



Verified Carbon Standard

AKINCI HYDROELECTRIC POWER PLANT



Project title	Akinci Hydroelectric Power Plant
Project ID	1380
Monitoring period	01-October-2021 to 31-July-2023
Original date of issue	27-March-2024
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Version	05
VCS Standard Version	4.7
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CONTENTS

PROJECT DETAILS	4
1.1 Summary Description of the Implementation Status of the Project	4
1.2 Audit History.....	7
1.3 Sectoral Scope and Project Type	7
1.4 Project Proponent	8
1.5 Other Entities Involved in the Project	8
1.6 Project Start Date	8
1.7 Project Crediting Period	9
1.8 Project Location	9
1.9 Title and Reference of Methodology	10
1.10 Double Counting and Participation under Other GHG Programs	11
1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions.....	11
1.12 Sustainable Development Contributions	12
1.13 Commercially Sensitive Information.....	17
2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT	17
2.1 Stakeholder Engagement and Consultation.....	17
2.2 Risks to Stakeholders and the Environment.....	19
2.3 Respect for Human Rights and Equity	19
2.4 Ecosystem Health	21
3 IMPLEMENTATION STATUS	22
3.1 Implementation Status of the Project Activity	22
3.2 Deviations	25
Grouped Projects	25
3.3 25	
3.4 Baseline Reassessment.....	25
4 DATA AND PARAMETERS.....	26
4.1 Data and Parameters Available at Validation	26
4.2 Data and Parameters Monitored.....	29
4.3 Monitoring Plan.....	31
QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	35

5.1	Baseline Emissions	35
5.2	Project Emissions	36
5.3	Leakage Emissions	38
5.4	GHG Emission Reductions and Carbon Dioxide Removals	38
APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION.....		41

PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Firat Elektrik Üretim ve Ticaret A.S. which is owned by Aydem Yenilenebilir A.Ş.. has constructed a 99 MWe capacity Hydroelectric Power plant. AKINCI HYDROELECTRIC POWER PLANT (Akıncı HPP in short) is a project that is designed and constructed on Kelkit river, Reşadiye-Tokat, Turkey. Kelkit River is a tributary of Yeşilırmak River, which is one of the biggest rivers in Turkey, and gives its name to the Yeşilırmak basin that makes up one of the 26 big river catchments of Turkey. The purpose of the project is to supply electricity to the Turkish power grid, from a renewable source.

The Project Activity (PA) utilizes the Kelkit river water in a diversion-type run-of-river hydro power scheme to generate electricity with zero carbon emissions for the Turkish Power Grid. The PA is displacing electricity that would otherwise be generated by the existing grid of the host country. There are three hydraulic turbines which have an installed capacity of (3x33.577) MWm / (3x33.00) Mwe. Annual gross electricity production by the PA is estimated to be 439,360 MWh. Therefore the Project Activity is expected to lead to an emission reduction of 225,831 tonnes CO_{2e} annually.

Table 1. Information about the turbine used in the project

Number of Turbine	3
Installed Capacity	(3x33.577) MWm / (3x33.00) Mwe
Total Installed Capacity	100.73 MWm / 99.00 MWe

The environmental impacts of the project are kept to a minimum level and all the regulations that are in act in the host country, Turkey, are targeted to be complied with the Akıncı HPP project. At the planning stage these impacts have been investigated and were presented to the Ministry of Environment and Urban Planning (MoEUP), in the form of an Environmental Impact Assessment Report. The report was assessed and the MoEUP and the project was granted an EIA Affirmative certification, indicating that the project is good to be implemented only if the mitigation measures reported are implemented and all the

undertakings stated in the report are complied with. Please also note that, considering that the project is using the water resource that is also essential for the aquatic life in the area, there is a fish ladder (fish passage way) within the regulator for the downstream and upstream movement of the fish, to facilitate fish migration.

The project start date is 24/10/2018. Unit 1 and 2 of the Akıncı Hydroelectric Power Plant was commissioned in 24/10/2018. After that, Unit 3 of the Akıncı Hydroelectric Power Plant was commissioned in 24/01/2019. Construction has started in 29/07/2013. During this monitoring period (01-October-2021 to 31-July-2023) the project has produced a net total of 557,763 MWh electricity and a total amount of 286,690 tCO₂e of emission reduction.

