MONITORING REPORT OF THE YOKUSLU-KALKANDERE HYDROELECTRIC POWER PLANT

Document Prepared by Rüzgar Danışmanlık

Project Title	The Yokuslu- Kalkandere Hydroelectric Power Plant
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1.PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Yokuslu-Kalkandere Hydroelectric Power Plant is a registered Project under Verra Registry with ID Number 905. The project activity involves the installation of a 41.19MWm / 40.24MWe hydroelectric power plant (HEPP) located on the İyidere River basin in the Black Sea Region of Turkey, within the province of Rize. The water diverted from the weir will be transferred to “Kalkandere Powerhouse” through a tunnel. The total installed capacity of the turbines in Kalkandere Powerhouse is 35.04 MWe (3x11.68 MWe). The turbined water has been transferred to “Kizilagac Powerhouse” through another tunnel. The total installed capacity of this plant is 5.2 Mwe (2 x 2.60 MWe). The project comes under Type-I Renewable Energy Project as per Appendix B of the procedures for CDM project activities.
Conditions prior to the project activity is the continuation of the current situation, which is the continuation of energy supply by grid-connected units which are mainly fossil fired power plants. Therefore, the main purpose of the project is to generate approximately 180,480 MWh/year of electricity to supply the national grid using a renewable resource and tap the significant hydropower potential in the region. The project activity reduces greenhouse gases (GHGs) emissions that would have otherwise occurred in the absence of the project activity by avoiding electricity generation from fossil fuel sources. The average annual emission reductions of the proposed Project during its second crediting period are estimated to be 83,309 tons of CO2e (tCO2e). The Yokuslu- Kalkandere Hydroelectric Power Plant reduces greenhouse gas emissions that would have otherwise occurred in the absence of the project activity by avoiding electricity generation from fossil fuel sources both in the operating margin and build margin of the system. The average annual emission reductions of the proposed Project are estimated to be 83,309 tons of CO2e (tCO2e) and a total of 833,090 tCO2e over 10 years of the second crediting period.

The project had started construction on 02 January 2009, the turbine started commissioning 30 December 2010. The plant has been designed to generate electricity by utilizing the 100.2 m of head between the tail water level of the upstream existing Cevizlik HEPP and the Incirlik HEPP project which is under project stage and is located downstream. There is no dam or any new reservoir formation that will have an impact on the project emissions within this monitoring period. The project contributes positive environmental benefits as displacing the electricity generated by fossil fuel-fired power plants by utilizing renewable resources to avoid environmental pollution and GHG emissions. Thus, the project has a significant contribution to climate protection and to sustainable development in the region.

This monitoring period is from 01/01/2021 to 30/06/2023. During this monitoring period, the actualized net electricity generation is 374,650.082 MWh. The total emission reduction of this monitoring period is 172,937 tCO2e.

Considering the difference between the amount achieved in this monitoring period and the ex-ante amount, lower than expected precipitation and resulted in lower production.

The following table shows a full detail of the project's technical specifications:

Table 1: Technical specifications of the project

Property	Unit	Amount
Powerhouse		
Project Discharge	m^3/s	50.00
Tailrace Elevation	m	119.00
Turbine Brand		VOITH
Turbine Type		Horizantal Axis Francis
Turbine Axis Level	m	117.5
Gross Head	m	100.2
Net Head	m	76.09
Installed Capacity	MWe	35.04
Unit Capacity	MWe	11.68
Number of Units		3
Serial No of Units		19743-19744-19745
Generator Brand/Type		INDAR/PSA-1600-X/14
Serial No of Generators		3010000202,3010000203, 3010000204

Table 2: Technical specifications of the Kizilagac Power Plant

Property	Unit	Amount
Powerhouse		
Project Discharge	m^3/s	50.00
Tailrace Elevation	m	102.60
Turbine Axis Level	m	98.00
Brand		Chongqing Water Turbine Works
Turbine Type		Vertical Kaplan Turbine
Maximum Head	m	14.45
Rated Head	m	12.00
Installed Capacity	MWe	5.20
Unit Capacity	MWe	2.60
Number of Units		2
Serial No of Units		2011-10/2011-11
Generator Brand/Type		CWTW/SF3150-24/3250
Serial No of Generators		2011-10, 2011-11

Please see the table below for the important dates for the implementation of the project activity:

