



MONITORING REPORT OF SANİBEY DAM & HYDROPOWER PLANT PROJECT

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Sanibey Dam and Hydroelectric Power Plant (Sanibey Dam and HEPP) is a registered Project under Verra Registry with ID Number 1100. The project activity involves the installation of a 310.66 MWe also energy structures consisting of two penstocks and a power plant building including two units having outputs of 155.33 MWe each are located on the downstream of the dam body. The plant is located on the Seyhan River basin, in Turkey Eastern Mediterranean Region.

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 966.53 GWh/year of electricity to supply the national grid using a renewable hydropower resource. 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 446,150 tons of CO₂e (tCO₂e) and a total of 4,461,500 tCO₂e over 10 years of the second crediting period. This monitoring period is from 2 December 2020 to 30 November 2023. During this monitoring period, the actualized net electricity generation is 1,926,150.553 MWh. The total emission reduction of this monitoring period is 889,111 tCO₂e.

The project was commissioned in two phases; the first phase started on 2nd December 2010 while the second phase started on 26th January 2011. To generate energy, a dam, having a body of concrete faced rockfill and a HEPP have been constructed. Generally describing; a spillway is located on the left bank of the riverbed; also, energy structures consisting of two penstocks and a power plant building including two units having outputs of 155.33 MWe each are located on the downstream of the dam body. Besides, diversion structures containing two tunnels one of which is used as a sluiceway outlet and the second one is containing valve house are located on the left bank. The turbine and generator manufacturer are Alstom. The manufacturer is a French company, acclaimed for its integrated power plants, power production services, and air quality control systems. Alstom has been selected as the equipment provider because of its reliable quality products and technology, which is a grid-friendly technology with low maintenance needs as well as low noise and low environmental impacts. Within the scope

of the project activity, there has been no dam or any new reservoir formation that has an impact on the project emissions during 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.

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

Table 1: Technical specifications of the project

Dam and Cofferdams		
Type		Concrete Faced Rock Fill
Height above Thalweg	m	105
Height above Foundation	m	130
Crest Width	m	8
Crest Length	m	400
Crest Elevation	m	240
Turbines		
Brand		ALSTOM POWER
Type		Vertical axis Francis
Number of Units		2
Unit Capacities (Each)	MWm/MWe	158.5/155.33
Total Installed Capacity	MWm/MWe	317/310.66
Serial Numbers of Water Turbins		AHT YED 01 / AHT YED 02
Transformer		
Type		Outdoor type, oily, three phased
Number of Units		3
Power of a Unit	MVA	175
Voltage	kV	14.4/380
Generator		
Brand		ALSTOM
Number of Generators		2

Power	MWA	175
Type		Three Phases Y 2 VG 175-167
Serial Number		2VG 175-167
Rated Voltage	V	14400
Rated Current	A	7016
Frequency	Hz	50

Table 2 Project Timeline

Milestone	Date
Stakeholder consultation	12/12/2006
Financial analysis of the project	05/12/2006
First VER consideration	05/12/2006
Investment Decision	25/12/2006
Feasibility report	11/2007
Contract signature for the construction-point of no return	01/07/2007
Start of construction	01/07/2007
EIA approval (by the Ministry of Environment and Forestry)	06/06/2007
Contract signature for the equipment's	20/03/2008
Loan signature	03/09/2008
Contract with a PDD consultant	01/02/2011
Contact with a DOE	08/2011
Commissioning date of the first unit	02/12/2010
Commissioning date of the second unit	26/01/2011
1st Monitoring Period	02/12/2010-31/05/2012
2nd Monitoring Period	01/06/2012-28/02/2018
3rd Monitoring Period	01/03/2018-01/12/2020
2 nd Crediting Period	02/12/2020-01/12/2030
4 th Monitoring Period	02/12/2020-30/11/2023