According to the methodology¹, baseline scenario was identified as “the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources”.

Table 1. Milestones of AKINCI HYDROELECTRIC POWER PLANT

Milestone	Date
Stake Holder Consultation Meeting is held in Reşadiye - Tokat	22/11/2007
EIA Affirmative certification issued	18/03/2008
The EMRA decision for expropriation issued	18/09/2008
Water usage agreement signed with DSI ²	15/12/2011
The Electricity Production Licence is granted	28/03/2012
The EIA Title Change Approved	09/07/2012
Amendment to the Water Usage Agreement Signed	14/09/2012
BRK Group acquired the project	08/03/2013 ³
The Special Provincial Authority is informed about the construction start up	29/07/2013
DOE Contracted for Validation	18/03/2014
First segment of Loan is utilized Official	24/09/2014
Site visit	17/08/2023

¹ <https://cdm.unfccc.int/UserManagement/FileStorage/A04BWNRLUEP6O1QX75YVTH28JDICZ>

² DSI-Devlet Su İşleri –General Directorate of State Hydraulic Works is the institution responsible for all the ground and surface water resources of the host country.

³ Date identified as the investment decision date.

Milestone	Date
System Usage Agreement	22/02/2021
Provisional acceptance letter of Unit 1 and Unit 2	24/10/2018
Provisional acceptance letter of Unit 3	24/01/2019
The first crediting period	24/10/2018 – 23/10/2028
Third monitoring period (current)	01/10/2021 – 31/07/2023

Project boundary is shown in the figure below.

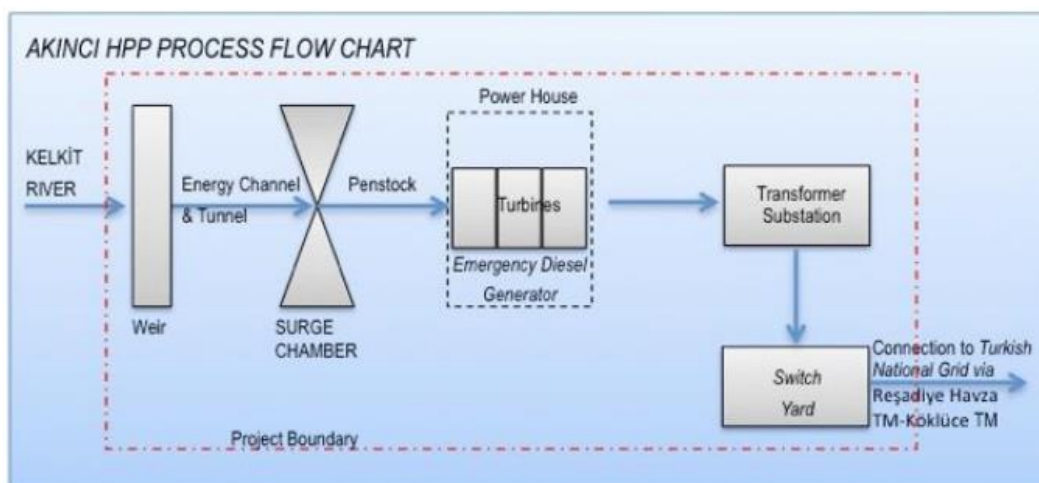


Figure 1. Project boundary

The table below exhibits the gases included in the project boundary. CO₂ emission is included in the baseline but the project activity does not emit any of the gases listed. The project boundary includes net electricity generated and supplied to the Turkish national grid.

Source	GHGs	Included?	Justification/Explanation
Electricity generation by the grid connected power plants	CO ₂	Yes	Major emission source.
	CH ₄	No	Minor emission source.
	N ₂ O	No	Minor emission source.
Emission from the reservoir of the proposed project	CO ₂	No	Minor emission source.
	CH ₄	No	Minor emission source.
	N ₂ O	No	Minor emission source.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/verification	24/10/2018 – 23/10/2028 (1 st crediting period)	<u>VCS</u>	<u>TÜV Rheinland (China) Ltd.</u>	10
Verification	24/10/2018 – 30/09/2020 (1 st monitoring period)	<u>VCS</u>	<u>KBS Certification Services Pvt. Ltd.</u>	2
Verification	01/10/2020 – 30/09/2021 (2 nd monitoring period)	<u>VCS</u>	<u>Carbon Check</u>	1
Verification	01/10/2021 – 31/07/2023 (3 rd monitoring period)	<u>VCS</u>	<u>Re-carbon Ltd.</u>	≥ 2 (1 year and 10 months)
Total	-	-	-	≥ 15 (14 years and 10 months)

1.3 Sectoral Scope and Project Type

Sectoral scope ⁴	Sectoral Scope 1: Energy industries (renewable-/non - renewable sources)
Project activity type	The project type is grid connected electricity generation from renewable sources. The project is a non-grouped, stand-alone project.