Table 3: Project Timeline

Milestone	Date
First VER consideration	July 23rd 2004
First Feasibility report	October 2004
First contacts with PDD consultants	October 2007
Last Feasibility report	November 2007
EIA is not required decision	November 23rd 2007
Contact with a PDD consultant	April 25th 2008
Contact with a DOE	June 1st , 2008
First discussions with financial institutions	September 2008
Investment Decision	October 10th 2008
Contract signature for the construction works of Kalkandere	January 2nd 2009
Contract signature for the electromechanical equipments Contract signature for electrical works	May 7th 2009
Stakeholder consultation	June 20th 2009
EIA approval (by the Ministry of Environment and Forestry)	November 06th, 2009
Commissioning of the first unit of Kalkandere power plant	December 30th, 2010
Project start date	December 30th, 2010
Commissioning of the other two units of Kalkandere power plant	January 28th, 2011
Commissioning of the Kizilagac power plant	30/12/2012
First crediting period	01/01/2011-31/12/2020
1st Monitoring Period	01/01/2011-31/12/2011
2nd Monitoring Period	01/01/2012-31/08/2017
3rd Monitoring Period	01/09/2017-31/12/2020
Second crediting period	01/01/2021-31/12/2030
4th Monitoring Period	01/01/2021-30/06/2023

Please see the vintage-based comparison of expected and achieved emission reductions for this monitoring period:

Table 4 Ex-ante vs achieved emission reduction.

Vintage	Total Days	Expected amount of net GHG removals (t CO2e)	Amount achieved during this monitoring period (tCO2e)	Expected net electricity generation (MWh)	Amount achieved during this monitoring period (MWh)	Difference (%)
01/01/2021-31/12/2021	365	83,309	58,363	180,480.000	126,436.839	-30%
01/01/2022 31/12/2022	365	83,309	69,659	180,480.000	150,908.440	-16%
01/01/2023-30/06/2023	181	41,312	44,915	89,498.301	97,304.803	9%
Total	**911**	**207,930**	**172,937**	**450,458.3011**	**374,650.082**	**-16.8%**

1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: "Energy Industry – Renewable-/Non-renewable Sources"[1]. Installed capacity of the project is 41.19 MWm/40.24 MWe.

The project is not a grouped project.

1.3 Project Proponent

Organization name	Sanko Enerji Sanayi ve Ticaret A.Ş.
Contact person	Muhsin Dervişoğulları
Title	Project Development Manager
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Telephone	+90 444 87 65 +90 212 410 46 66
Email	muhsin.dervisogullari@sankoenerji.com.tr

1.4 Other Entities Involved in the Project

Organization name	Rüzgar Karbon ve Enerji Danışmanlık Sanayi Ticaret Limited Şirketi
Role in the Project	Consultant
Contact person	Mrs. Çağla Balcı Eriş
Title	Manager
Address	Göztepe Mah. Avcı Sok. Nursaray Apt. No:1 D:22 Kadıköy-İstanbul 34270 TURKEY
Telephone	+90 216 355 09 68
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1.5 Project Start Date

The project start date is 01/01/2011.

[1] https://cdm.unfccc.int/DOE/scopes.html

1.6 Project Crediting Period

This monitoring period includes between 01 January 2021 and 30 June 2023 and belongs to second crediting period which is 01/01/2021 and 31 December 2030. The Project's total crediting period is ten years renewable twice.

1.7 Project Location

The Yokuslu-Kalkandere hydroelectric power plant (HEPP) located on the İyidere River basin in the Black Sea Region of Turkey, within the province of Rize. Kalkandere Powerhouse between 40º53'47"-north latitudes and 40º25'45" east longitudes. Kizilagac Powerhouse between 40 º 54' 27,81" -north latitudes and 40 º 25' 16,97" east longitudes.

The following figures show the project's location:

Figure 1 : Project Location

Figure 2: Satellite image of the Project

1.8 Title and Reference of Methodology

The approved baseline and monitoring methodology selected for the proposed project activity is: ACM0002 Version 21.0[2] "Grid connected electricity generation from renewable sources" The methodology also refers to the latest approved versions of the following tools, which are applied by the project:

- TOOL01: "Tool for the demonstration and assessment of additionality", version 7.0[3]
- TOOL07: "Tool to calculate the emission factor for an electricity system" version 7.0[4]
- TOOL11: "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 03.0.1.[5]

1.9 Participation under other GHG Programs

The project has not been registered or seeking registration under other GHG programs.[6]

[2] https://cdm.unfccc.int/UserManagement/FileStorage/ZPFJL01OU2RYC6N3HASIXV7K84QBG9
[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf
[6] The relevant declaration letter has been submitted to the VVB.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

- Emission Trading Programs and Other Binding Limits: Not applicable. The project is a voluntary project and the host country, Turkey cannot host CDM or JI projects. The project has not been registered under any other voluntary GHG program.
- Other Forms of Environmental Credit: Not applicable. The project will not generate other form of environmental credits such as Green Power Certificates.
- Participation under Other GHG Programs: Not applicable. The project is a voluntary project and the host country, Turkey cannot host CDM or JI projects. The project has not been registered under any other voluntary GHG program.

