MONITORING REPORT OF CEVİZLİK RUN-OF-RIVER- HYDROELECTRIC POWER PLANT

Document Prepared by Rüzgar Danışmanlık

Project Title	The Cevizlik Run-of-River-Hydroelectric Power Plant
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1. PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Cevizlik Run-of-River-Hydroelectric Power Plant is located in the Eastern Blacksea Region of Turkey, within the province of Rize province. The project is comprised of the construction of a greenfield 92,96 MWm / 91,40 MWe run of river hydropower electricity plant (HEPP) located on the İyidere river. The generation license was granted by EMRA (Energy Market Regulatory Authority) on 27/06/2007.[1] The project has started construction on 2 January 2008, the project started to generate electricity on 29 May 2010. The Project includes the installation of two Francis turbines each with an installed capacity of 46.48 MWm Cevizlik HEPP is constructed underground without any upstream reservoir lake.

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 330 GWh/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 162,665 tons of CO2e (tCO2e) and a total of 1,626,652 tCO2e over 10 years of the second crediting period. The Cevizlik HEPP 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. There is no dam or any new reservoir formation that will have an impact on the project emissions within the 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 such as Contributing to the economic development of the country by providing sustainable energy, increasing the income and local standard of living by providing job opportunities for the local people.

This monitoring period is from 29/05/2020 to 30/06/2023. During this monitoring period, the actualized net electricity generation is 840,044.469 MWh. The total emission reduction of this monitoring period is 414,078 tCO2e. Considering the difference between the amount achieved in this monitoring period and the ex-ante amount, lower than expected precipitation and flood disaster resulted in lower production. With respect to the Project technologies, please see below the full detail of the project's technical specifications:

[1] The generation license with all the amendments has been provided to the VVB during the verification process.

Table 1 : Project Technologies of Cevizlik HEPP

Property	Unit	Amount
Catchment Area	km^2	790
Annual Average Precipitation	mm	1100
Average Discharge	m^3/s	26,46
Design Discharge	m^3/s	50
Type	-	Ogee shaped concrete gravity
Crest Length	m	60
Crest Elevation	m	456
Thalweg Elevation	m	450
Foundation Elevation	m	444
Height above Thalweg	m	6
Height above Foundation	m	12
Flood Water Level	m	457.95
Q100	m3/s	557
Q500	m3/s	719.52
Flushing Gate		
Crest Elevation	m	450
Foundation Elevation	m	444
Crest Length	m	17
Number of Gates		3
Gate Size	m x m x m	3 x 2.50 x 4.00
Intake Structure Total Width	m	14
Settling Basin		
Length	m	64
Width	m	4 X 7

Settled Particular Size	mm	0.60
Regulation Pond Surface Area	m^2	14091
Regulating Pond Capacity Active Volume	m^3 m^3	200000 173000
Headrace Tunnel		
Type		Horseshoe, concrete lined
Inner Diameter	m	4.00
Thickness of Concrete	m	0,40
Tunnel Capacity	m^3/s	50,00
Headrace Tunnel Length	m	7981,485
Access Tunnel 1 Length	m	410
Access Tunnel 2 Length	m	545
Access Tunnel 3 Length	m	960
Access Tunnel 4 Length	m	250
Access Tunnel 5 Length	m	113,50
Surge Tank		
Type		Varying Cross Section
Top Elevation	m	476
Bottom Elevation	m	412,40
Max. Water Level	m	470.10
Minimum Water Level	m	420.39
Inner Diameter	m	12.00 (412,40~430.00 between elevation) 16.00 (430.00~476.00 between elevation)
Penstock		
Inner Diameter	m	3.40
Excavation Diameter	m	4.60
Average Steel Thickness	m	20
Length	m	348,63

The key parameters about the turbines used in the project have been listed below in Table 2.