This is non-AFOLU Project.

Sectoral scope	
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⁴ Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

AFOLU project category ⁵	
Project activity type	

1.4 Project Proponent

Organization name	Aydem Yenilenebilir Enerji A.Ş. ⁶
Contact person	Özgün Gül Koparan
Title	Environmental Affairs Manager
Address	Adalet Mah. Hasan Gönüllü Bulvarı No:15-1 Merkezefendi Denizli-Turkey
Telephone	+90 258 242 27 76
Email	ozgun.gulkoparan@aydemenerji.com.tr

1.5 Other Entities Involved in the Project

Organization name	GTE Karbon Sürdürülebilir Enerji Eğt. Dan. ve Tic. A.Ş.
Role in the project	Project consultant
Contact person	M. Kemal Demirkol
Title	Director
Address	Mustafa Kemal Mah. 2111. Sok. No: 5 06530 Cankaya - Ankara – TURKEY
Telephone	+90 312 514 63 63
Email	kemal.demirkol@gte.com.tr

1.6 Project Start Date

Project start date	24-October-2018
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⁵ See Appendix 1 of the VCS Standard

⁶ Bereket Energy was the major shareholder of Fırat Elektrik Üretim and as the Bereket Changed title as a company policy they have dissolved all the individual sister companies that hold licences of facilities (like the Akıncı HPP) and changed the ownership as Aydem Yenilenebilir A.Ş.

Justification	Project start date is 24-October-2018, which is the provisional acceptance date.
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1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☒ Ten years, fixed ☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	24-October-2018 to 23-October-2028 (both days included)

1.8 Project Location

The host party is the Republic of Turkey. The Project is located at the Black Sea Geographical Region/Tokat Province. The nearest settlement to the project activity is Mutluca Village which is 3 km far from the project activity.

The exact coordinates of the main project structures can be seen in the table below.

Table 2. Coordinates of the main project structures

	Weir Point 1	Weir Point 2	Power House
Latitude	40°23'44.16"N	40°23'48.01"N	40°26'23.86"N
Longitude	37°18'55.93"E	37°18'54.10"E	37°06'53.28"E

The location of the project is shown in figures below.