1.11 Sustainable Development Contributions

The project helps Turkey to stimulate and commercialize the use of grid-connected renewable energy technologies and markets. Furthermore, the project demonstrates the viability of grid-connected wind farms which can support 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 are to:

SDG-7 Clean and Affordable Energy

The project contributes to the Sustainable Development Goal, Affordable and Clean Energy. During this monitoring period, the actualized net electricity generation is 374,650.082 MWh.

SDG-8 Decent Work and Economic Growth

The project contributes to the Sustainable Development Goal, Decent Work and Economic Growth. Employment opportunities were provided for 22 personnel during the operation phase of the project.

SDG-13 Climate Action

The project contributes to the Sustainable Development Goal, Climate Action. During this monitoring period, the actualized emission reduction is 172,937 tCO2

Table 5 Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	By 2030, increase substantially the share of renewable energy in the global energy mix	İncrease of renewable energy generated	During this monitoring period, the actualized net electricity generation is 374,650.082 MWh.	The amount of electricity produced during the lifetime of the project is 1,804,800 MWh over the second ten year of project lifetime.
2)	8.5	By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with	Increase of quality and quantitative employment in the region	Currently 22 people are employed	22 employees
3)	13.2	Integrate climate change measures into national policies, strategies, and planning	Reduction of the greenhouse gas emissions	During this monitoring period, the actualized emission reduction is 172,937 tCO_2e.	The emission reduction amount over the second ten year of the project lifetime is 833,090 tCO_2e.

2 SAFEGUARDS

2.1 No Net Harm

There isn't any negative environmental or socio-economic impact. Also, in line with Turkish environmental regulations, an "Environmental Impact Assessment (EIA) Report" had been carried out and EIA Positive Decision was approved by the Ministry of Environment and Forestry in 06/11/2009.7 In the context of the "EIA Positive Letter" submitted within the project documents to the local branch of Rize provincial directorate of environment and urbanism

Throughout its construction and operational phase during its first crediting period, Yokuslu- Kalkandere Hydroelectric Power has not created any harm neither environmentally nor socio-economically; on the contrary, the project contributed to the socio-economic development in the project area significantly as:

1. Clothing and stationery aid was given to primary and high school students.
2. Scholarships were given to needy undergraduate students.
3. Every year during the month of Ramadan, food aid was given.
4. Furnishing aid was provided to the social facility for women in the Kalkandere district.

With respect to the second crediting period and this monitoring period:

1. Fish passages are regularly controlled by DSI, Nature Conservation, and Provincial Environment Directorate officials.
2. Streambed downstream and upstream water analyses are taken every 3 months and monitoring studies are carried out.

2.2 Local Stakeholder Consultation

The Article 9 of the EIA Regulation stipulates a public participation process in order to provide participation of the communities in EIA process, to inform the communities about the proposed facility and to gather their opinions. In order to satisfy this requirement, announcements were published in two newspapers (Zümrüt Riza and Dünya Gazetesi) – one national and one local- declaring the date, time, venue and topic of the meeting.

Under EIA regulation project owner organized a stakeholder consultation meeting on 21st of May 2009. Two major questions asked during meeting first one was about economic advantages of the project and second is environmental impacts of the project. It is confirmed that project owner hired local employees during construction and used local companies to buy the needs of the project site if possible. For the environmental issues project owner fully met the legal requirements. It was verified during the site visit through the interviews with local people and village heads that the project has a positive impact to the region' s sustainable development. All the

stakeholders that were interviewed were content with the project activity and the general opinion was that the project was beneficial for the surrounding villages.