Table 2 Key parameters of the turbines

Component	Property
Turbine type	Francis
Turbine firm	Alstom
Rotation	300 r / min
Production year	2007
Average flow rate	25 m^3 / s
Number of turbines	2
Serial numbers of the turbines	2060 & 2061
Installed capacity of each turbine	46,48 MWm / 45,70 MWe

Key parameters of the turbines detailed above have been in line with the provisional acceptance of the power plant. It has been ensured with the recent photographs of the labels on the equipment that key parameters of the turbines are still same with of the first crediting period. Plant load factor has been calculated specifically for the project as 0.40 in the baseline excel sheet. Operational lifetime of the powerplant is 49 years as stated in the generation license. As for the lifetime of the hydro equipment, “many hydro hardware manufacturers quote design lives of 25 years though in many cases the same manufacturers have the turbines out in the field that are over 50 years old and still operating reliably and efficiently.” 2 In one other research paper regarding the evaluation of the lifetime of Francis turbines, the residual lifetime is about 60 years.3 And last of all, another research center for hydro power technology, HydroCen has indicated that the average lifetime of Francis turbines are 40 years. Therefore, the operational lifetime of the

[2] https://www.renewablesfirst.co.uk/renewable-energy-technologies/hydropower/hydropower-learning-centre/how-long-will-hydropower-systems-last/

[3] https://hal.archives-ouvertes.fr/hal-01516837/document

powerplant as indicated as 49 years in the generation license has been found appropriate for the identification of the lifetime of the equipment.

Table 3 Project Timeline

Milestone	Date
First VER consideration	July 23rd 2004
Feasibility report	May 2005
Stakeholder consultation	March 16th 2006
EIA approval (by the Ministry of Environment and Forestry)	February 20 2009
Contract signature for the electrical works	December 4th 2006
Contract signature for the equipments	December 5th 2006
First discussions with financial institutions	February 2006
First contacts with PDD consultants	October 2007
Loan signature	January 2008
Contract signature for the construction works	January 2nd 2008
Contact with a PDD consultant	April 25th 2008
Contact with a DOE	June 12th 2008
Start of PDD elaboration	July 2008
Start of VER validation	November 2009
The commissioning of the power plant	28/05/2010
1st Monitoring Period	29/05/2010-30/06/2011
2nd Monitoring Period	01/07/2011-30/06/2012
3rd Monitoring Period	01/07/2012-31/03/2018
4th Monitoring Period	01/04/2018-28/05/2020
Second Crediting Period	29/05/2020-28/05/2030
5th Monitoring Period	29/05/2020-30/06/2023

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

Table 4 Ex-ante vs achieved emission reduction.

Vintage	Total Days	Expected amount of net GHG removals (t CO_2e)	Amount achieved during this monitoring period (tCO2e)	Expected net electricity generation (MWh)	Amount achieved during this monitoring period (MWh)	Difference (%)
29/05/2020-31/12/2020	217	96,708	71,865	196,191,781	145,793,349	-25.69%
01/01/2021-31/12/2021	365	162,665	106,602	330,000,000	216,265,390	-34.47%
01/01/2022-31/12/2022	365	162,665	140,675	330,000,000	285,388,360	-13.52%
01/01/2023 - 30/06/2023	181	80,664	94,936	163,643,836	192,597,370	17.69%
Total (29/05/2020-30/06/2023)	1128	502,702	414,078	1,019,835,616	840,044,469	-17.63%

1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: “Energy Industry – Renewable-/Non-renewable Sources”.

The installed capacity of the project is 91,40 MWe, thus it is a large-scale project activity.

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
Address	15 Temmuz Mah. Gülbahar Cad. No: 43 K: 6-7 34212 Güneşli / İstanbul
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
Email	cagla@ruzgardanismanlik.net

1.5 Project Start Date

The project start date is 29/05/2010 which is the first electricity generation date of the project.

1.6 Project Crediting Period

The project second crediting period is from 29 May 2020 to 28 May 2030. The Project's total crediting period is ten years renewable twice.
This monitoring period is covering its fifth crediting period. (29/05/2020-30/06/2023)

1.7 Project Location

The project is in the Eastern Black Sea Region of Turkey, within the province of Rize province. The project is on the İyidere river. The nearest settlement to the project site is Gürdere village.
The project area is located at 40º 50' 37''North latitudes and 40º 28' 31'' East longitudes coordinates.
The following figures show the project's location.