Figure 2. Project location

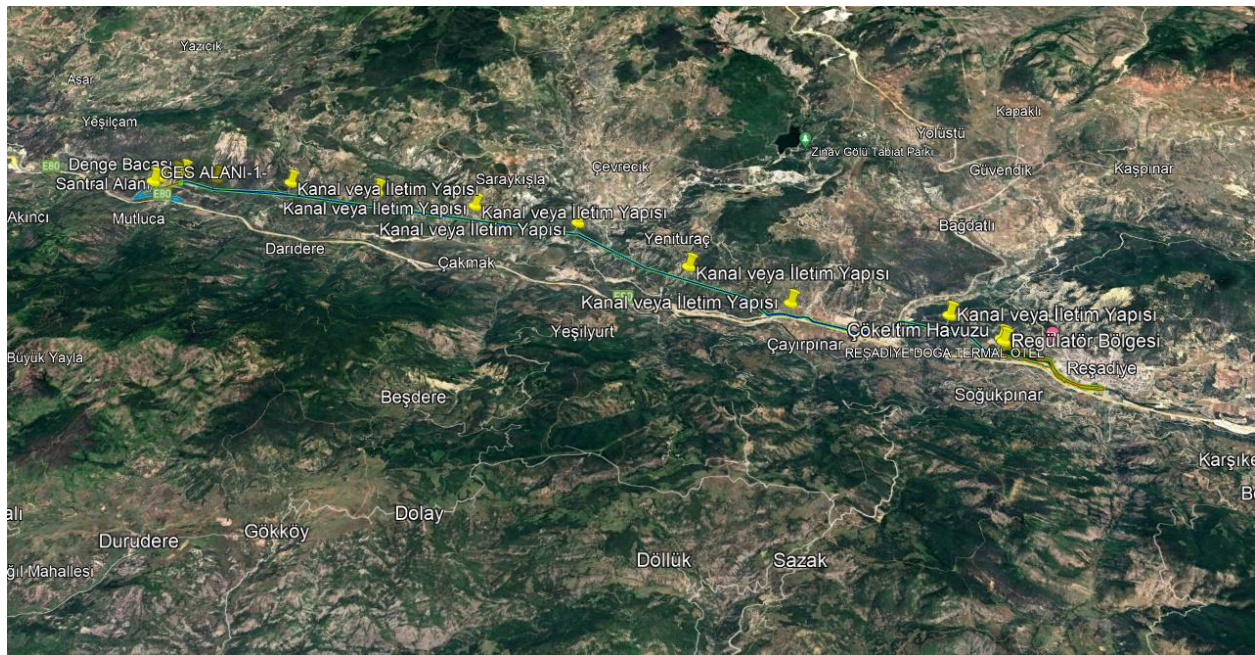


Figure 3. Project location

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
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Methodology	ACM0002	ACM0002 “Large-scale Consolidated Methodology; Grid-connected electricity generation from renewable sources.” ⁷	15.0.0
Tool	Tool01	“Tool for the demonstration and assessment of additionality” ⁸	7.0
Tool	Tool07	“Tool to calculate the emission factor for an electricity system” ⁹	4.0

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.11 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

⁷ <https://cdm.unfccc.int/UserManagement/FileStorage/52FDLM8C49Q3TBSOIJYPVH16ER0UAW>

⁸ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

⁹ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf>

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through the Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."

☐ Yes ☒ No

1.12 Sustainable Development Contributions

The project aims to generate energy source by reducing the dependence on fossil fuels without producing air pollution or toxic by-products. Hydroelectric Power Plant supplies the increasing national electricity demand in a cleaner and sustainable manner.

The following is a list of the project's contribution to the UN SDG:

- SDG-7 on access to affordable, reliable, and sustainable energy, as the project is not relying on imported fossil fuels.
- SDG-8 is to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. In this project, occupational trainings and occupational health trainings were given regularly. The project providing decent and secure work environment.
- SDG-12 is to ensure sustainable consumption and production patterns. As sustainable consumption and production aims the transition towards low-carbon and green economies, this project directly adapt it since hydroelectric power plants significantly contribute to the reduction of GHGs.
- SDG-13 On urgent action to combat climate change, as the project is replacing the fossil fuel based national grid and it is producing emission reductions.
- SDG 14-Supporting life below water as the project activity is not effected on water quality. No pollution from any source will be emitted into the river from the operation of the plant. All activities related to fuels and oils is done in a drained area to prevent leakage, and the drained excess fuels and oils will be transferred to waste treatment facilities.
- SDG 15- Supporting life on land: Any Natural Parks, Wetlands, Natural Monuments, Nature Protected Areas, Wildlife Protected Areas, Biogenetic Reserve Areas, Biosphere Reserves, Natural Sites, Special Environmental Protection Areas have not been destroyed or effected from the project.
- SDG-17-Strengthen the means of implementation and revitalize the global partnership for sustainable development. The project contributes to sustainable development in two major ways in Turkey:

Akinci HPP presents environmental benefits:

- As a renewable energy source hydropower can be used without jeopardizing the supply of primary energy sources in the future
- The proposed project will significantly contribute to the reduction of GHGs.
- Generating electricity from hydropower energy does not result in emissions of pollutants into the atmosphere with zero residuals that carry adverse impacts on soil, water etc.

Akinci HPP presents significant socio-economic benefits:

- In the construction phase of Akinci HPP and operation of the plant resulted in the need of extra employment in the local area. Priority is given to local labor force and necessary trainings is organized to improve vocational capacity of the workers.
- Construction materials are, if possible, supplied through local resources