There is an active grievance mechanism. In summary, the mechanism works as follows. In addition, a digital platform was created for demands and requests. All requests are tracked digitally. With the hierarchy of Operations Manager, Corporate Communications Officer, CFO, CEO, Coordinator, demands are evaluated in the digital environment, and solutions are sought. There are no updates to the project design. And the work done to collect public grievances is mentioned below:

- There is a “Public Relations Team” that will act as a bridge between the project and those affected by the project (regional people, non-governmental organizations, national and local organizations, and authorities, other parties related to the project, etc.). The team is work throughout the business to create a positive relationship based on open communication and mutual respect.
- The Public Relations team consist of a team of 4 people, namely the Public Relations Officer and the Operations Manager.
- Obtaining information, requests, and complaints to be handled and examined within a maximum of 7 working days.
- Corrective actions, if any, to be taken as a result of the examination of the requests are notified to the requesters by the Public Relations Officer.
- Requests other than those related to infrastructure will be finalized within 30 days.
- Complaints about the infrastructure will be finalized as soon as possible so that they do not cause problems in the daily lives of the people of the region.
- For each request received, the Information, Request, and Complaint Form is filled out. After the form is filled out by the Public Relations Officer, the Operations Manager is informed to take the necessary action.
- After the applicable action is finalized as a result of the request/complaint, the Information Acquisition, Request, and Complaint Closing Form is filled, and the relevant person will be informed.

No negative comments have been received regarding the project until now and the grievance mechanism continues to work and will continue throughout this monitoring period and 2nd crediting period.

For the time being, it has been experienced that mukhtars and villagers of the region are the most cooperative about the exchange of information and opinions.The project owner and local stakeholders have a good relationship and they are always in touch. All stakeholders have access to provide feedback related with this project via phone or e-mail or mail or on-site project visit in person.

And Stakeholders are allowed to make anonymous comments should they wish. This is 12th year 2023 and there is no input (disputes, complaint grievances, or comments) received from the local stakeholder including this monitoring period. And the local stakeholders also reach to employees if whenever they have a request because all employees are local and from around project’s villages. VVBs have also made interviews with them during the on site visits. There were not any negative feedbacks on socio-economic and environmental issues

by the locals. Since there were no negative feedbacks from the locals, there is no need to take any further action. Furthermore, the project owner has made appropriate contributions or improvements to the local community everytime. All stakeholders including Mukhtar makes sure that there's continuous communication between the two parties and happy about it.[7]

2.3. AFOLU-Specific Safeguards

N/A

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The construction of the project started on 02.01.2009. The first unit of "Kalkandere Power House" started operation on 30 December 2010. The other two units were commissioned on 28 January 2011. The commissioning date of Kizilagac Power house is 30 December 2012.

During the registration of the project, the project proponent was the AKIM ENERJI URETIMI SANAYI VE TICARET A.S (as project developer). Akım Enerji was taken with all its liabilities by SANKO ENERJI SANAYI VE TICARET. A.S. on 28/09/2012. Similarly, the shareholder structure was changed on 28/09/2012 and the Project has been transferred to SANKO ENERJI SANAYI VE TICARET A.S. The sole Project Proponent is SANKO ENERJI SANAYI VE TICARET. A.S. In addition, the verification process of the project has carried out by Rüzgar Danışmanlık. During the monitoring period, there was no event or situation that occurred, which may impact the applicability of the methodology.

3.2 Deviations

3.2.1 Methodology Deviations

No deviation in the methodology has been applied to the project activity during the monitoring period.

3.2.2 Project Description Deviations

The project activity was originally planned with a 42.33 MWe installed capacity. The total installed capacity was changed and decided to install as 40.24 MWe Kalkandere HEPP.

Clarifications about the project owner and other organizations involved in the project are included in Section 3.1.

[7] The related official letter has been submitted to the VVB.

3.3 Grouped Projects

This is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid-connected power generation in year y
Source of data	Turkish Government Ministry of Energy and Natural Resources
Value applied	0.4616
Justification of choice of data or description of measurement methods and procedures applied	$EF_{grid,CM,y}$ was calculated by the Turkish Ministry of Energy and Natural Resources using Version 7.0 of TOOL 7: "Tool to calculate the emission factor for an electricity system" and published in "TURKEY NATIONAL ELECTRICITY NETWORK EMISSION FACTOR INFORMATION FORM".[8]
Purpose of Data	To calculate the baseline emission.
Comments	-

4.2. Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh/year
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y
Source of data	EPİAŞ records.
Description of measurement methods and procedures to be applied	Continuous measurements are to be made by two sets (one main and one reserve) of meters. These meters are sealed and fully controlled by TEIAS . Measurements will be used for the calculation of the net electricity generation supplied by the project to the grid.
Frequency of monitoring/recording	Continuous measurement, monthly recording