Figure 1 : Project Location

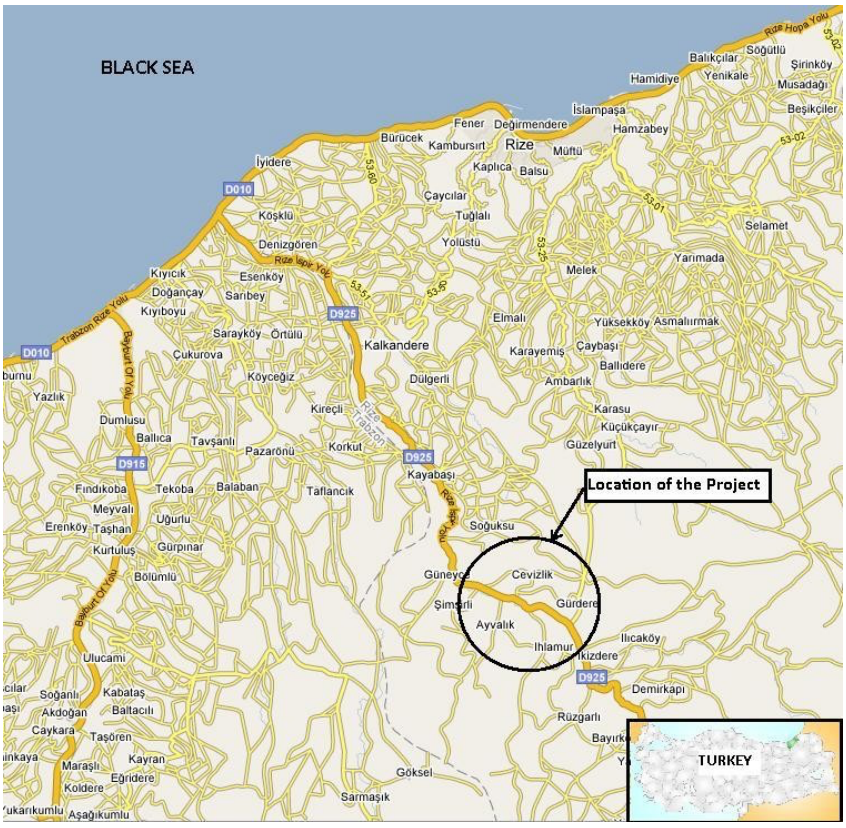


Figure 2 Google Earth screenshot of the coordinates

1.8 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002/version 20.0: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” was applied.[4]

For calculating the emission factor of the Turkish electricity grid,” Tool to calculate emission factor for an electricity system”, Version 07.0 was applied[5.]

The project’s additionality has been demonstrated using the version of “Tool for the demonstration and assessment of additionality, Version 07.0.0”[6]

TOOL11: "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" version 03.0.1.7

[4] https://cdm.unfccc.int/UserManagement/FileStorage/AG07ZJQ3EXD42LT5YV9HR16M8KINPO

[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

1.9 Participation under other GHG Programs

The project has not been registered or seeking registration under other GHG programs.[8]

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 commercialise the use of grid-connected renewable energy technologies and markets. Furthermore, the project demonstrates the viability of grid-connected hydro 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 840,038,022 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 21 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 414,078 tCO2e.

[8] The offical document has been provided to the VVB

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	Increase of renewable energy generated	During this monitoring period, the actualized net electricity generation is 840,038,022 MWh.	The amount of electricity produced during the 10 years of the project is 330,000,000 GWh.
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 disabilities, and equal pay for work of equal value	Increase of quality and quantitative employment in the region	Currently, 21 people are employed.	21 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 414,078 tCO2e.	The emission reduction amount over the 10 years of the project is 1,626.653 tCO2e.

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 20/02/2009.

All generated waste is handled according to the national legislations. Domestic solid wastes are kept in tanks and collected by Rize Special Provincial Administration. There is a packaged wastewater treatment plant fo the treatment of domestic wastewater generated within the context of the project activity.13 The wastewater is discharged in accordance with the Water Pollution Control Regulations. On the other hand, the impact on aquatic life is managed by the fish passage to provide an upstream and downstream movement. Life water control is carried out regularly by DSI 22. Regional Directorate.