• Table 3: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	The project generated 557,763.41 MWh electricity from hydropower which is a renewable source during the monitoring period	The project generated 1,531,291.56 MWh electricity from hydropower which is a renewable source from the start of the project until the end of this monitoring period
2)	8.5	Job opportunities created	Implemented activities to increase	Due to the activity of the power plant, 18 people were employed. ¹⁰	Due to the activity of the power plant, 18 people were employed during the monitoring period
3)	12	Responsible consumption and production is provided	Implemented activities to increase	The consumption and production has been responsibly continued during this monitoring period	The consumption and production has been responsibly continued during the project activity
4)	13.3	Tonnes of greenhouse gas emissions avoided	Implemented activities to increase	By generating electricity from clean sources, project has prevented 286,690 tCO ₂ into the atmosphere during the monitoring period	Prevented the release of 787,082 tonnes of CO ₂ into the atmosphere from the start of the project until the end of this monitoring period

¹⁰ Social security records showing the employment

5)	14.1	Life below water has taken into account	Implemented activities to increase	No pollution from any source is emitted into the river from the operation of the plant. All activities related to fuels and oils is done in a drained area to prevent leakage, and the drained excess fuels and oils are transferred to waste treatment facilities.	No pollution from any source is emitted into the river from the operation of the plant. All activities related to fuels and oils is done in a drained area to prevent leakage, and the drained excess fuels and oils are transferred to waste treatment facilities.
6)	15	Life on land has taken into account	Implemented activities to increase	Any life area on land have not been destroyed or effected from the project during this monitoring period.	Any life area on land have not been destroyed or effected from the project during the project activity.
7)	17	Partnerships for the goals are prioritized	Implemented activities to increase	The project activity presents environmental and socio-economic benefits.	The project activity presents environmental and socio-economic benefits.

1.13 Commercially Sensitive Information

There is no commercially sensitive information about the project.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	Through consultation meetings, stakeholders are identified.
Legal or customary tenure/access rights	No expropriation was required during the implementation period. There are no lands which was occupied by IPs.
Stakeholder diversity and changes over time	There is no change over time and stakeholder diversity was identified during the consultation meetings.
Expected changes in well-being	The project does not have any negative impacts.
Location of stakeholders	Reşadiye, Tokat, Turkey
Location of resources	Reşadiye, Tokat, Turkey

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	The relationship with the local stakeholders deemed to be very important and before the project was implemented a stakeholder's consultation meeting was held at the project site.
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Date(s) of stakeholder consultation	22-November-2007 at 15:00
Communication of monitored results	Every month the PP consults with local stakeholders at the box locations and discuss their grievances as well as positive comments. During the monitoring period there were no complaints about or demands from the project.
Consultation records	There was a “grievance box” in a gas station within the vicinity of the project for a continuous grievance policy that is implemented by the project owner.
Stakeholder input	There was not any negative comments for the project.

2.1.3 Free, Prior, and Informed Consent

Consent	In these meetings general information about the construction site, duration of the construction and cost of the project, technical information about the equipment's to be used at the project, the potential environmental impacts and the measures to be taken are presented to the stakeholders.
Outcome of FPIC	There is no outcome for FPIC.

2.1.4 Grievance Redress Procedure

No grievance has been raised during the monitoring period of this project.

Grievances received	Resolution and outcome
No grievance has been received.	There is no resolution or outcome since there is no grievance received.

2.1.5 Public Comments

Summary of comments received	Actions taken
No comment received from the stakeholders	Since there is no comment received from the stakeholders, no actions have been taken.

2.2 Risks to Stakeholders and the Environment

	Risk identified	Mitigation or preventative measure taken
Risks to stakeholder participation	There is no risk identified.	No mitigation or preventative measure should be taken since there is no risk identified for stakeholder participation.
Working conditions	There is no risk identified.	No mitigation or preventative measure should be taken since there is no risk identified about working conditions.
Safety of women and girls	There is no risk identified.	No mitigation or preventative measure should be taken since there is no risk identified for the safety of women and girls.
Safety of minority and marginalized groups, including children	There is no risk identified.	No mitigation or preventative measure should be taken since there is no risk identified for the safety of minority and marginalized groups, including children.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	There is no risk identified.	No mitigation or preventative measure should be taken since there is no risk identified about the pollutants.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	No discrimination or sexual harassment has occurred.
Management experience	The necessary trainings are provided to the employees.

Gender equity in labor and work	Equal opportunities have been provided in the context of gender equity and pay for labor and work. The project creates local and regional employment both during the construction phase and operational phase. The project proponent employed 35 workers during the construction phase and 10 workers during the operation phase prioritizing local employment for the works which do not require high skilled staff.
Human trafficking, forced labor, and child labor	Project does not use victims of human trafficking, forced labor, and child labor. Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements. If any complaint is received by the PO, they will act on the issue right away throughout the lifetime of project activity.

