



**Verified Carbon
Standard**

THE YOKUSLU-KALKANDERE HYDROELECTRIC POWER PLANT

Document Prepared by GAIA Climate Consultant

Project Title	The Yokuslu- Kalkandere Hydroelectric Power Plant
Version	04
Report ID	SNK22
Date of Issue	31/10/2022
Project ID	905
Monitoring Period	01/09/2017 to 31/12/2020
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CONTENTS

- 1 PROJECT DETAILS 3**
 - 1.1 Summary Description of the Implementation Status of the Project3
 - 1.2 Sectoral Scope and Project Type6
 - 1.3 Project Proponent6
 - 1.4 Other Entities Involved in the Project6
 - 1.5 Project Start Date6
 - 1.6 Project Crediting Period7
 - 1.7 Project Location7
 - 1.8 Title and Reference of Methodology8
 - 1.9 Participation under other GHG Programs.....8
 - 1.10 Other Forms of Credit8
 - 1.11 Sustainable Development Contributions8

- 2 SAFEGUARDS 12**
 - 2.1 No Net Harm 12
 - 2.2 Local Stakeholder Consultation 12
 - 2.3 AFOLU-Specific Safeguards 13

- 3 IMPLEMENTATION STATUS..... 13**
 - 3.1 Implementation Status of the Project Activity 13
 - 3.2 Deviations 14
 - 3.3 Grouped Projects 15

- 4 DATA AND PARAMETERS 15**
 - 4.1 Data and Parameters Available at Validation..... 15
 - 4.2 Data and Parameters Monitored 19
 - 4.3 Monitoring Plan..... 23

- 5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS..... 28**
 - 5.1 Baseline Emissions..... 28
 - 5.2 Project Emissions 29
 - 5.3 Leakage 30
 - 5.4 Net GHG Emission Reductions and Removals 30...31

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Yokuslu-Kalkandere Hydroelectric Power Plant (Kalkandere HEPP) consists of the construction of a greenfield one weir and two run-of-river hydroelectric power plants located in the Iyidere river basin, in Turkey's Eastern Blacksea Region.

The objective of the project is to generate electricity and supply it into the public grid. 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 tapping the significant hydropower potential in the region. Total installed capacity of the project is 41.19 MWm/40.24 MWe.¹ The project has 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. The water diverted from the weir is transferred to "Kalkandere Powerhouse" through a tunnel. The water is transferred to "Kizilagac Powerhouse" through another tunnel. The total installed capacity of this plant is 5.2 MWe (2 x 2.60 MWe). 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.

This monitoring period is from 01/09/2017 to 31/12/2020. During this monitoring period, the actualized net electricity generation is 470,651.10 MWh. The total emission reduction of this monitoring period is 263,092 tCO₂e. Please see the vintage-based comparison of expected and achieved emission reductions for this monitoring period:

Vintage	Total Days	Expected amount of net GHG removals (t CO ₂ e)	Amount achieved during this monitoring period (tCO ₂ e)	Expected net electricity generation (MWh)	Amount achieved during this monitoring period (MWh)	Difference (%)
01/09/2017-31/12/2017	122	33,454	20,114	59,846.85	35,983.42	-%40

¹ The installed capacity figure is 35.04 MWe (3 x 11.68 MWe) for Kalkandere Power House and 5.2 MW (2 x 2.60 MWe). The total installed capacity of the project is 40.24 MWe. The Generation Licence has been submitted to the DOE.

Vintage	Total Days	Expected amount of net GHG removals (t CO ₂ e)	Amount achieved during this monitoring period (tCO ₂ e)	Expected net electricity generation (MWh)	Amount achieved during this monitoring period (MWh)	Difference (%)
01/01/2018-31/12/2018	365	100,089	88,771	179,050.00	158,804.06	-%11
01/01/2019-31/12/2019	365	100,089	73,834	179,050.00	132,082.57	-%26
01/01/2020-31/12/2020	365	100,089	80,373	179,050.00	143,781.05	-%20
Total	1,217	333,721	263,092	596,996.85	470,651.10	-%21

Table 1: Ex-ante vs achieved emission reduction

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

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

Property	Unit	Amount
Powerhouse		
Length	m	46.00
Width	m	17.40
Project Discharge	m ³ /s	50.00
Tailrace Elevation	m	119.00
Turbine Brand		VOITH
Turbine Type		Horizontal Axis Francis
Turbine Axis Level	m	117,50
Gross Head	m	100.20
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 Project