Biodiversity: Necessary precautions are taken for the species under conservation by international conventions, if any found on the site. During the second crediting period, fish passages are regularly controlled by DSI, Nature Conservation, and Provincial Environment Directorate officials. In 2021, there was no inspection due to the pandemic. Streambed downstream and upstream water analyses are taken every 6 months and monitoring studies are carried out.

2.2 Local Stakeholder Consultation

During the registration of this project, a Local Stakeholder Consultation meeting was held on 16/03/2006 in the conference room of the culture-building in İkizdere district of Rize province. The purpose of the meeting was to inform the public and stakeholders about the plan and present and discuss the social and environmental impacts of the project. The invitation process for local stakeholder meeting was followed and associations/governmental offices were invited by invitation letters or calling. Apart from this kind of invitation other stakeholders were invited by local announcements such as announcements done in village coffeehouse and in the newspaper. In order to satisfy this requirement, announcements were published in two newspapers (Karadeniz Haber ve Vatan Gazetesi) -one national and one local- declaring the date, time, venue, and topic of the meeting. All the aspects of the project including the socio-economic and environmental aspects were presented to the participants by a project developer representative and were discussed by the stakeholders. Clarifications were requested and the overall response to the project was encouraging and positive. Details regarding the preparations, the meeting, and the suggestions/ comments that came afterward had been all provided in the PD of the first crediting period.

As for the second crediting period, an LSC Meeting is not required but ongoing communication with the local stakeholders continue and in place. Furthermore, a site visit including the stakeholder engagement procedure was conducted on 24/08/2023. The local people including the mukhtar of close village and power plant employees were interviewed. There was not any negative feedback from the locals on socio- economic and environmental issues and there is no need to take any further action. Furthermore, the mukhtar of Gündere village and local stakeholders are able to reach Plant Manager whenever they have any complaints, suggestions, or ideas about the project. Since mukhtars are the head of the village, they are the main contact person between the project owner and the local stakeholders. Mukhtars make sure that there's continuous communication between the two parties. In addition, a Complaint and Request form is available on the Project site. Stakeholders convey their requests and objections to the project owner by phone or individual application. All applications are recorded via the form. Project manager checks the comments in the book on a regular basis, and records responses. Furthermore, there is a "Public Relations Team" that has acted 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 works throughout the business to create a positive relationship based on open communication and mutual respect. Obtaining information, requests, and complaints has been handled and examined within a maximum of 7 working days.

There is no update or any change to the project design after the registration of the project.

2.3 AFOLU-Specific Safeguards

N/A

3. IMPLEMENTATİON STATUS

3.1 Implementation Status of the Project Activity

The project was started construction on 02.01.2008. The first unit started to generate electricity on 29 May 2010. 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 this Cevizlik HEPP project is carried out by Rüzgar Danışmanlık. During this 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

There are no project description deviations applied during this monitoring period.

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 CO2 emission factor for grid-connected power generation in year y
Source of data	Turkish Government Ministry of Energy and Natural Resources (https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik- sebekesi-emisyon-faktoru)
Value applied	0.492925
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 06.0 of TOOL 7: “Tool to calculate the emission factor for an electricity system” and published in "TURKEY NATIONAL ELECTRICITY NETWORK EMISSION FACTOR INFORMATION FORM".
Purpose of Data	To calculate the baseline emission.
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{Pj,y}$
Data unit	MWh/yr