[8] https://enerji.gov.tr//Media/Dizin/EVCED/tr/ÇevreVeİklim/İklimDeğişikliği/TUESEmisyonFktr/Belgeler/Bform2020.pdf

Value applied

Vintage	Electricity supplied to the grid (MWh)	Electricity consumption from the grid (MWh)	Net electricity supplied to the grid [MWh]
01/01/2021-31/12/2021	126,746.330	309,491	126,436.839
01/01/2022-31/12/2022	151,209.487	301,047	150,908.440
01/01/2023-30/06/2023	97,422.450	117,647	97,304.803
Total	375,378.267	728,185	374,650.082

Monitoring equipment

Meters are in compliance with the communiqué for Metering Devices to be used in Electricity Market. Two metering tests were performed on 08/11/2017 and 28/09/2018 respectively, for the changed meters.

The main and back meters were changed on 10/08/2020[9]. The specification of currently used electricity meters are as follows and 10/08/2020 is also initial calibration date of current meters and then these meters have tested on 30/09/2022.

Name	Serial Number	Brand – Model	Accuracy class
Main Meter	9674574	EMH-LZQJ-XC	C-1s
Backup meter	9674575	EMH-LZQJ-XC	C-1s

QA/QC procedures to be applied

Since Kızılağaç power plant is under the same license as Kalkandere, the energy produced is transferred to the system through the same meters. A separate meter has not been installed in the Kızılağaç power plant.

TEIAS obtains the readings from the meters remotely and reports them in a spread sheet (for measurement control and will store the data discharged from the meters electronically) to the Plant engineer. EPİAŞ records are main source, TEİAŞ meter readings are cross-check source.

Re-calibration periods are defined by national metrology institutes country by country and in Turkey this period is defined as 10 years[10]

[9] The related official documents has been submitted to the VVB.

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

Purpose of data	Calculation of baseline emissions
Calculation method	N/A
Comments	Estimated net electricity generation was taken from Generation License.

Data / Parameter	A_{PJ}
Data unit	m^2
Description	Area of the regulation pond measured in the surface of the water, after the implementation of the project activity when is full
Source of data	Project site
Description of measurement methods and procedures to be applied	Measured from topographical surveys, maps, satellite pictures etc.
Frequency of monitoring/recording	Yearly
Value monitored	11,442 m^2
Monitoring equipment	Measured from topographical surveys, maps, satellite pictures, etc
QA/QC procedures to be applied	The reservoir area map has been provided to the VVB.
Purpose of the data	Calculation of project emissions
Calculation method	The reservoir area mentioned above (11,442 m2) is the maximum reservoir area at 224.92 m altitude. This water level only occurs at the Q500 flood discharge. The reservoir area was calculated with using AutoCAD programs.
Comments	N/A

Data / Parameter	**Cap_{PJ}**
Data unit	MW
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	The installed capacity will be determined based on recognized standards.
Frequency of monitoring/recording	Yearly
Value monitored	40.24 MWe (3*11.68+2*2.60MWe)
Monitoring equipment	The data is monitored from the electricity generation license which was granted by Energy Market Regulatory Authority.
QA/QC procedures to be applied	The current Generation License and turbine specification documents have been provided to the VVB.
Purpose of the data	Calculation of project emissions
Calculation method	The installed capacity figure is 35.04 MWe (3x11.68 MWe) for Kalkandere Powerhouse and 5.20 MW (2 x 2.60 MWe). The total installed capacity of the project is 40.24 MWe.
Comments	N/A

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 are complete, consistent, clear and accurate. The project is operated by Sanko Enerji Sanayi Ve Ticaret.A.S. which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines.

Data and parameters that are listed below as well as in Section 5.2., will be monitored in accordance with ACM0002 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources":

i. Quantity of net electricity generation supplied by the project plant to the grid (EGFacility,y),

Data is recorded for each crediting period and maintained at least 2 years after its end. The company will establish a dedicated maintenance system to ensure the data availability for the required period. According to the Turkish Law and Regulations, the methods of monitoring the net electricity fed to the grid and quality control and assures are explained below:

Monitoring data is collected in accordance with the agreement done between the project owner and Turkish Electricity Transmission Company (TEIAS) which provides the infrastructure for the connection to the national grid. The metering system is defined in the agreement as two groups: main meter and spare meter. The design of the metering system is checked and approved by TEIAS before commissioning of the plant. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA) requires

all meters to be in line with either Turkish Standards Institution or International Electro technical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of both parties. This prevents any intervention and assures the accuracy and quality of the measurements. Concerning metering system accuracy, project participants have to comply with relevant national legislation According to b) paragraph of the 9th Article of the Regulation of Metering and Testing of Metering Systems “periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformer are done every 10 years. Since the meters are within TEIAS’ province, TEIAS executes all the procedures for handling non-conformities. Therefore, the Project Participant does not have any internal auditing for this purpose. Data will be stored electronically, during the crediting period and at least two years after the last issuance of credits for the wind farm project activity in the concerning crediting period. The Project Proponent is responsible for storage of data received from the measuring devices.