Kizilagac Power Plant:

Property	Unit	Amount
Powerhouse		
Length	m	34.00
Width	m	28.22
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

Table 3: Technical specifications of the Kizilagac Power Plant

1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: “Energy Industry – Renewable-/Non-renewable Sources”². 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.S.
Contact person	Ferudun İtergen
Title	Deputy General Manager
Address	15 Temmuz Mah, Gülbahar Cad, No:43, 34212 Istanbul / Turkey
Telephone	+90 212 410 45 00
Email	ferudun.itergen@sankoenerji.com.tr

1.4 Other Entities Involved in the Project

Organization name	GAIA Climate Consultant
Role in the Project	Project Coordinator
Contact person	Gamze Karaca
Title	Carbon Consultant
Address	Maslak Meydan Sk. No:1 Beybi Giz Plaza Kat:26 Maslak/Istanbul
Telephone	+90212 2240450
Email	gkaraca@gaiacclimate.com

1.5 Project Start Date

The project start date is 30/12/2010 which is the commissioning date of the project.

² <https://cdm.unfccc.int/DOE/scopes.html>

1.6 Project Crediting Period

The project crediting period is from 01 January 2011³ to 31 December 2020. The Project's total crediting period is ten years renewable twice.

This monitoring period is covering its first crediting period. (01/09/2017-31/12/2020)

1.7 Project Location

The Project site is located in Turkey, in Eastern Black Sea, in the center of the Kalkandere district at western part of Rize province. It is also located in İyidere river basin. The nearest settlement to the project site is Gürdere village.

The project is in the order from headwaters thorough the downstream, Tozköy, Dereköy and Cevizlik dams basin. Powerhouse of the project are located as following: Kalkandere Powerhouse between 40° 54' 26" North latitudes and 40° 25' 01" East longitudes.



Figure 1: Project's location

³ The first commissioning date of the project is December 30, 2010. However, in line with registered PDD and the first monitoring report, the crediting period is started on the first day of 2011.

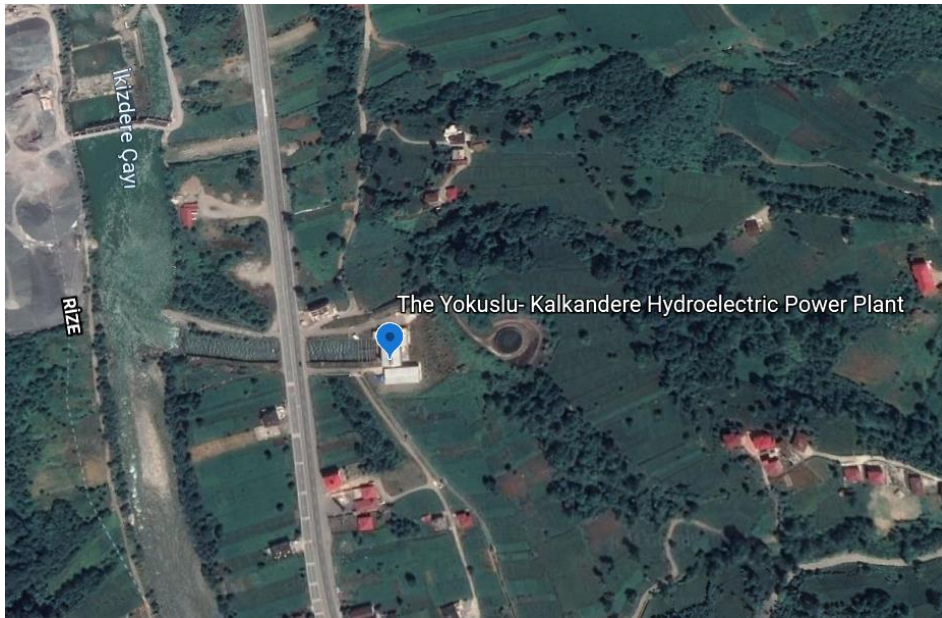


Figure 2: Project Location⁴

1.8 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources, Version 12”⁵ was applied. In addition, as referred in the methodology, “Tool to calculate the emission factor for an electricity system, Version 02”⁶ was applied.

1.9 Participation under other GHG Programs

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

1.10 Other Forms of Credit

The project has not created another form of Credit..

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 wind farms which can support improved energy security, improved

⁴ Google Earth screenshot of the coordinates has been provided to the DOE.

