



Verified Carbon Standard

MONITORING REPORT TITLE

Document Prepared by GAIA Climate Consultant

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

PEKER ENERJI A.Ş. installed Adiguzel II Hydroelectric Power Plant (hereafter referred to as ADIGUZEL II HEPP) of which the plant is located in the Guney county of the city of Denizli, in Turkey. The objective of the project is to generate zero-emission electricity to be fed into the interconnected national grid.

ADIGUZEL II HEPP, which is comprised of the construction of a greenfield 30.09 MWe run-of-river hydroelectric power plant located in the Buyuk Menderes river basin, in Turkey's Aegean Sea Region. The power plant consists of 2 Francis turbines with the vertical axis with 15.05 MWe power each., cofferdam of upstream, penstock, energy transmission line, a head pond, a surge tank, and a power station. Energy is produced by utilizing water flow from the thalweg elevation of 320.50 meters to 267.00 meters of tailwater elevation. The maximum water level is 318.00 m and the tailwater level is 267.00 m. Water transports via penstock which has 270 m in length and 3.30m in diameter. The length of the energy transmission line is about 5 km and the transmission line is connected to Adiguzel Dam which is located at the source side of the Project. The water from the surge tank is transferred to Adiguzel II HEPP, which has 2 vertical shafts of Francis turbines with a total installed capacity of 30.09 MW and vertical axis, three-phased synchronous generators are used. Within the scope of the project activity, there has been no dam or any new reservoir formation that will have an impact on the project emissions during the monitoring period.

The project contributes positive environmental benefits as displacing the electricity generated by fossil fuel-fired power plants by utilizing renewable resources so as 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 24 January 2015 to 30 September 2020. During this monitoring period, the actualized net electricity generation is 263,933.35 MWh. The total emission reduction of this monitoring period is 166,012 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 (%)
24/01/2015-31/12/2015	342	41,922	31,208	66,694.68	49,615.35	%-26
01/01/2016-31/12/2016	365	44,741	41,083	71,180.00	65,315.57	%-8
01/01/2017-31/12/2017	365	44,741	30,294	71,180.00	48,162.82	%-32
01/01/2018-31/12/2018	365	44,741	21,506	71,180.00	34,191.56	%-52
01/01/2019-31/12/2019	365	44,741	22,219	71,180.00	35,324.52	%-50
01/01/2020-30/09/2020	274	33,586	19,702	53,433.75	31,323.53	%-41
Total	2,076	254,472	166,012	404,848.44	263,933.35	%-35

Table 1: Ex-ante vs achieved emission reductions

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:

Power Plant Building		
Length	M	28.70
Width	M	15.00
Turbines		
Brand/Type		ORIENT/Vertical Francis Turbine
Number of Units		2
Serial No of Units		13ORIENT001-13ORIENT002
Unit Rated Power	MWe	15.048 ¹

¹ Source: Turbine Generator Unit Label has been provided to the DOE. Unit Rated Power = Label Rated capacity (16.72) * Power factor (0.90) = 15.048MWe

Total Installed Capacity	MWe	30.096
Rated Head	m	50.69
Project rated discharge	m ³ /s	66,00
Transformer		
Type		Outdoor Type, oily, three phased
Number of Units		2
Power of a Unit	kVA	16,750
Voltage	kV	10,5 / 34,5 kV
Efficiency	%	99
Penstock		
Inner Diameter	m	3,30
Steel Thickness	mm	12,00
Length	m	270
Generator		
Type		Vertical axis, three phased synchron
Number of Units		2
Max. Voltage Output	kW	10,5
Power Factor		0,90
Efficiency	%	98

Table 2: Technical specifications of the Project

1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: “Energy Industry – Renewable/Non-renewable Sources”. Installed capacity of the project is 30.09 MWe.

The project is a single green field investment and is not part of a project group or bundle.

1.3 Project Proponent

Organization name	Peker Enerji A.S.
Contact person	Hakan Özyaşar
Title	Electrical Electronics Engineer
Address	UGUR MUMCU CD. UGUR MUMCU'NUN SOK. No: 15/1 GOP/ANKARA
Telephone	0312 466 5658
Email	hakan.ozyasar@hanayelektrik.com

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
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1.5 Project Start Date

The project start date is 24/01/2015 which is the commissioning date of the project.