Table 3 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 (%)
02/12/2020-31/12/2020	30	36,670	16,137	79,440.822	34,958,840	-56
01/01/2021-31/12/2021	365	446,150	271,702	966,530.000	590,610,946	-39
01/01/2022-31/12/2022	365	446,150	346,536	966,530.000	750,728,172	-22
01/01/2023-30/11/2023	334	408,258	254,735	884,441.151	551,852,595	-38
Total	1094	1,337,228	889,111	2,896,941.973	1,928,150,553	-33

Considering the difference between the amount achieved in this monitoring period and the ex-ante amount, lower than expected precipitation resulted in lower production. According to the official records published by the General Directorate of Meteorology, annual areal precipitation in the Black Sea Region, where the project is located, is lower than normal. Therefore, emission reductions for during this monitoring period lower than expectations.

Audit type	Period	Program	Validation/verification body name	Number of years
<i>Validation</i>	02/12/2010-01.12.2020	VCS	Bureau Veritas	Ten years
<i>1st Verification</i>	02/12/2010-31/05/2012	VCS	RINA	One year and seven months
<i>2nd Verification</i>	01/06/2012-28/02/2018	VCS	Re-carbon	Five years and eight months
<i>3rd Verification</i>	01/03/2018-01/12/2020	VCS	Re-carbon	Two years and nine months

<i>Re-validation-Second Crediting period</i>	02/12/2020-01/12/2030	VCS	Applus	2 nd Ten years
<i>4th Verification</i>	02/12/2020-30/11/2023	VCS	RINA	Approximately 3 years

1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: “Energy Industry (Renewable/Nonrenewable Sources”. Sanibey Dam and HEPP is not a grouped project. And this hydropower plant’s installed capacity is 310.66 MWe and thus qualifies under large-scale project. There is no project activity type. (NA-Since this isn’t an AFOLU project, the category is not applicable).

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
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1.5 Project Start Date

The start date of the project activity is 02.12.2010 which is the date when the project is commissioned, and the first electricity generation.

1.6 Project Crediting Period

The first crediting period was from 02.12.2010 until 01.12.2020 with two times renewable crediting period of 10 years. The second crediting period is between 02.12.2020 and 01.12.2030. This is 4th monitoring period since 2010 and first monitoring period of second crediting period.

1.7 Project Location

The Sanibey Dam and HEPP Project site is located in the Seyhan river basin in Turkey, in Eastern Mediterranean Region, in the boundaries of Imamoglu and Aladag district, Adana province; the project is located between 37°24' - 37°38' north latitudes and 35°25' - 35°35' east longitudes.