⁵ <https://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L/view.html>

⁶ <https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v2.pdf>

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 470,651.10 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 23 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 263,092 tCO₂e.

Table 1: 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 470,651.10 MWh.	The amount of electricity produced during the life of the project is 1,481,359.89 MWh.

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, 23 people are employed.	23 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 263,092 tCO ₂ e.	The emission reduction amount over the life of the project is 830,238.52 tCO ₂ e.

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

All generated waste is handled according to the national legislations. Waste oil from equipment is collected properly in line with the relevant regulation and disposed via accredited abatement companies. Domestic solid wastes are kept in tanks and collected by Rize Special Provincial Administration. There is a packaged wastewater treatment plant for the treatment of domestic wastewater generated within the context of the project activity.⁸ 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. In addition, noise measurements are conducted during regular periods to determine possible turbine and generator noise levels.

2.2 Local Stakeholder Consultation

During the registration of this project, Local Stakeholder Consultation meeting was held on 21/05/2009 in the conference room of the culture building in Kalkandere Religious High School in Rize Province. The purpose of the meeting was to inform public and stakeholders about the plan and present and discuss social and environmental impacts of the project. 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 announcement done on village coffeeshouse and in newspaper. In order to satisfy this requirement, announcements were published in two newspapers (Zümrüt Rize ve Dünya 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.

⁷ EIA Positive Decision has been submitted to the DOE.

⁸ The wastewater package treatment plant photographic evidences have been provided to the DOE.

During this monitoring period a site visit including the stakeholder engagement procedure was conducted on 17/11/2020. Six people including the mukhtar of Gürdere village and power plant employees were interviewed. There was not any negative feedback on socio-economic and environmental issues by the locals. Since there was no negative feedback from the locals, there is no need to take any further action. Locals stated that they are happy with the project since Kalkandere HEPP provided employment opportunities for local people. Since there were no negative feedbacks from the locals, there is no need to take any further action.

Also, mukhtars (head of the village) of Yokuşlu, Fındıklı and Hüseyinhoca villages had already taken the contact information of the Plant Manager of the company so that the local stakeholders can reach Plant Manager whenever they have any complaints, suggestions, or ideas about the project. Stakeholders convey their requests and objections to the project owner by phone or individual application.¹⁰ Since mukhtars are the head of the villages, they are the main contact persons between the project owner and the local stakeholders. Mukhtars make sure that there's continuous communication between the two parties.

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 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 28/09/2012.¹¹ 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 registration of the project was carried out by GAIA Carbon Finance. However, during the monitoring period, the name of the Carbon Consultant has

¹⁰ The Complaint and Request forms have been submitted to the DOE.

¹¹ The Turkish Trade Registry Gazette has been provided to the DOE.

changed to the GAIA Climate Consultant. During the monitoring period, there was no event or situation that occurred, which may impact the applicability of the methodology.

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

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

Table 4: Project Timeline

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.¹²

¹² The current Generation Licence and Provisional Acceptance Protocol have been submitted to DOE.

Clarifications about the project owner and other organizations involved in the project are 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	EG_{facility,y}
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project to the grid in year y.
Source of data	Validated VCS Project Description (Version 8) of the Project.
Value applied	179,050 MWh/yr
Justification of choice of data or description of measurement methods and procedures applied	Electricity meters
Purpose of Data	Used for baseline emission calculation.
Comments	N/A

Data / Parameter	Cap_{PJ}
Data unit	MWe
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Validated VCS Project Description (Version 8) of the Project.
Value applied	42.33
Justification of choice of data or description of measurement	The installed capacity will be determined based on recognized standards.

methods and procedures applied	
Purpose of Data	Calculation of project emissions
Comments	N/A

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	Validated VCS Project Description (Version 8) of the Project.
Value applied	2,205
Justification of choice of data or description of measurement methods and procedures applied	Measured from topographical surveys, maps, satellite pictures, etc.
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	NCV_{i,y}
Data unit	TJ
Description	Heating values of fuels consumed in thermal power plants in Turkey by the electric utilities.
Source of data	TEIAS website "Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities" 2006-2008: http://www.teias.gov.tr/istatistik2008/46.xls
Value applied	Detailed in Annex 5 in the Validated VCS Project Description (Version 8) of the Project.
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Purpose of Data	Used for baseline emission calculation.
Comments	Values are given in Tcal and where converted using to TJ using a conversion factor of 4.1868TJ/Tcal.