There is no sampling approaches applied for this project.

The project is operated by Sanko Enerji Sanayi ve Ticaret A.Ş. which ensures the overall site management in accordance with Turkish Laws and technology providers' guidelines.

The monitoring has been performed in-house by the project proponent:

1. Plant Engineer is 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. In addition to the measurements made by TEIAS, the internal SCADA system (MIKRONIKA program of SYNDES ENERGIA) measures the produced electricity. The plant engineer checks these electricity measurement records and reports to the Operations Manager of the plant.
2. Accounting Manager is in charge of providing the electricity sales receipts to the Operations Manager of the plant.
3. Operations Manager is the VER coordinator. He is in charge of:

    a. Ensuring that instrumentations and devices are available and properly suited to perform efficiently the monitoring.

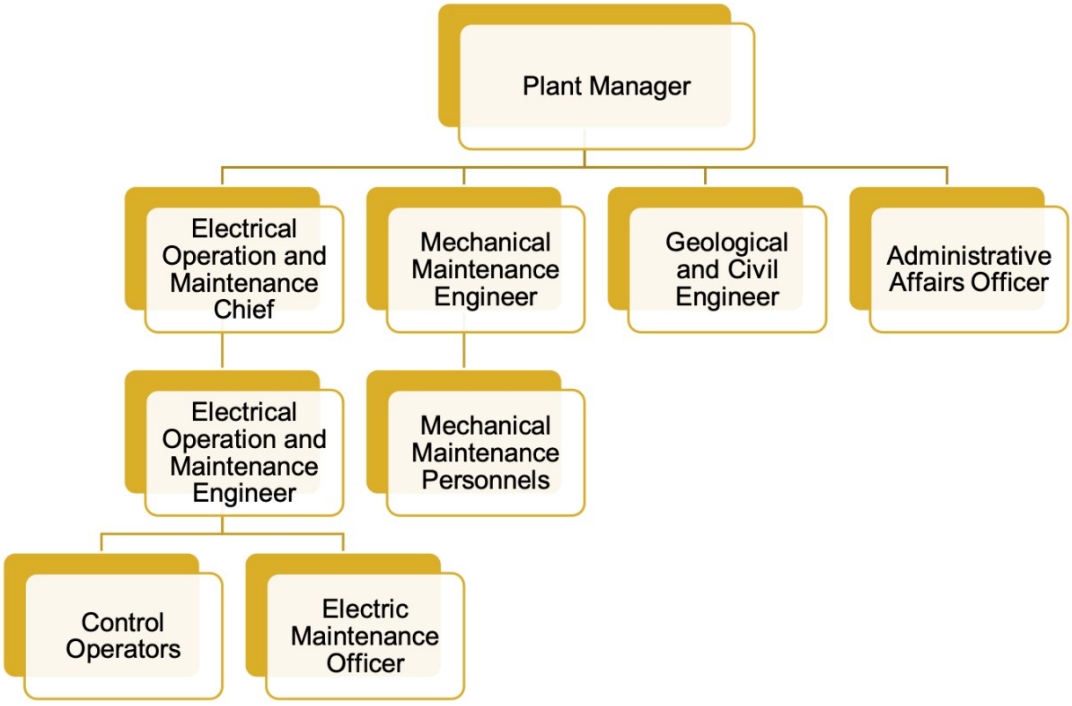
    b. Communicating and coordinating the monitoring tasks of all business units.

    c. Developing, executing, analyzing and improving the VER Monitoring/Reporting Procedures. This includes the crosschecking and consolidation (with multiple sources whenever possible) of the data obtained from the plant engineer and the accounting manager. He also records this operation properly to be able to provide it to the VVB during the verification process.

d. Calculating and reporting the emission reductions.

The organizational chart of the facility is given in the figure below.

Figure 2 Organizational Chart



Each year, the monitoring report is submitted to VVB 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.

TEIAS obtains the readings from the meters remotely and reports them in a spread sheet (for measurement control and will store the data discharged from the meters electronically) to the Plant engineer.