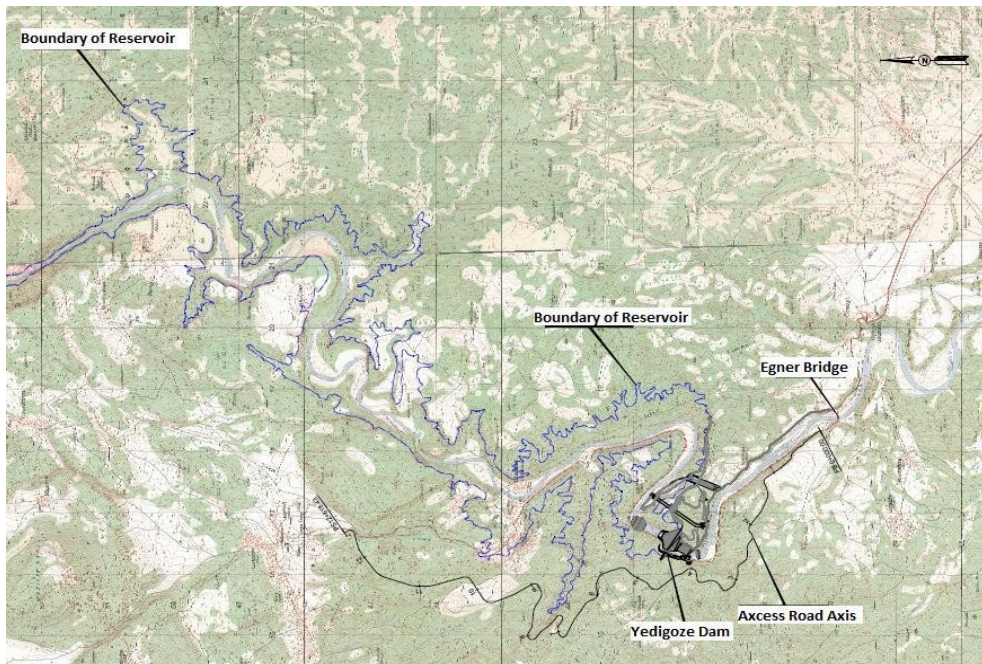
Figure 1 Location of the project



Figure 2 Satellite image of the Project



Figure 3 Sanibey Dam and Hydroelectric Power Plant Layout



1.8 Title and Reference of Methodology

The approved baseline and monitoring methodology selected for the proposed project activity is: ACM0002 version 21.0 “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

TOOL07: “Tool to calculate the emission factor for an electricity system” version 7.0.

1.9 Participation under Other GHG Programs

Sanibey Dam and HEPP has not registered with any I-REC or environmental credit program.¹

¹ 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 does 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 hydro plants 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. The project is expected to generate 966.53 GWh of clean energy per annum. During this monitoring period, the actualized net electricity generation is 1,926,150.553 MWh. The net generation has been calculated as below:

Net Generation (MWh) = Electricity Supplied to the Grid (MWh)– Electricity Consumption from the Grid (MWh)

Both electricity supplied to the grid and electricity consumption from the grid has been identified and approved by EPIAS. By means of electricity generation through hydropower, Sanibey Dam and HEPP contributes to the following target 7.2 “By 2030, increase substantially the share of renewable energy in the global energy mix.

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 30 personnel during the operation phase of the project by contributing to the following indicators 8.5.2 “Unemployment rate, by sex, age and persons with disabilities” and following target: “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”

SDG-13 Climate Action

The project contributes to the Sustainable Development Goal, Climate Action. The project leads to an emission reduction of 446,150 tCO₂ per annum. The project contributes to the following indicator 13.3.2 “Number of countries that have communicated the strengthening of institutional, systemic and individual capacity- building to implement adaptation, mitigation, and technology transfer, and development actions” and to the following target 13.3 “Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning” During this monitoring period, the actualized emission reduction is 889,111 tCO₂e.

Table 4: 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 1,926,150.553 MWh.	The amount of electricity produced during the lifetime of the project is 9,665,300 GWh 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 30 people are employed	30 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 889,111 tCO _{2e} .	The emission reduction amount over the second ten year of the project lifetime is 4,461,500 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 06/06/2007. Throughout its construction and operational phase during its first crediting period, Sanibey Dam and HEPP has not created any harm neither environmentally nor socio-economically as also indicated in the project documents belonging to its first crediting period. For its second crediting period, the Project Owner has continued to ensure the continuation of contributions to the socio-economic development in the project area. For instance: Each year, 10 university students are given education scholarships.

2.2 Local Stakeholder Consultation

The announcements, the meeting was held on December 12th, 2006, in the conference room of the Akoren Municipality building in Aladag district of Adana province. The meeting which started at 14:00 under the chairmanship of the Adana Provincial Directorate of Environment and Forestry received a broad participation. 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. It was observed that public and local authorities gave support for the implementation of the Sanibey Dam and HEPP Project. Therefore, during the registration of the project, a stakeholder meeting was not planned. Nevertheless, mukhtars of local villages have been interviewed and continuously informed about the Project for understanding the general perspective about the HEPP. 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.

Besides that, the contact details of the relevant plant responsible exist at the mukhtars of Eğner, Uluçınar and Boztahta, the project owner and local community are always in touch. The project owner regularly checks with these Mukhtars if any complaint, suggestions, or a request exists. Any complaint or need from the local community could directly be received by the project owner and appropriate contributions or improvements are made to the local community. There is an active grievance mechanism. 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.