Data / Parameter	EF_{CO₂,i,y}
Data unit	tCO ₂ /GJ
Description	CO ₂ emission factor of fossil fuel type i in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied	Detailed in Annex 5 in the Validated VCS Project Description (Version 8) of the Project.
Justification of choice of data or description of measurement methods and procedures applied	According to the “Tool to calculate the emission factor for an electricity system”, if values provided by the fuel supplier of the power plants in invoices or regional or national average defaults values are not available the IPCC default values at the lower limit of uncertainty must be used.
Purpose of Data	Used for baseline emission calculation.
Comments	

Data / Parameter	Electricity capacity additions
Data unit	-
Description	Power plants which are most recently taken into operation
Source of data	TEIAS website: http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJ EKSİYONU%202005.pdf http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJ EKSİYONU%202006.pdf http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJ EKSİYONU%202007.pdf http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKS İYONU2008.pdf http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKS İYONU2009.pdf
Value applied	Detailed in Annex 5 in the Validated VCS Project Description (Version 8) of the Project.
Justification of choice of data or description of measurement methods and procedures applied	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEİAŞ website is the most up-to date and reliable data available for the Turkish grid.
Purpose of Data	Used for baseline emission calculation.

Comments	
Data / Parameter	$\eta_{m,y}$
Data unit	%
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	UNFCCC web site: “Tool to calculate the emission factor for an electricity system”. Annex 1.
Value applied	Detailed in Annex 5 in the Validated VCS Project Description (Version 8) of the Project.
Justification of choice of data or description of measurement methods and procedures applied	No official efficiency values based on each power plant or each fuel type is available in Turkey Most natural gas power plants in Turkey are combined cycle, most coal power plants operate sub-critical and most liquid fuel power plants adopt an open cycle technology.
Purpose of Data	Used for baseline emission calculation.
Comments	N/A

Data / Parameter	$EF_{grid,Cm}$
Data unit	tCO ₂ e/MWh
Description	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”
Source of data	Validated VCS Project Description (Version 8) of the Project.
Value applied	0.559
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per ACM0002 with 3 years vintage data and option of ex ante calculation based on “50% of OM and 50% of BM values approach for the first crediting period”
Purpose of Data	Used for baseline emission calculation.
Comments	$EF_{grid,CM}$ value (0.559 tCO ₂ /MWh) is valid for the duration of the crediting period.

4.2 Data and Parameters Monitored

Data / Parameter	EG_{facility,y}																											
Data unit	MWh																											
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y																											
Source of data	Main source is the monthly meter readings records (EPIAŞ data, also known as PMUM). Invoicing of the electricity production is carried out according to EPIAŞ data; thus, rendering the EPIAŞ data official source of electricity generation																											
Description of measurement methods and procedures to be applied	The net electricity generation supplied to the grid is measured continuously by meters (both main and spare) and recorded monthly.																											
Frequency of monitoring/recording	Annually																											
Value monitored	<table border="1"> <thead> <tr> <th>Vintage</th> <th>Electricity supplied to the grid (MWh)</th> <th>Electricity consumption from the grid (MWh)</th> <th>Net electricity supplied to the grid [MWh]</th> </tr> </thead> <tbody> <tr> <td>01/09/2017-31/12/2017</td> <td>36,077.94</td> <td>94.52</td> <td>35,983.42</td> </tr> <tr> <td>01/01/2018-31/12/2018</td> <td>159,006.81</td> <td>202.75</td> <td>158,804.06</td> </tr> <tr> <td>01/01/2019-31/12/2019</td> <td>132,421.00</td> <td>338.43</td> <td>132,082.57</td> </tr> <tr> <td>01/01/2020-31/12/2020</td> <td>144,078.71</td> <td>297.66</td> <td>143,781.05</td> </tr> <tr> <td>Total (01/09/2017-31/12/2020)</td> <td>471,584.46</td> <td>933.36</td> <td>470,651.10</td> </tr> </tbody> </table>				Vintage	Electricity supplied to the grid (MWh)	Electricity consumption from the grid (MWh)	Net electricity supplied to the grid [MWh]	01/09/2017-31/12/2017	36,077.94	94.52	35,983.42	01/01/2018-31/12/2018	159,006.81	202.75	158,804.06	01/01/2019-31/12/2019	132,421.00	338.43	132,082.57	01/01/2020-31/12/2020	144,078.71	297.66	143,781.05	Total (01/09/2017-31/12/2020)	471,584.46	933.36	470,651.10
Vintage	Electricity supplied to the grid (MWh)	Electricity consumption from the grid (MWh)	Net electricity supplied to the grid [MWh]																									
01/09/2017-31/12/2017	36,077.94	94.52	35,983.42																									
01/01/2018-31/12/2018	159,006.81	202.75	158,804.06																									
01/01/2019-31/12/2019	132,421.00	338.43	132,082.57																									
01/01/2020-31/12/2020	144,078.71	297.66	143,781.05																									
Total (01/09/2017-31/12/2020)	471,584.46	933.36	470,651.10																									