In line with the EMRA requirements, the company purchased and installed two electricity meters to the Yokuslu- Kalkandere Hydroelectric Power Plant.

The recalibration of these equipments has been done in line with the equipment requirements but re-calibration periods are defined by national metrology institutes country by country and in Turkey this period is defined as 10 years.

As mentioned above there are two sets of meters in the transformer station. (The meters are electronic meters with an accuracy class of 0.2.) One of is the main meter for measuring and the other is the check meter for control. Both meters are metering the energy in two directions (consumption and production). If there is a measuring difference between these two meters and one of the parties (TEIAS

or the company) requests for calibration of the meters, in this case, the meters will be calibrated without waiting for the periodic calibration date. (TEIAS System Usage Agreement, Art 3, B./2. /b)) 19 . There is no need for any additional internal audit process since this calibration process is done by another third party under the control of TEIAS. The project owner is not responsible for calibration of the meters in Turkey according to the local standards.

All production figures which are subject to sales to the grid are agreed with EPIAS (Market Financial Reconciliation Centre). These figures can be accesses from EPIAS's web site by the seller. Therefore, net electricity production figures announced by EPIAS has been used in emission calculation figures. These figures has 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.

On the other hand, the emission reductions has been calculated according to the measurements of the main electricity meter since the electricity production invoices are made out based on this meter. EPİAŞ records are main source, TEİAŞ meter readings (OSF forms) are cross-check source. During each monitoring period, the invoices will be presented to the VVB, together with the calculation details.

The Electrical Engineers receive sufficient and continuous training in terms of monitoring and verification on aspects such as meter's reading and calibration and reading's recording, adjustment, and reporting. If new personnel are hired, they have to follow up a training program and trained in the specific skills required to carry out the Monitoring Plan.

Data is recorded for each crediting period and maintained at least 2 years after its end. The company will establish a dedicated maintenance system to ensure the data availability for the required period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 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. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid connected power plants and the addition of new grid connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y} \quad \textbf{(1)}$$

BE_y :Baseline emissions in year y (tCO2)

$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM 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 "TOOL07: Tool to calculate the emission factor for an electricity system" (tCO2/MWh)

Calculation of $\mathbf{EF_{grid,CM,y}}$ Based on pre-calculated values by Turkish Government, Ministry of Energy and Natural Resources, document "TURKEY NATIONAL ELECTRICITY NETWORK EMISSION FACTOR INFORMATION FORM",[11] the applicable grid emission factor value to calculate the emission reductions of the Hydro power plant project(other renewables) is 0.4616 tCO2/MWh.

Since the BM, OM and CM values are calculated by Turkish Ministry of Energy and Natural Resources, those factors are calculated and updated regularly.

For Build margin factor calculation, Chronological order of power generation plants from TEİAŞ Load Dispatch Department with commissioning dates, plant names, fuel types, installed power values, electricity generation for the calculated year were used as input data. Consequently, Turkish Ministry of Energy and Natural Resources calculated; $EF_{grid,BM,y}$: 0.3680

For Operating margin factor calculation, Chronological order of power generation plants from TEİAŞ Load Dispatch Department with, fuel types, electricity generation for the calculated year were used as input data. By using all the data which were mentioned above, Turkish Ministry of Energy and Natural Resources calculated; $EF_{grid,OM,y}$: 0.7424

The combined margin emission factor is calculated by using weighted average CM as per tool formula below:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM} \quad \textbf{(2)}$$

BE_y	=	Baseline emissions in year *y* (t CO_2)
$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)
$EF_{grid,y}$	=	Combined margin CO_2 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" (t CO_2/MWh)

According to the Tool for hydro power generation project activities for the second crediting period: wOM = 0.25 and wBM = 0.75

[11] https://enerji.gov.tr//Media/Dizin/EVCED/tr/ÇevreVeİklim/İklimDeğişikliği/TUESEmisyonFktr/Belgeler/Bform2020.pdf

CM (OM*0.25 + BM*0.75)	**0.4616**
(0.7424 * 0.25) + (0.3680 * 0.75)	

5.2. Project Emissions

Project emissions are calculated as follows:

$PE_y = PE_{EF,y} + PE_{GP,y} + PE_{HP,y}$ ***(3)***

PE_y : Project emissions in year y (tCO2e/yr)
$PE_{FF,y}$: Project emissions from fossil fuel consumption in year y (tCO2/yr)
$PE_{GP,y}$: Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO2e/yr)
$PE_{HP,y}$: Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