1.6 Project Crediting Period

The crediting period of the project begins with the commissioning of the plant. The project started to generate electricity on 24/01/2015. Thus, the first crediting period shall last from 24th of January 2015 until 23rd of January 2025. This monitoring period is covering its first crediting period. (24/01/2015-30/09/2020)

A two times renewable crediting period of 10 years 0 month shall apply.

1.7 Project Location

The Project site is located in the Büyük Menderes river basin in Turkey, in the Aegean Sea region, approximately 5 km to the south of the Güney county of Denizli. Adigüzel II HEPP is located 38°07'59" N - 29° 09'12" E coordinates. The following figures show the project's location.



Figure 1: The project's location²



Figure 2: The Project Lay-out

² Google Earth screenshot of the coordinates has been provided to the DOE.

1.8 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002: “Grid-connected electricity generation from renewable sources, Version 15.” was applied.³ In addition, as referred in the methodology, “Tool to calculate the emission factor for an electricity system, Version 04.0”⁴ was applied. The project’s additionality has been demonstrated using the version of “Tool for demonstration and assessment additionality” Version 07.0.0⁵

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

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 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 263,933.35 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 9 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 166,012 tCO₂e.

³https://cdm.unfccc.int/filestorage/5/2/F/52FDLM8C49Q3TBSOIJYPVH16ER0UAW/EB79_repan11_ACM0002_ver15.0.pdf?t=aGd8cWhydTBNfDC08kIfcUd85LBTBvvd9Qnu

⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf>

⁵ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

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 31/01/2012.⁶

2.2 Local Stakeholder Consultation

According to the regulation declared by the Ministry of Environment and Forestry and published on the Official Gazette (dated 17th July 2008, numbered 26939), projects which an EIA is not required from are not subject to an obligation to hold Stakeholder Meetings. Therefore, a stakeholder meeting has not been planned. Nevertheless, mukhtars of local villages have been interviewed and continuously informed about the Project for understanding the general perspective about the HEPP.

Before the initiation of the Project, all local public authorities like the Mayor of Amasya were informed about the Project. Apart from the local public authorities, some NGOs and mukhtars of local villages have been interviewed and informed about the Project. The provincial directorate of environment also regularly follows the environmental impact issue and listens to the complains of the local people.

During this monitoring period, a site visit including the stakeholder engagement procedure was conducted on 30/1/2020. Five people including the mukhtar of Adıgüzeller village and four local stakeholders were interviewed. All of these people are from local villages around the plant. There were not any negative feedbacks on socio-economic and environmental issues by the locals. Locals stated that they are happy with the project since Adıgüzeller 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, mukhtar (head of the village) of Adıgüzeller village had already taken the contact information of the Plant Manager of the company so that the local stakeholders will be able to reach Plant Manager whenever they have any complaints, suggestions or ideas about the project. Since mukhtar is the head of the village, he is the main contact person between the project owner and the local stakeholders. Mukhtar makes sure that there's continuous communication between the two parties.

⁶ Positive EIA Letter has been submitted to the DOE.

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 project was started construction on 15/04/2013. The first unit started commissioning on 24/01/2015. During the monitoring period, there was no event or situation that occurred, which may impact the applicability of the methodology.

The registration of Adiguzel II Hydroelectric Power Plant was carried out by GAIA Carbon Finance. However, during this monitoring period, the name of the Carbon Consultant has changed to the GAIA Climate Consultant. In addition, there has been no change in the shareholder structure.

Milestone	Date
Water Usage Agreement	30/09/2009
Revised Feasibility Report	March 2011
Board Decision for Early Consideration Investment and Carbon Finance Support	11/07/2011
Electromechanical Equipment Contract	30/12/2011
EIA-Not-Required Certificate	31/01/2012
Generation Licence	18/04/2012
Construction Contract	May 2012
Loan Agreement	09/07/2012
Revised Transmission System Contract	30/09/2013
The date for start of construction (Site delivery record)	15/04/2013
Project Start Date (Commissioning of Power Plant)	24/01/2015
1 st Monitoring Period	24/01/2015-30/09/2020

Table 3: 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

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

The registration of Adiguzel II Hydroelectric Power Plant was carried out by GAIA Carbon Finance. However, during this monitoring period, the name of the Carbon Consultant has changed to the GAIA Climate Consultant. In addition, there has been no change in the shareholder structure.