Monitoring equipment	<p>Meters are in compliance with the communiqué for Metering Devices to be used in Electricity Market.</p> <p>During this monitoring period, two metering tests were performed on 08/11/2017 and 28/09/2018 respectively, for the changed meters.¹³</p> <p>The main and back meters were changed on 10/08/2020. The features of the changed electricity meters are provided below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Name</th> <th style="width: 25%;">Serial Number</th> <th style="width: 25%;">Brand –Model</th> <th style="width: 25%;">Accuracy class</th> </tr> </thead> <tbody> <tr> <td>Main Meter</td> <td>53087889</td> <td>ACTARIS (SL761A071)</td> <td>Active 0.2S – Reactive 2</td> </tr> <tr> <td>Backup meter</td> <td>53087890</td> <td>ACTARIS (SL761A071)</td> <td>Active 0.2S – Reactive 2</td> </tr> </tbody> </table> <p>The specification of currently used electricity meters are as follows and 10/08/2020 is also initial calibration date of current meters:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Name</th> <th style="width: 25%;">Serial Number</th> <th style="width: 25%;">Brand –Model</th> <th style="width: 25%;">Transformer Information</th> </tr> </thead> <tbody> <tr> <td>Main Meter</td> <td>9674574</td> <td>EMH-LZQJ-XC</td> <td>TM1</td> </tr> <tr> <td>Backup meter</td> <td>9674575</td> <td>EMH-LZQJ-XC</td> <td>TM1</td> </tr> </tbody> </table> <p>Accuracy class: C-1S</p> <p>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.</p>	Name	Serial Number	Brand –Model	Accuracy class	Main Meter	53087889	ACTARIS (SL761A071)	Active 0.2S – Reactive 2	Backup meter	53087890	ACTARIS (SL761A071)	Active 0.2S – Reactive 2	Name	Serial Number	Brand –Model	Transformer Information	Main Meter	9674574	EMH-LZQJ-XC	TM1	Backup meter	9674575	EMH-LZQJ-XC	TM1
Name	Serial Number	Brand –Model	Accuracy class																						
Main Meter	53087889	ACTARIS (SL761A071)	Active 0.2S – Reactive 2																						
Backup meter	53087890	ACTARIS (SL761A071)	Active 0.2S – Reactive 2																						
Name	Serial Number	Brand –Model	Transformer Information																						
Main Meter	9674574	EMH-LZQJ-XC	TM1																						
Backup meter	9674575	EMH-LZQJ-XC	TM1																						
QA/QC procedures to be applied	<p>Measurements are undertaken using energy meters.</p> <ul style="list-style-type: none"> According to the Article 2 of the Communiqué of Meters in Electricity Sector¹⁴: ‘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. 																								

¹³ The metering test results have been submitted to the DOE.

¹⁴ http://www.epdk.gov.tr/documents/elektrik/mevzuat/teblig/elektrik/sayaclar_hakkinda/Elk_Tblg_Sayaclar.doc

	<ul style="list-style-type: none"> • 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 will be done every 10 years. • 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 (EPIAŞ data, also known as PMUM). Data from remote automatic meter reading system (OSOS) is used for crosschecking. Invoicing of the electricity production is carried out according to EPIAŞ data; thus, rendering the EPIAŞ data official source of electricity generation.
Purpose of the data	Calculation of emission reductions
Calculation method	The net electricity is calculated by: <ol style="list-style-type: none"> a) Subtracting self-consumption value from gross generation value for each month to find the net electricity supplied to the grid. 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	
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 DOE.
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 40.24MWe.
Comments	

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 DOE.
Purpose of the data	Calculation of project emissions
Calculation method	The reservoir area mentioned above (11,442 m ²) 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

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 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.

The main and spare meter readings are recorded monthly-remote automatic meter reading system and cross-checked whether calibration is required. The capacity of the transmission line connected is medium voltage of 154 kVA, the accuracy class for power meters have been defined in the Communiqué for Power Meters as 0.2S class. The calibration will be implemented in accordance with the related standard procedures. The periodical maintenance is under the responsibility of TEIAS and has been fixed as once in 10 years as mentioned above.