<table>
<tr><td>Description</td><td>Quantity of net electricity generation supplied by the project plant/unit to the grid in year y</td></tr>
<tr><td>Source of data</td><td>Main source is the monthly meter readings records (EPİAŞ data, also known as PMUM in the past). Invoicing of the electricity production is carried out according to EPİAŞ data; thus, rendering the EPİAŞ data official source of electricity generation</td></tr>
<tr><td>Description of measurement methods and procedures to be applied</td><td>The produced and consumed electricity are continuously measured by the meters attached to the power plant. This continuous measurement is recorded in a monthly basis. These meters are sealed by TEIAS and intervention by the project proponent is not possible. Measurements is used for the calculation of the net electricity generation supplied by the project to the grid.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Continuous measurement and at least monthly recording.</td></tr>
<tr><td>Value monitored</td><td>
<table>
<tr><th>Vintage</th><th>Electricity supplied to the grid (kWh)</th><th>Electricity consumption from the grid (kWh)</th><th>Net electricity supplied to the grid [kWh]</th></tr>
<tr><td>29/05/2020-31/12/2020</td><td>146,163,449</td><td>370,100</td><td>145,793,349</td></tr>
<tr><td>01/01/2021-31/12/2021</td><td>216,940,940</td><td>675,550</td><td>216,265,390</td></tr>
<tr><td>01/01/2022-31/12/2022</td><td>285,964,420</td><td>576,060</td><td>285,388,360</td></tr>
<tr><td>01/01/2023-30/06/2023</td><td>192,827,130</td><td>229,760</td><td>192,597,370</td></tr>
<tr><td>Total (29/05/2020-30/06/2023)</td><td>841,895,939</td><td>1,851,470</td><td>840,044,469</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Meters are in compliance with the communiqué for Metering Devices to be used in Electricity Market.
The main and back meters was changed on 24/09/2019. The features of the new electricity meters are provided below:
<table>
<tr><th>Name</th><th>Serial Number</th><th>Brand –Model</th><th>Accuracy class</th></tr>
<tr><td>Main Meter</td><td>84260531</td><td>ITRON-SL761X071</td><td>Active 2019/C-2</td></tr>
</table>
</td></tr>
</table>

	Backup meter	84260532	ITRON-SL761X071	Active 2019/C-2
	Main Meter	84260533	ITRON-SL761X071	Active 2019/C-2
	Backup meter	84260534	ITRON-SL761X071	Active 2019/C-2

QA/QC procedures to be applied	Measurements are undertaken using energy meters. • According to the Article 2 of the Communiqué of Meters in Electricity Sector: 'The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained "Type and System Approval" certificate from the Ministry of Trade and Industry.' Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. • Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems' (Regulation) of Ministry states that: 'b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.' Therefore; periodic calibration of the meters have been done every 10 years[9]. • As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan. In addition to that the quantity of net electricity delivered to the grid will be cross checked with the meter reading records (OSF forms) provided to the company by TEIAS and internal reports provided to the head of the company by the plant manager. • The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import. Main source is the monthly meter readings records (EPİAŞ data, was known as PMUM in the past). Data from remote automatic meter reading system (OSOS) is used for crosschecking. Invoicing of the electricity production is carried out according to EPİAŞ data; thus, rendering the EPİAŞ data official source of electricity generation.
Purpose of the data	Calculation of net electricity supplied to the grid and thus baseline emissions
Calculation method	The net electricity is calculated by: a) Subtracting self-consumption value from gross generation value for each month to find the net electricity supplied to the grid.

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

	b) Adding up all monthly net electricity values to calculate the total net electricity supplied to the grid during the monitoring period. c) Multiplying the total net electricity value with the CM emission factor.
Comments	NA

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.

The Project Proponent is responsible to implement the monitoring report according to the UNFCCC rules and procedures. 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.

The main and spare meter readings are recorded monthly remote automatic meter reading system and cross-checked whether calibration is required. The meter (ACE SL7000 series developed for Turkey) which is used in the powerhouse is produced by Itron and is in line with the EMRA requirements for electricity meters. (Please find the information on the technical specifications of the meter and its declaration of conformity on the product website.[10] Also, the Itron meter fully conforms to or exceeds all relevant IEC standards for electronic metering

[10] https://www.itron.com/na/solutions/product-catalog/ace-sl7000

equipment (IEC 62052 and IEC 62053)[11]. Re-calibration periods are defined by national metrology institutes country by country and in Turkey, this period is defined as 10 years according to the Regulation of Metering and Testing of Metering Systems paragraph b) of Article 9. The article states that Periodic tests of meters of electricity, water, coal gas, natural gas and current, and voltage transformers are done every 10 years.

Data has been 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.

Besides, in order to measure the electricity production figure of the plant accurately, there will be two sets of meters in the powerhouse. One 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. This calibration process is done by another third party under the control of TEIAS. The company is not responsible for the calibration of the meters in Turkey according to the local standards.

Information related to the electricity meters can be found in the table given below.