During this monitoring period, a site visit including the stakeholder engagement procedure will be conducted on 25/12/2023. There were not any negative feedbacks on socio- economic and environmental issues by the locals during these 13 operation years, there is no need to take any further action for this monitoring period between 02/12/2020 and 31/11/2023. There is no update or any change to the project design after the registration of the project. The grievance mechanism continues to work and will continue throughout the whole crediting period.

2.3 AFOLU-Specific Safeguards

NA

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The construction of the project started on 01.07.2007. The first unit started operation on 2 December 2010. The second unit was commissioned on 26 January 2011. The project activity was initially developed under the name of “Yedigoze Dam & HEPP” by Yedigoz e Elektrik Uretim ve Ticaret A.S. In parallel with the demand of executive board members, both the company name and consequently the name of the project had been changed to “Sanibey Baraji Elektrik Uretim ve Ticaret A.S.” and “Sanibey Dam & HEPP” respectively. The board decision was taken on 08/06/2011 with decision number 13. The Board decision was later published in the Turkish Trade Registry Gazette on 16/08/2011 (No: 7881). Finally, Sanibey Baraji Elektrik Uretim ve Ticaret A.S. has been transferred to SANKO ENERJİ SANAYİ VE TİCARET A.S. on 28/09/2012. Similarly, the shareholder structure was changed on 28/09/2012 and the Project has been transferred to SANKO ENERJİ SANAYİ VE TİCARET A.S. The sole Project Proponent is SANKO ENERJİ SANAYİ VE TİCARET. A.S. And the carbon consultant is Rüzgar ve Karbon Enerji Danışmanlık Sanayi Ticaret Limited Sirketi for this 4th monitoring period. The operation of the project activity during this monitoring period, there is no unexpected events that may impact the GHG emission reductions or removals and monitoring.

3.2 Deviations

3.2.1 Methodology Deviations

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

3.2.2 Project Description Deviations

There are no project description deviations applied during this monitoring period. The current situation regarding the project owner and other organizations involved in the project has been included in Section 3.1.

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". ²
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{P,y}$
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	EPIAŞ 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 are used for the calculation of the net electricity generation supplied by the project to the grid.

² <https://enerji.gov.tr//Media/Dizin/EVCED/tr/CevreVeiklim/IklimDeğişikliği/TUESEmisyonFktr/Belgeler/Bform2020.pdf>

Frequency of monitoring/recording	Continuous measurement, monthly recording			
Value applied	Vintage	Electricity supplied to the grid (kWh)	Electricity consumption from the grid (kWh)	Net electricity supplied to the grid [kWh]
	02/12/2020-31/12/2020	35,112,487	153,646	34,958,840
	01/01/2021-31/12/2021	590,425,880	1,814,934	588,610,946
	01/01/2022-31/12/2022	752,442,732	1,714,560	750,728,172
	01/01/2023-30/11/2023	553,520,911	1,668,316	551,852,595
	Total	1,931,502,010	5,351,456	1,926,150,553
Monitoring equipment	The model of meter (ACE SL7000 series developed for Turkey) which is used in the powerhouse is produced by Actaris and is in line with the EMRA requirements for electricity meters. The meters used for the project activity are EMH LZQJ-XC. The serial numbers are 8923679 and 8923681 (main meters) and 8923680 and 8923682 (backup meters). The accuracy class of the meters is 0.2s.			
	Meters			
	Brand	EMH		
	Type	LZQJ-XC		
	Accuracy Class	0.2s		
	Serial Number of Main Meters	Main meter 1: 8923679 Main meter 2: 8923681		
	Serial Number of Backup Meters	Backup meter 1: 8923680 Backup meter 2: 8923682		
	Date of installation of meters	22/10/2019		
	Date of initial calibration of meters	22/10/2019		
	Date of TEIAS test of meters	19/12/2020		