The main source is the EPIAS (also known as PMUM) data which is used for the quantity of net electricity delivered to the grid monthly meter readings records. It has been cross-checked with the meter reading records (OSF forms) provided to the company by TEIAS. Invoicing of the electricity production is carried out according to EPIAS therefore the official source of electricity generation is EPIAS data.

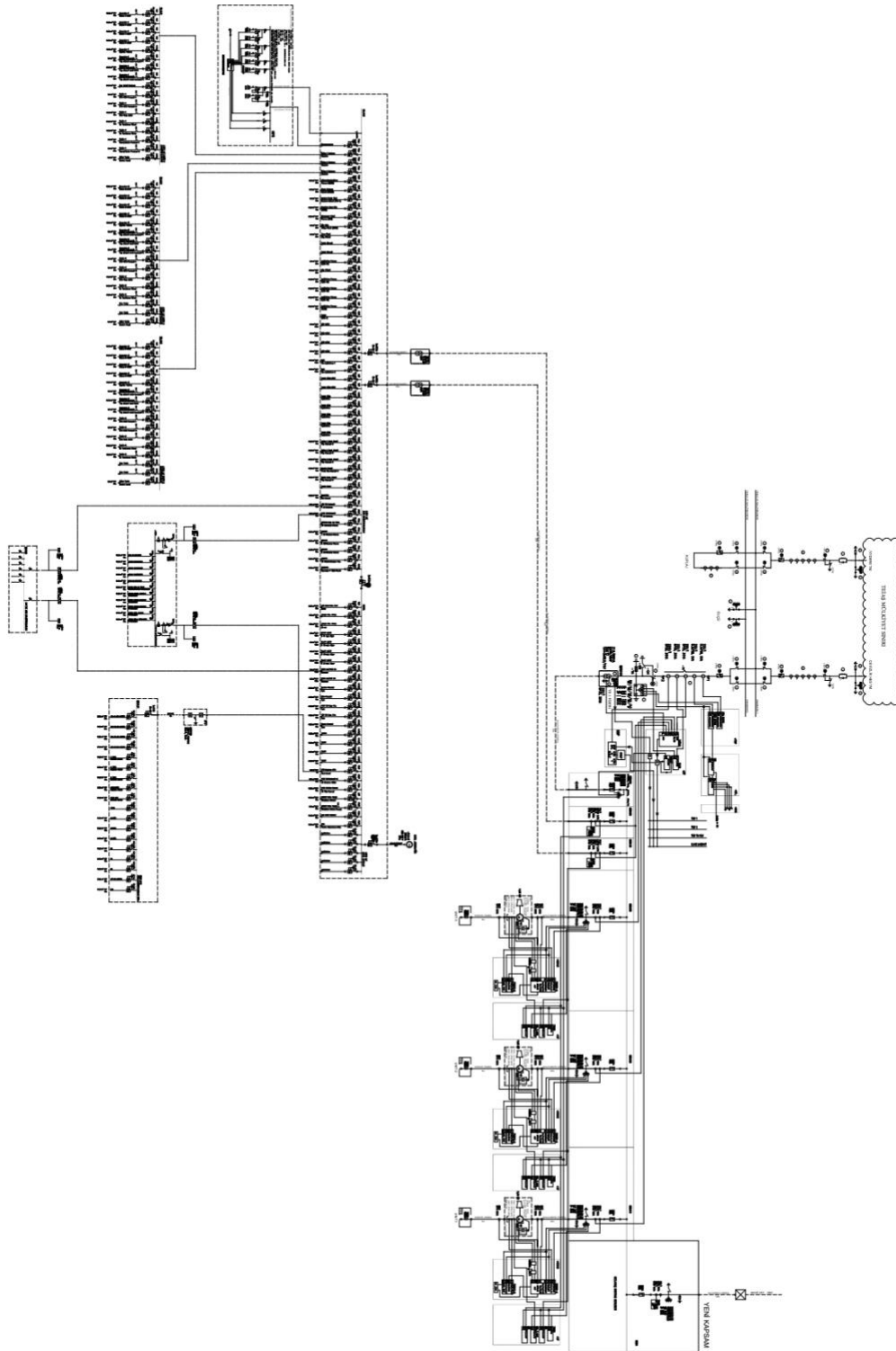


Figure 3: Single Line Diagram of Kalkandere HEPP Powerhouse