Table 5 Electricity Meter Information

Brand	Type	Class	Serial Number
Itron	SL761X071	C-2	84260531
			84260532
			84260533
			84260534

Operational and Management Structure

As described before, there are two main factors important for the calculation of emission reductions. The only relevant data that have to be monitored is only net electricity generation ($EG_{facility,y}$) per year. Since project emission is zero no additional monitoring is required. The generation data are subject to the strict internal quality control systems of both parties.

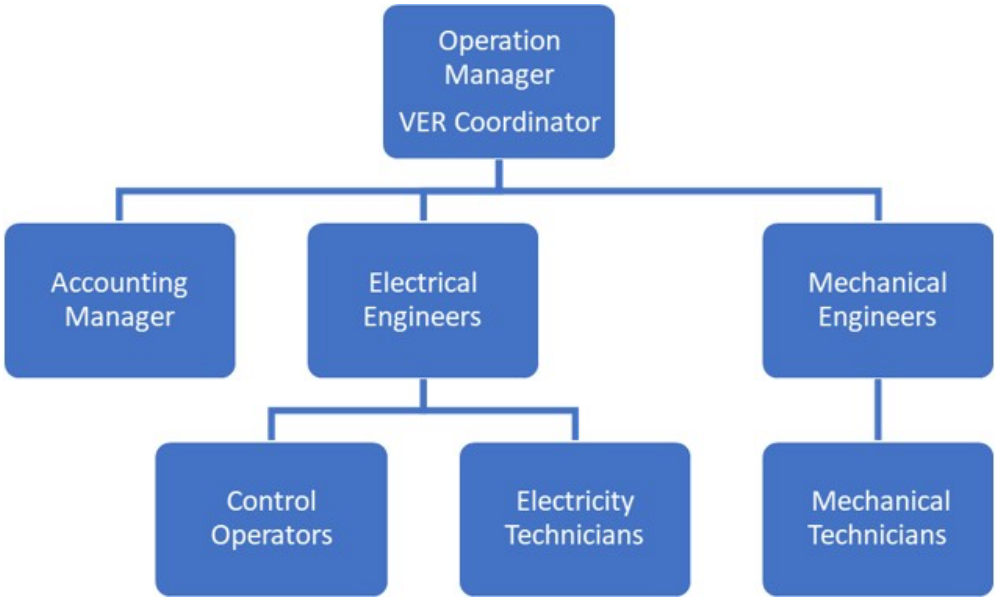
[11] https://www.itron.com/-/media/feature/products/documents/brochure/ace-sl7000-en-web.pdf

The monthly meter reading documents are stored by Sanko Enerji Sanayi Ve Ticaret. A.S. and TEİAŞ. The settlement notification, which is issued by TEİAŞ and includes the meter reading data, is stored on a TEİAŞ file server and accessible for Sanko Enerji Sanayi Ve Ticaret. A.S. via a secured website. The meters themselves can always be read as plausibility check for verification. The other important parameter is the emission factor. It is approved according to strict quality control parameters from an independent external party. With this, no additional structures or processes must be implemented to insure the availability and high quality of the necessary data for monitoring.

The Project Manager is responsible for all issues related to the project and operation of the plant. On the other hand, plant manager is responsible for daily operational processes of the plant, management of the plant personnel, and other technical and management issues for the plant. Electrical Engineers undertake the specific actions required by the monitoring plan, i.e., they measure the electricity generation, the electricity supplied to the Turkish grid by the power plant, the electricity imports and the amount of fuel consumed, if fuel is consumed. Mechanical Engineers ensure that all the instrumentations and devices to perform the monitoring work properly. Administrative Officer acts as the point of contact for all employees, providing administrative support and managing their queries. In total, 21 employees are working for the Project Activity.

Roles and responsibilities have been summarized in the following chart.

Figure 3 Operation and Management Diagram



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:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$

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 VCS 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” (tCO_2/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", the applicable grid emission factor value to calculate the emission reductions of the Hydro power plant project(other renewables) is 0.492925 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 : $EF_{grid,BM,y}$: 0.4153

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; $EF_{grid,OM,y}$: 0.7258

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

$$EF_{grid,CM,y} = EF_{grid,0M,y} * w_{0M} + EF_{grid,BM,y} * w_{BM} \quad \textbf{(2)}$$

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)

$EF_{Grid,CM,y}$ = 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

CM=(OM*0.25 + BM*0.75)	0.492925
(0.7258 *0.25) + (0.4153 * 0.75)	

5.2 Project Emissions

There is no project emission resulting from the reservoir area of the Project Activity as the power density of the project is greater than 10W/m2.