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_{gross, y}
Data unit	GWh
Description	Turkey's Gross Electricity Generated by primary energy source for the five most recent years (2008 - 2012).
Source of data	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/30(06-2012).xls
Value applied	Validated VCS Project Description (Version 7) of the Project.
Justification of choice of data or description of measurement methods and procedures applied	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
Purpose of Data	Used for baseline emission calculation.
Comments	

Data / Parameter	Cap_{BL}
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity.
Source of data	Project site
Value applied	0 (this is a new hydro power plant)

Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	FC_{i, y}
Data unit	Ton (m ³ for Natural Gas)
Description	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data	Turkish Electricity Transmission Company (TEİAŞ) http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakit48-53/49.xls
Value applied	Validated VCS Project Description (Version 7) of the Project. (Please see Section 3.1 and Annex 3)
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
Purpose of Data	To calculate the Operating Margin (OM) emission factor
Comments	-

Data / Parameter	NCV_{i, y}
Data unit	TJ/Ton (TJ/m ³ for Natural Gas)
Description	Net calorific value of fossil fuel type
Source of data	TEİAŞ website: "Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities" 2008-2012: http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/yakit48-53/51.xls
Value applied	Validated VCS Project Description (Version 7) of the Project. Please see Annex 3
Justification of choice of data or description of measurement	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.

methods and procedures applied	
Purpose of Data	To calculate the Operating Margin (OM) emission factor
Comments	

Data / Parameter	EF_{CO2,i,y}
Data unit	tCO2/GJ
Description	Default CO2 emission factor of fossil fuel type i used in power in year y
Source of data	IPCC default values (as provided in Table 1.4, Chapter 1, Volume 2 (Energy), 2006 IPCC Guidelines for National Greenhouse Gas Inventory) are used. Link: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied	Validated VCS Project Description (Version 7) of the Project. Please see Section 3.1. and Annex 3
Justification of choice of data or description of measurement methods and procedures applied	There is no information on the fuel specific default emission factor in Turkey. Hence, IPCC values have been used as per the “Tool to calculate the emission factor for an electricity system (version 04.0)”.
Purpose of Data	To calculate the Operating Margin (OM) emission factor
Comments	

Data / Parameter	Electricity Imports
Data unit	GWh
Description	Electricity imported to the Grid from other countries
Source of data	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2012/uretim%20tuketim(23-47)/30(06-2012).xls
Value applied	Please refer to the link above for Turkey’s electricity imports.
Justification of choice of data or description of measurement methods and procedures applied	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to-date and accurate information available.

Purpose of Data	-
Comments	-

Data / Parameter	Electricity capacity additions
Data unit	Name of the plant; Installed capacity (MW); Fuel type; Commissioning date.
Description	Set of power capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently.
Source of data	Turkish Electricity Transmission Company (TEIAS) Generation units put into operation in 2009-2010 http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2013.pdf
Value applied	Validated VCS Project Description (Version 7) of the Project. Please refer to Section 2.4 for Capacity Additions
Justification of choice of data or description of measurement methods and procedures applied	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to date and accurate information available.
Purpose of Data	To calculate the Operating Margin (OM) emission factor
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".
Value applied	Validated VCS Project Description (Version 7) of the Project. Please refer to ANNEX 3
Justification of choice of data or description of measurement methods and procedures applied	-

Purpose of Data	Used for baseline emission calculation.
Comments	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.