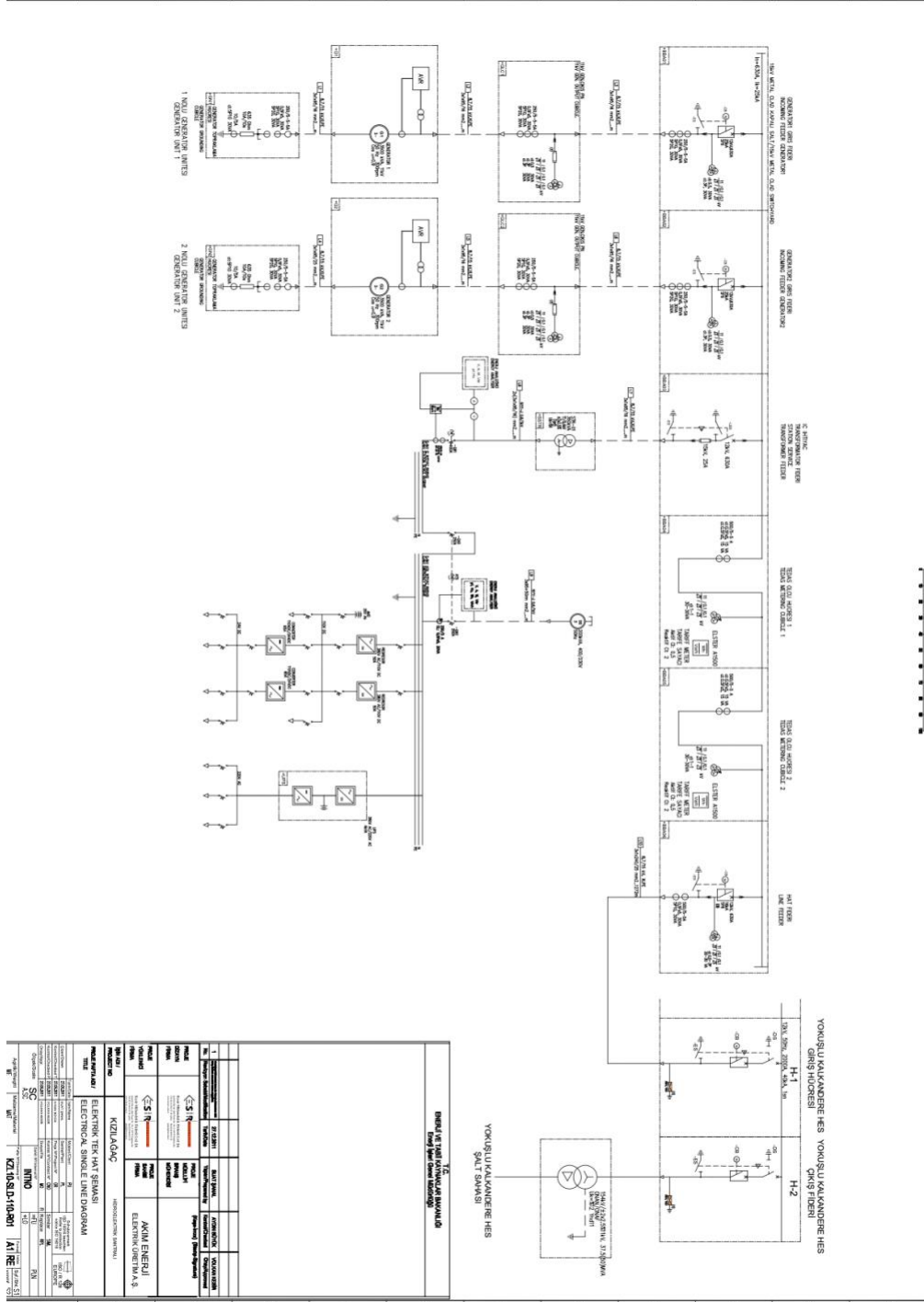


Figure 4: Single Line Diagram of Kızılagac HEPP Powerhouse

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 ($EG_{\text{facility},y}$) 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.

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 have to 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, 23 employees are working for the Project Activity. Roles and responsibilities have been summarized in the following chart.

