	9276784	84051668

Calibration of the metering devices has been made by TEIAS and sealed before the commissioning of the power plant. The meters were calibrated by TEIAS. The installed meters are in line with the regulations.

Project created job opportunity for 13 people in this monitoring period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emission is calculated according to the formula

BEy = EGy x EFy

Where:

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

EFy = Combined Margin CO2 emission factor (tCO2/MWh), which is 0.645 tCO2/MWh in the VCS PD.

EGy	Net Generation (MWh)	375,654.07
EFy	**Emission Factor (tCO_2/GWh)**	645
BEy	**Gross Total Emission Reduction (tCO_2) During Monitoring Period**	242,293
ERy **May-Dec 2013**	**Emission reductions in 2013 (vintage)**	35,713
ERy **Jan-Dec 2014**	**Emission reductions in 2014 (vintage)**	29,352
ERy **Jan-Dec 2015**	**Emission reductions in 2015 (vintage)**	75,681
ERy **Jan-Dec 2016**	**Emission reductions in 2016 (vintage)**	28,917
ERy **Jan-Dec 2017**	**Emission reductions in 2017 (vintage)**	23,058
ERy **Jan-Dec 2018**	**Emission reductions in 2018 (vintage)**	20,079
ERy **Jan-Aug(13th) 2019**	Emission **reductions in 2019 (vintage)**	29,493

Spread sheet used for calculations have been provided. EFy has been calculated in VCS PD. EGy has been calculated from EPIAS records and meter reading records-OSF forms are used for cross check.

5.2 Project Emissions

No Project Emissions are considered.ACM0002 Version 10 suggests that project proponents shall account for CH4 and CO2 emissions for the reservoir. Although the project does not have a reservoir and result in only a small lake which is attached to the regulator of the facility, the proposed calculations were run to prove the fact that the project's emissions can be assumed "0".

5.3 Leakage

No leakage emissions are considered. Potential leakage emissions in the context of power sector projects are emissions that arise from the project activities such as power plant construction, fuel handling and land inundation. According to ACM0002 / Version 10, such emissions do not need to be taken into account. These emissions sources are neglected.

5.4 Net GHG Emission Reductions and Removals

Total Emission Reduction has been determined as;

ERy = BEy –Pey - LEy

Where;

ERy = Emission reductions in year y (tCO2)

BEy = Baseline emissions in year y (tCO2)

PEy = Project Emissions in year y (tCO2)

LEy = Leakage emissions in year y (tCO2)

The project emissions and leakage is considered as “0”.

Thus, ERy = BEy

EGy	Net Generation (MWh)	375,654.07
EFy	**Emission Factor (tCO_2/GWh)**	645
BEy	**Gross Total Emission Reduction (tCO_2) During Monitoring Period**	242,293
PEy	**Project Emissions(tCO_2)**	0
LEy	Leakage Emissions	0
ERy	Net Emission Reduction (tCO_2) During Monitoring Period	242,293

Thus, the net emission reduction (in tonnes CO2) for the years between May 2013 and August 2019 is calculated as given in table below.

Table 5. Summary of Emission Reductions

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2013 May-Dec	35,713	0	0	35,713
2014 Jan-Dec	29,352	0	0	29,352
2015 Jan-Dec	75,681	0	0	75,681
2016 Jan-Dec	28,917	0	0	28,917
2017 Jan-Dec	23,058	0	0	23,058
2018 Jan-Dec	20,079	0	0	20,079
2019 Jan-Aug	29,493	0	0	29,493
Total (75.4 months)	242,293	0	0	242,293

Total emission reductions realized as 242,293 tCO2 for this monitoring period. When the estimated electricity generation figure of the power plant for each year in the validated VCS PD (76,915 MWh/yr) is considered, the total emission reductions should be approximately 311,716.16 tCO2 (Table 6) for between the May 2013 and August 2019. Percent difference is calculated as 22% which means the project reduced 22% less CO2 than the estimated amount.

AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey takes the water for production from Kemer Dam, which is under the control of DSİ. Since the primary purpose of the Kemer Dam is irrigation, no water is discharged except the irrigation season in drought periods. AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey is located at the end of this channel.Therefore, AKCAY 28.78 MW, HYDROELECTRIC POWER PLANT PROJECT (HEPP), Turkey can operate only during the irrigation season (April to October) in drought periods. But in rainy periods, water is discharged from the dam under the control of DSI also except the irrigation season. Additionally, 2014, 2016, 2017, 2018 and 2019 years were dry. For these reasons, the realized figure is a bit lower than the estimated figure between May 2013 and August 2019. This also led to lower emission reduction, but there is no problem with the efficiency of the power plant.

Table 6. Estimated Baseline Emission Reductions between 2013-2019

Year	Net Electricity Supplied to the Grid (MWh)	Emission reductions (tCO_2e)
2013	51,276.67	33,073.33
2014	76,915.00	49,610.00
2015	76,915.00	49,610.00
2016	76,915.00	49,610.00
2017	76,915.00	49,610.00
2018	76,915.00	49,610.00
2019	47,430.92	30,592.83
Total	483,282.59	311,716.16

Estimated amount of EG for the whole monitoring period is calculated as 483,282.59 MWh. However, project generated 311,716.16 MWh electricity in the whole MR. Therefore, the percent difference is calculated as 22%.