Data / Parameter	EG_{m,y}
Data unit	MWh
Description	Net electricity generated by power plant/unit m in year y
Source of data	Annex I of Turkish Electricity Transmission Company (TEIAS) Capacity Projection Report for 2012. http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2012.pdf
Value applied	Validated VCS Project Description (Version 7) of the Project Please refer to Section 3.1., Table 12
Justification of choice of data or description of measurement methods and procedures applied	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, hence providing the most up-to-date and accurate information available.
Purpose of Data	
Comments	

Data / Parameter	EF_{L,m,y}
Data unit	kgCO ₂ /GJ
Description	The CO ₂ emission factor of the grid power unit m (Default CO ₂ emission factor of fossil fuel types are used)
Source of data	IPCC default values (as provided in Table 1.4, Chapter 1, Volume 2 (Energy), 2006 IPCC) Guidelines for National Greenhouse Gas Inventory) are used. Link: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Value applied	Validated VCS Project Description (Version 7) of the Project. Please refer to ANNEX 3
Justification of choice of data or description of measurement methods and procedures applied	There is no information on the power unit specific emission factor in Turkey. Hence, IPCC values have been used as per the “Tool to calculate the emission factor for an electricity system (version 04.0)”.
Purpose of Data	-
Comments	-

Data / Parameter	W_{OM}
Data unit	rate
Description	Weight of operating margin emissions factor
Source of data	Tool to calculate the emission factor for an electricity system
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	“Tool to calculate the emission factor for an electricity system (Version 04.0)”, suggests wOM = 0.5 and wBM = 0.5 for the first crediting period, except wind and solar power plants. In the second and third crediting periods wOM=0.25 and wBM=0.75
Purpose of Data	-
Comments	-

Data / Parameter	W_{BM}
Data unit	rate
Description	Weight of built margin emissions factor
Source of data	Tool to calculate the emission factor for an electricity system
Value applied	0.5
Justification of choice of data or description of measurement methods and procedures applied	“Tool to calculate the emission factor for an electricity system (Version 04.0)”, suggests wOM = 0.5 and wBM = 0.5 for the first crediting period, except wind and solar power plants. In the second and third crediting periods wOM=0.25 and wBM=0.75
Purpose of Data	-
Comments	-

Data / Parameter	EF_{grid,CM,y}
Data unit	t CO ₂ /MWh
Description	Combined margin CO ₂ emission factor for the project electricity system in year y
Source of data	Tool to calculate the emission factor for an electricity system
Value applied	Validated VCS Project Description (Version 7) of the Project. Please refer to ANNEX 3
Justification of choice of data or description of measurement methods and procedures applied	The baseline emission factor is the weighted average of the Operating Margin Emission Factor and Build Margin Emission Factor. The “Tool to calculate the emission factor for an electricity system” (version 04.0) guideline procedures have been applied.
Purpose of Data	To calculate the Combined Margin (CM) emission factor
Comments	-

4.2 Data and Parameters Monitored

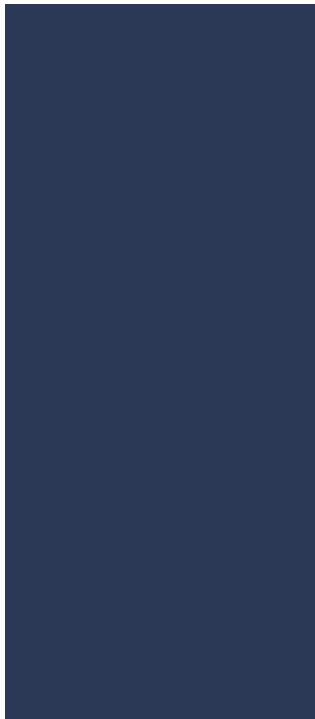
Data / Parameter	A _{PJ}
Data unit	m ²
Description	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Description of measurement methods and procedures to be applied	Measured from topographical surveys, maps, satellite pictures, etc.
Frequency of monitoring/recording	Yearly
Value monitored	875,264.111 m ²⁷
Monitoring equipment	Topographical surveys, maps, satellite pictures

⁷ The reservoir area screenshot for APJ value has been provided.

QA/QC procedures to be applied	The readings will be done during the period when the water flow is made to have the largest reservoir area
Purpose of the data	Calculation of project emissions
Calculation method	
Comments	Since there is no capacity increase, the same installed capacity during the registration is valid.