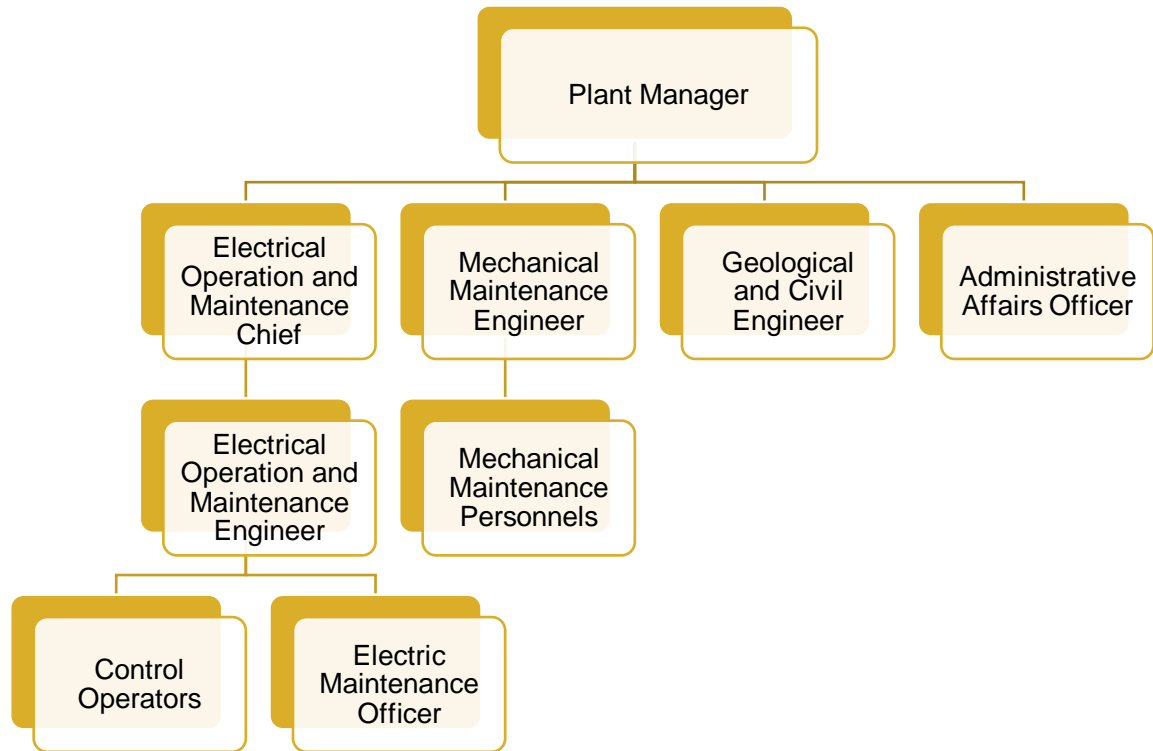


Figure 5: Operation and Management diagram

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

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

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

$EF_{grid,CM,y}$ value is fixed as 0.559 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:

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

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)

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

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. The power density of the project activity is calculated as follows:

Where:

PD = Power density of the project activity, in W/m²

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m²)

A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m²) For new reservoirs, this value is zero

$$Cap_{PJ} = 40.240.000 \text{ W}$$

$$Cap_{BL} = 0 \text{ (Justification: The project is a new hydro power plant)}$$

$$A_{PJ} = 11,442 \text{ m}^2$$

$$A_{BL} = 0 \text{ (Justification: The project is a new hydro power plant)}$$

$$\text{Therefore; } PD = (40.240.000 - 0)/(11,442 - 0) = 3,517 \text{ W/m}^2$$

Since the Power Density of the Project is greater than 10 W/m² PE_y=0

5.3 Leakage

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing and transport).

According to the ACM0002-Version 12, these emissions sources are neglected.¹⁵ Therefore, the leakage from the Project Activity is zero.

5.4 Net GHG Emission Reductions and Removals

Also, according to ACM0002/Version 12 the emission reductions in year “y” should be calculated as the following formula:

$$ER_y = BE_y - PE_y - LE_y$$

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).

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

y = Refers to a given period

Since PE_y and LE_y are assumed to be 0, emission reductions are equal to baseline emissions.

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/09/2017-31/12/2017	20,114	0	0	20,114
01/01/2018-31/12/2018	88,771	0	0	88,771
01/01/2019-31/12/2019	73,834	0	0	73,834

¹⁵ <https://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNV3LTK1BP3OR24Y5L/view.html>

01/01/2020- 31/12/2020	80,373	0	0	80,373
Total Sum (01/09/2017- 31/12/2020)	263,092	0	0	263,092

Table 5: Summary of Emission Reductions