	Date of last TEIAS test of meters	12/11/2022
QA/QC procedures to be applied	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. EPIAŞ records are main source, TEIAS 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. According to System Usage Agreement, TEIAS has made test for meters every 2 years.	
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 reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir 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	Once in each monitoring period	
Value applied	14,299,206	
Monitoring equipment	Topographical surveys, maps, satellite pictures	
QA/QC procedures to be applied	The readings have done during the period when the water flow is high to have the largest reservoir area and to satisfy the conservative principles.	
Purpose of data		
Calculation method	N/A	
Comments	-	

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	Supplier information on the equipment.
Frequency of monitoring/recording	Once in each monitoring period
Value applied	310.66
Monitoring equipment	N/A
QA/QC procedures to be applied	Supplier information on the related equipment and the existence of the equipment has been checked. Also, this information may be checked from EMRA (Energy Market Regulatory Authority) website.
Purpose of data	-
Calculation method	N/A
Comments	-

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.

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.

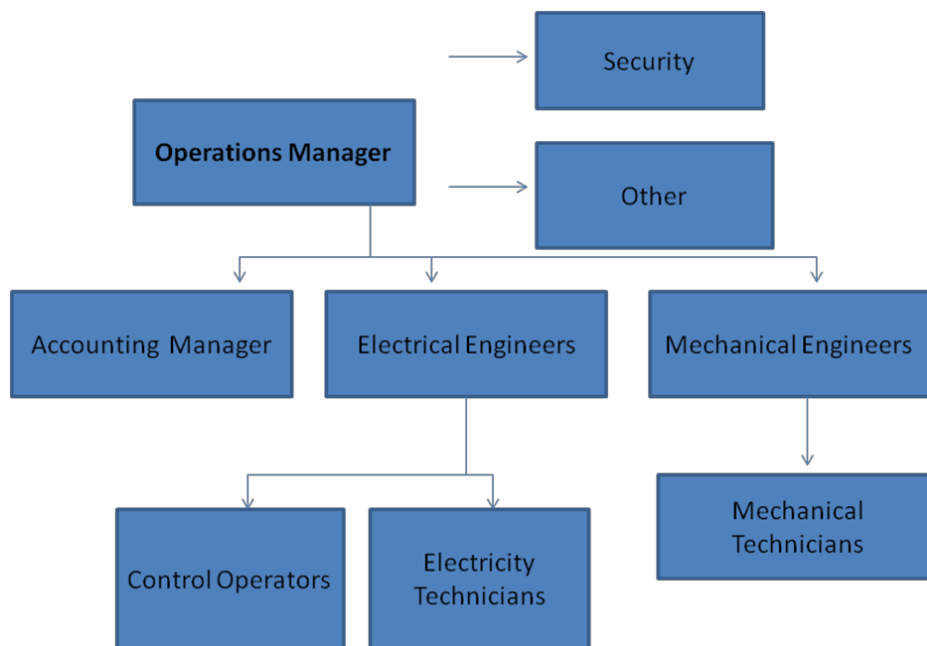
The monitoring has been performed in-house by the project proponent:

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. Mechanical Engineers have ensured that all the instrumentations and devices to perform the monitoring are working properly.
3. Accounting Manager has overseen providing the electricity sales receipts to the Operations Manager of the plant.
4. Operations Manager has been the VER coordinator. He oversees:

- 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 electrical engineers and the accounting manager. He will also record this operation properly to be able to provide it to the VVB during the verification process.
- d) Calculating and report the emission reductions, and
- e) Organizing in-house seminars to inform and train the company staff to the monitoring procedures.

Please refer to Figure 4 where the site organizational chart is presented.