Data / Parameter	Cap_{PJ}
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Description of measurement methods and procedures to be applied	Supplier information on the equipment and the number of turbines will be checked on site visits
Frequency of monitoring/recording	Yearly
Value monitored	30,096,000 (15,048,000Wx2).
Monitoring equipment	The data is monitored from the electricity generation license which was granted by Energy Market Regulatory Authority. The company has not made any change on the project design up to know and therefore, there is no increase or decrease in the installed capacity of the power plant.
QA/QC procedures to be applied	Supplier information on the related equipment and the existence of the equipment will be checked. Also, this information may be checked from the EMRA website.
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	

Data / Parameter	EG _{facility,y}			
Data unit	MWh/yr			
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	Continuous measurement and at least monthly recording.			
Value monitored				
	Vintage	Electricity supplied to the grid (MWh)	Electricity consumption from the grid (MWh)	Net electricity supplied to the grid [MWh]
	24/01/2015-31/12/2015	49,672.46	57.10	49,615,35
	01/01/2016-31/12/2016	65,348.25	31,68	65,316.57
	01/01/2017-31/12/2017	48,166.91	4.09	48,162.82
	01/01/2018-31/12/2018	34,193.86	2.30	34,191.56
	01/01/2019-31/12/2019	35,318.43	3.91	35,314.52
	01/01/2020-31/09/2020	31,326.37	2.85	31,323.53
	Total Sum	264,035.28	101.94	263,933.35
Monitoring equipment	Meters are in compliance with the communiqué for Metering Devices to be used in Electricity Market.			



The specification of electricity meters is provided below:

Name	Serial Number	Brand –Model	Date of Last Calibration
Main Meter	65006597	ITRON-SL7000	16/09/2020
Backup meter	65006598	ITRON-SL7000	16/09/2020

Accuracy class: Active CL:C – Reactive CL:2

During the monitoring period four metering tests were performed on 08/12/2015, 18/10/2016, 26/11/2018, 16/09/2020 respectively. The calibration test results are provided to the DOE.

The main meter (65006597) was changed on 16.09.2020⁹. The features of the new electricity meter are provided below:

Name	Serial Number	Brand –Model	Accuracy class
Main Meter	9202719	EMH-LZQJ-XC	Active: CL:C-1S

QA/QC procedures to be applied

Measurements are undertaken using energy meters.

- According to the Article 2 of the Communiqué of Meters in Electricity Sector¹⁰: ‘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 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

⁹ The main meter was changed in 2020. Protocol of the replacement has been submitted to the DOE.

¹⁰ http://www.epdk.gov.tr/documents/elektrik/mevzuat/teblig/elektrik/sayaclar_hakkinda/Elk_Tblg_Sayaclar.doc

	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: - Subtracting self-consumption value from gross generation value for each month to find the net electricity supplied to the grid. - Adding up all monthly net electricity values to calculate the total net electricity supplied to the grid during the monitoring period. - Multiplying the total net electricity value with the CM emission factor.
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 are complete, consistent, clear and accurate. The project is operated by Peker Enerji 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 the 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 TEİAŞ’ province, TEİAŞ 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.

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 Peker Enerji 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 Peker Enerji 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 technicians 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 technicians ensure that all the instrumentations and devices to perform the monitoring work properly. Administrative Officer act as the point of contact for all employees, providing administrative support and managing their queries. In total, there are nine employees within the scope of the project. Roles and responsibilities have been summarized in the following chart.