Project emission from Fossil fuel consumption ($PE_{FF,y}$)

The project's internal consumption is approximately 500 kVA, which can be considered negligible. This consumption will be satisfied from the electricity generation when the plant is in operation or from the grid when the plant is not in operation. Eventually, if there is no electricity available in the grid and the plant is not in operation the internal consumption will be satisfied from a diesel generator, but this could rarely occur. If diesel engines would be used, emissions associated would be calculated according to the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" and considered as project emissions. Therefore:

$PE_{FF,y} = 0$

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

Since the project activity does not involve the operation of a geothermal power plant, $PE_{GP,y} = 0$

Emissions from water reservoirs of hydropower plants ($PE_{HP,y}$)

The project activity is a Greenfield run-of-river hydropower project. The water is diverted using a diversion wall structure to the power canal and then to the powerhouse. The water will be fed back to the river through the tailrace canal. The diversion structure results in a regulation pond with a surface area of 11,442 m^2, which does not affect in any way the volumes of existing reservoirs downstream of the project.

The power density (PD) for this regulation pond is calculated as follows:

PD = 40,240,000 W/11,442 m^2

PD = 3,517 W/m^2

PD > 10 W/m^2

Therefore, $PE_{HP,y}$=0

Hence, PEy= 0

5.3 Leakage

As per ACM0002 Version 21.0, leakage emissions do not need to be considered.

5.4. Net GHG Emission Reductions and Removals

Also, according to ACM0002/Version 21 the emission reductions in year "y" should be calculated as the following formula:

$ERy = BEy - PEy$ ***(4)***

Where:

ERy = Emission reductions in year y (t CO2/yr).

BEy= Baseline emissions in year y (t CO2/yr).

PEy = Project emissions in year y (t CO2/yr).

As per the tool, the PEy equals to zero. Thus, the project emissions are equal to the baseline emissions.

Total installed capacity = 41.19MWm / 40.24MWe

Net electricity delivered to grid ($EG_{PJ,y}$) = 374,650.082 MWh

Grid emission factor ($EF_{grid,CM,y}$) = 0.4616

Baseline emissions (BE_y) = Emission reductions (ERy), since Project emissions (PE_y) is zero.

$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$ = 374,650.082 * 0.4616 = 172,937 tCO_2e

Table 6 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)
January 2021	1,532	0	0	1,532
February 2021	1,531	0	0	1,531
March 2021	3,200	0	0	3,200
April 2021	9,058	0	0	9,058
May 2021	10,732	0	0	10,732
June 2021	5,012	0	0	5,012
July 2021	3,684	0	0	3,684
August 2021	5,497	0	0	5,497
September 2021	4,667	0	0	4,667
October 2021	6,921	0	0	6,921
November 2021	3,578	0	0	3,578
December 2021	2,951	0	0	2,951
Total 2021 Vintage	58,363	0	0	58,363
January 2022	2,331	0	0	2,331
February 2022	2,980	0	0	2,980
March 2022	3,300	0	0	3,300
April 2022	11,947	0	0	11,947
May 2022	12,169	0	0	12,169
June 2022	13,207	0	0	13,207
July 2022	8,242	0	0	8,242

August 2022	3,376	0	0	3,376
September 2022	3,248	0	0	3,248
October 2022	4,130	0	0	4,130
November 2022	2,686	0	0	2,686
Decamber 2022	2,045	0	0	2,045
Total 2022 Vintage	**69,659**	0	0	**69,659**
January 2023	1,564	0	0	1,564
February 2023	1,852	0	0	1,852
March 2023	6,440	0	0	6,440
April 2023	9,191	0	0	9,191
May 2023	12,700	0	0	12,700
June 2023	13,168	0	0	13,168
Total 2023 Vintage (01.01.2023-30.06.2023)	**44,915**	**0**	**0**	**44,915**
Total (01.01.2021-30.06.2023)	**172,937**	**0**	**0**	**172,937**

Year	Ex-ante emissions reductions/removals	Achieved emissions reductions /removals	Percent difference	Justification for the difference
2021	83,309	58,363	-30%	The 2021 was a dry year for this district.
2022	83,309	69,659	-16%	The 2022 was a dry year for this district.

2023	41,312	44,916	9%	Only first 6 months of the year. This is not correct compare for Hydropower Project
01/01/2021-30/06/2023	207,930	172,938	-16.8%	This is lower expectation value because of the different weather conditions of this monitoring period