Figure 4 : Organizational Chart



The monitoring report has been submitted at the end of every year for the verification of VVB. The report has covered 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. The meter which has been used in the powerhouse is produced by EMH and is in line with the EMRA requirements for electricity meters. Also, the electricity meter fully conforms to or exceeds all relevant IEC standards for electronic metering equipment. The electricity meter ensures long term stability of the accuracy and achieves a maintenance free design which makes unnecessary the re-calibration of the meter. However, re-calibration periods are defined by national metrology institutes country by country and in Turkey this period is defined as 10 years. Besides, to measure the electricity production figure of the plant accurately, there are 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 have been calibrated without waiting for the periodic calibration date. (TEIAS System Usage Agreement). 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 does not interfere with the calibration of the meters in Turkey according to the local standard.

On the other hand, the emission reductions have been calculated according to the measurements of the main electricity meter since the electricity production invoices are made out based on this meter. EPIAŞ records are main source, TEİAŞ meter readings are cross-check source. The project developer is not responsible for the transmission losses; therefore, transmission losses are not included. During each monitoring period, the invoices will be presented to the VVB, together with the calculation details.

The Electrical Engineers have received 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. One of the personnel from the team have been giving the mentioned training once a year. If new personnel are hired, they have to followed 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 has established 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:

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

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

$EF_{grid, CM, y}$ value is fixed as 0.4616 tCO₂/MWh for during the crediting period.

Calculation of $EG_{PJ, y}$

Since the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity:

$$EG_{PJ, y} = EG_{facility, y}$$

Where:

$EG_{PJ, y}$: 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)

$EG_{facility, y}$: Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).

Baseline Emission:

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

$$BE_y = 1,926,150.553 \cdot 0.4616 = 889,111 \text{ tCO}_2e$$

5.2 Project Emissions

Project emissions are calculated as follows:

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

Where:

PE_y = Project emissions in year y (t CO₂e/yr)

$PE_{FF, y}$ = Project emissions from fossil fuel consumption in year y (t CO₂/yr)

$PE_{GP, y}$ = Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO₂e/yr)

$PE_{HP, y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO₂e/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:

$$PE_{FF, y} = 0$$

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 is fed back to the river through the tailrace canal. The diversion structure results in a regulation pond with a surface area of 14,299,206 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:

$$PD = 310,660,000 \text{ W} / 14,299,206 \text{ m}^2$$

$$PD = 21.73 \text{ W/m}^2$$

$$PD > 10 \text{ W/m}^2$$

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

5.3 Leakage Emissions

No leakage emissions are considered. This is in line with the registered PDD and applicable methodology ACM0002 version 21.0.0. Therefore, the leakage from the Project Activity is zero.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

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

$$ER_y = BE_y - PE_y$$

Where:

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

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

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

y = Refers to a given period

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

Total installed capacity = 310.66 MW

Net electricity delivered to grid ($EG_{PJ,y}$) = 966.53 GWh / yr

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

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

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} = 1,926,150.553 \cdot 0.4616 = 889,111 \text{ tCO}_2\text{e}$$

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
02/12/2020-31/12/2020	16,137	0	0	16,137	0	16,137
01/01/2021-31/12/2021	271,702	0	0	271,702	0	271,702
01/01/2022-31/12/2022	346,536	0	0	346,536	0	346,536
01/01/2023-30/11/2023	254,735	0	0	254,735	0	254,735
TOTAL (02/12/2020-30/11/2023)	889,111	0	0	889,111	0	889,111

<u>Year</u>	<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
02/12/2020-31/12/2020	36,670	16,137	-56	Only last 30 days of the year. This is not correct compare with whole year production for Hydropower Project
01/01/2021-31/12/2021	446,150	271,702	-39	Annual areal precipitation in the Mediterranean Region is lower than normal.
01/01/2022-31/12/2022	446,150	346,536	-22	Annual areal precipitation in the Mediterranean Region is lower than normal.
01/01/2023-30/11/2023	408,258	254,735	-38	11 months of areal precipitation in the Mediterranean Region is lower than normal.
TOTAL (02/12/2020-30/11/2023)	1,337,228	889,110	-34	Areal precipitation in the Mediterranean Region is lower than normal.