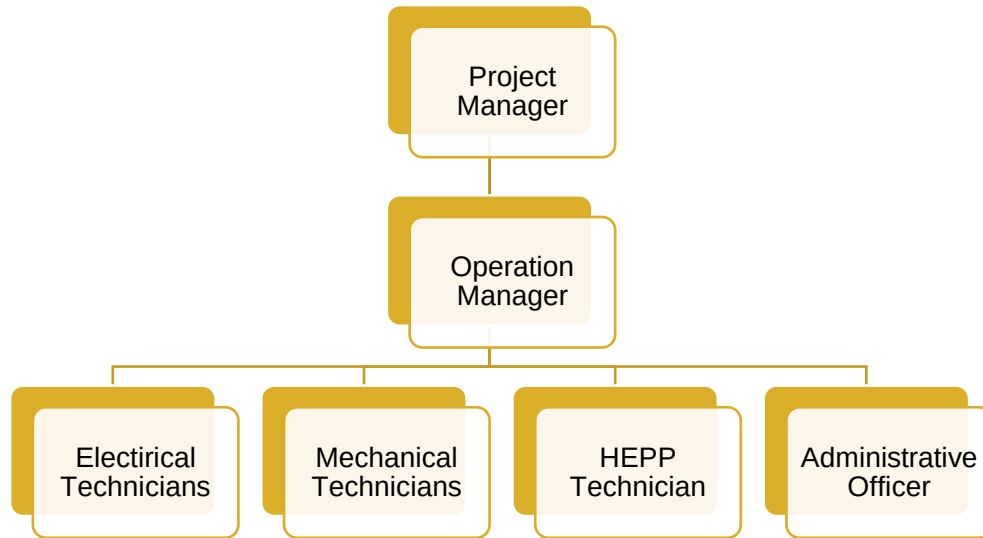


Figure 3: Operation and management diagram

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

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

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 0.629 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).

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} = 30,096,000 W

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

A_{PJ} = 875,264.111 m²

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

Therefore; $PD = (30,096,000 - 0) / (875,264.111 - 0) = 34.385 \text{ W/m}^2$

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).

These emissions sources are neglected. Therefore, the leakage from the Project Activity is zero.

5.4 Net GHG Emission Reductions and Removals

Also, according to ACM0002/Version 15 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)
24 January 2015	63	0	0	63
February 2015	32	0	0	32
March 2015	110	0	0	110
April 2015	698	0	0	698
May 2015	3,354	0	0	3,354
June 2015	3,294	0	0	3,294
July 2015	8,408	0	0	8,408
August 2015	7,723	0	0	7,723

September 2015	4,887	0	0	4,887
October 2015	210	0	0	210
November 2015	1,488	0	0	1,488
December 2015	940	0	0	940
Total 2015	31,208	0	0	31,208
January 2016	20	0	0	20
February 2016	28	0	0	28
March 2016	29	0	0	29
April 2016	5,232	0	0	5,232
May 2016	3,201	0	0	3,201
June 2016	8,488	0	0	8,488
July 2016	10,474	0	0	10,474
August 2016	8,507	0	0	8,507
September 2016	4,671	0	0	4,671
October 2016	164	0	0	164
November 2016	141	0	0	141
December 2016	127	0	0	127
Total 2016	41,083	0	0	41,083
January 2017	-1	0	0	-1
February 2017	31	0	0	31
March 2017	15	0	0	15

April 2017	796	0	0	796
May 2017	1,518	0	0	1,518
June 2017	4,044	0	0	4,044
July 2017	10,559	0	0	10,559
August 2017	9,014	0	0	9,014
September 2017	4,320	0	0	4,320
October 2017	0	0	0	0
November 2017	0	0	0	0
December 2017	0	0	0	0
Total 2017	30,294	0	0	30,294
January 2018	0	0	0	0
February 2018	0	0	0	0
March 2018	0	0	0	0
April 2018	2,773	0	0	2,773
May 2018	1,294	0	0	1,294
June 2018	1,806	0	0	1,806
July 2018	9,097	0	0	9,097
August 2018	6,346	0	0	6,346
September 2018	191	0	0	191
October 2018	0	0	0	0
November 2018	0	0	0	0

December 2018	0	0	0	0
Total 2018	21,506	0	0	21,506
January 2019	0	0	0	0
February 2019	0	0	0	0
March 2019	13	0	0	13
April 2019	2,611	0	0	2,611
May 2019	1,766	0	0	1,766
June 2019	2,756	0	0	2,756
July 2019	8,329	0	0	8,329
August 2019	6,646	0	0	6,646
September 2019	100	0	0	100
October 2019	0	0	0	0
November 2019	0	0	0	0
December 2019	0	0	0	0
Total 2019	22,219	0	0	22,219
January 2020	-1	0	0	-1
February 2020	0	0	0	0
March 2020	0	0	0	0
April 2020	2,199	0	0	2,199
May 2020	1,782	0	0	1,782
June 2020	3,876	0	0	3,876
July 2020	7,588	0		7,588

August 2020	4,259	0	0	4,259
September 2020	0			0
Total 2020	19,702	0	0	19,702
Total Sum (24/01/2015- 30/09/2020)	166,012	0	0	166,012

Table 4: Summary of Emission Reductions