And project emissions are calculated as follows.

$PE_y = PE_{EF,y} + PE_{GP,y} + PE_{HP,y}$

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 (tCO2e/yr)

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:

$PE_{EF,y} = 0$

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 14,091 m2, 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 = 92,960,000 W/14,091 m2

PD = 6,597 W/m^2
PD > 10 W/m2

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

Hence,

PEy= 0

5.3 Leakage

No leakage emissions are considered. This is in line with the registered PDD and applicable methodology ACM0002 version 20.0.0. Therefore, the leakage from the Project Activity is zero.

5.4. Net GHG Emission Reductions and Removals

Also, according to ACM0002 Version 20 the emission reductions in year “y” should be calculated as the following formula:

$$ERy = BEy - PEy - LEy$$

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).

LEy = Leakage emissions in year y (t CO2/yr).

y = Refers to a given period

Since PEy and LEy are assumed to be 0, emission reductions are equal to baseline emissions.

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)
29/05/2020-31/05/2020	3,103	0	0	3,103
June 2020	26,812	0	0	26,812
July 2020	13,980	0	0	13,980
August 2020	10,887	0	0	10,887
September 2020	5,407	0	0	5,407
October 2020	3,476	0	0	3,476
November 2020	4,868	0	0	4,868
December 2020	3,331	0	0	3,331
Total 2020 Vintage (29.05.2020-31.12.2020)	71,865	0	0	71,865
January 2021	2,731	0	0	2,731
February 2021	2,730	0	0	2,730
March 2021	4,824	0	0	4,824
April 2021	17,923	0	0	17,923
May 2021	22,734	0	0	22,734
June 2021	9,778	0	0	9,778
July 2021	6,011	0	0	6,011
August 2021	8,618	0	0	8,618
September 2021	7,597	0	0	7,597

October 2021	11,974	0	0	11,974
November 2021	6,265	0	0	6,265
December 2021	5,416	0	0	5,416
Total 2021 Vintage (01.01.2021-31.12.2021)	106,602	0	0	106,602
January 2022	4,252	0	0	4,252
February 2022	4,553	0	0	4,553
March 2022	5,352	0	0	5,352
April 2022	25,565	0	0	25,565
May 2022	27,176	0	0	27,176
June 2022	31,835	0	0	31,835
July 2022	16,093	0	0	16,093
August 2022	6,040	0	0	6,040
September 2022	4,705	0	0	4,705
October 2022	6,448	0	0	6,448
November 2022	4,921	0	0	4,921
Decamber 2022	3,735	0	0	3,735
Total 2022 Vintage (01.01.2022-31.12.2022)	140,675	0	0	140,675
January 2023	2,993	0	0	2,993
February 2023	2,841	0	0	2,841
March 2023	11,152	0	0	11,152

April 2023	17,697	0	0	17,697
May 2023	29,083	0	0	29,083
01/06/2023-30/06/2023	31,170	0	0	31,170
Total 2023 Vintage (01.06.2023-30.06.2023)	94,936	0	0	94,936
Total (29.05.2020-30.06.2023)	**414,078**	**0**	**0**	**414,078**

Year	Ex-ante emissions reductions/removals	Achieved emissions reductions/removals	Percent difference	Justification for the difference
29/05/2020-31/12/2020	**96,708**	**71,865**	**-25.69%**	Approximately only last 6 months of the year. This is not correct compare for Hydropower Project
2021	**162,665**	**106,602**	**-34.47%**	The 2021 was a dry year for this district
2022	**162,665**	**140,675**	**-13.52%**	The 2022 was a dry year for this district.
01/01/2023-30/06/2023	**80,664**	**94,936**	**17.69%**	Only first 6 months of the year. This is not correct compare for Hydropower Project
29/05/2020-30/06/2023	**502,702**	**414,078**	**-17,63%**	This is lower expectation value because of the different weather conditions of this monitoring period