2.3.2 Human Rights

The PO recognizes, respects, and promotes the protection of the rights of LCs, and customary rights holders in line with applicable international human rights law. Türkiye has ratified ILO convention¹⁹. PO will never be complicit in violence or human rights abuses. If any complaint is received by the PO, they will act on the issue right away throughout the lifetime of project activity.

2.3.3 Indigenous Peoples and Cultural Heritage

There are no lands which was occupied by IPs.

2.3.4 Property Rights

No expropriation was required during the implementation period. There are no lands which was occupied by IPs. The project site is not a private land.

Disputes over rights to territories and resources	N/A
Respect for property rights	No expropriation was required during the implementation period.

2.3.5 Benefit Sharing

The project does not impact property rights. So this section is N/A

Summary of the benefit sharing plan	The project does not impact property rights; therefore, there is no benefit sharing plan.
Benefit sharing during the monitoring period	There is no benefit sharing during the monitoring period.

2.4 Ecosystem Health

	Risk identified	Mitigation or preventative measure taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified	No mitigation or preventative measure should be taken during the monitoring period since there is no risk identified.
Soil degradation and soil erosion	No risk identified	No mitigation or preventative measure should be taken during the monitoring period since there is no risk identified.
Water consumption and stress	No risk identified	No mitigation or preventative measure should be taken during the monitoring period since there is no risk identified.
Usage of fertilizers	No risk identified	No mitigation or preventative measure should be taken during the monitoring period since there is no risk identified.

2.4.1 Rare, Threatened, and Endangered species

Necessary precautions are taken for the species under conservation by international conventions, the field is regularly observed in terms of any change and irregularity of the biodiversity. Regular ecosystem reporting mechanism is applied for the field.

Species or habitat	Necessary precautions are taken for the species under conservation by international conventions, the field is regularly observed in terms of any change and irregularity of the biodiversity. Regular ecosystem reporting mechanism is applied for the field.
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2.4.2 Introduction of species

No adverse effects from the introduction of species identified at validation are specified; thus, this section is N/A.

Species introduced	Classification	Justification for use	Adverse effects and mitigation
N/A	N/A	N/A	N/A

There is no invasive species in the project location; thus, this section is N/A.

Existing invasive species	Mitigation measures to prevent spread or continued existence of invasive species
N/A	N/A

2.4.3 Ecosystem conversion

The project is not an AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project start date is 24/10/2018. Unit 1 and Unit 2 was commissioned in 24/10/2018. Unit 3 was commissioned in 24/01/2019 which is also connected to Akinci Hydroelectric Power Plant. Since that date, there is no special event that may have impact on monitoring of GHG emission reductions. The

Akinci HEPP generated 557,763.41 MWh of net electricity during this monitoring period, which is between 01-October-2021 and 31-July-2023 (278,881.705 MWh/year).

The properties of the project activity are given in the table below.

Weir Information	
Regulator Type	Controlled with radial gates
Maximum and Minimum Operating Level	484 m and 371 m
Transmission Structure Type	Cannal + Conduit + Tunnel
Transmission Structure Length	17,744.92 m
Turbine Information	
Turbine Type	Vertical Axis Francis
Number of Units	3
Gross Head	105.90 m
Net Head	104.30 m
Project Flow Rate	35 m ³ /sec
Generator Information	
Installed Capacity	99 MWe
Total Energy	439,360 MWh
Total Production Hours	4437 h
Dam Voltage	3 x 10.6 kV ; 1 x 6.3 kV
Energy Transmission Line Section	154 kV
Energy Transmission Line Length	4 km

Meter details have been given in the table below.

Table 4. Properties of the Meters

Properties	Main Meter	Spare Meter
Serial no.	7019918	7019919
Brand	EMH	EMH
First Index Protocol	25/10/2018	25/10/2018
Date of previous calibration	14/11/2017	14/11/2017
Calibration date	19/11/2020 ¹¹	19/11/2020
Due Date of Calibration Date	18/11/2022	18/11/2022
New calibration date	21/11/2022	21/11/2022
Class	0.2S	0.2S

The single line diagram of the project activity is provided in the figure below.

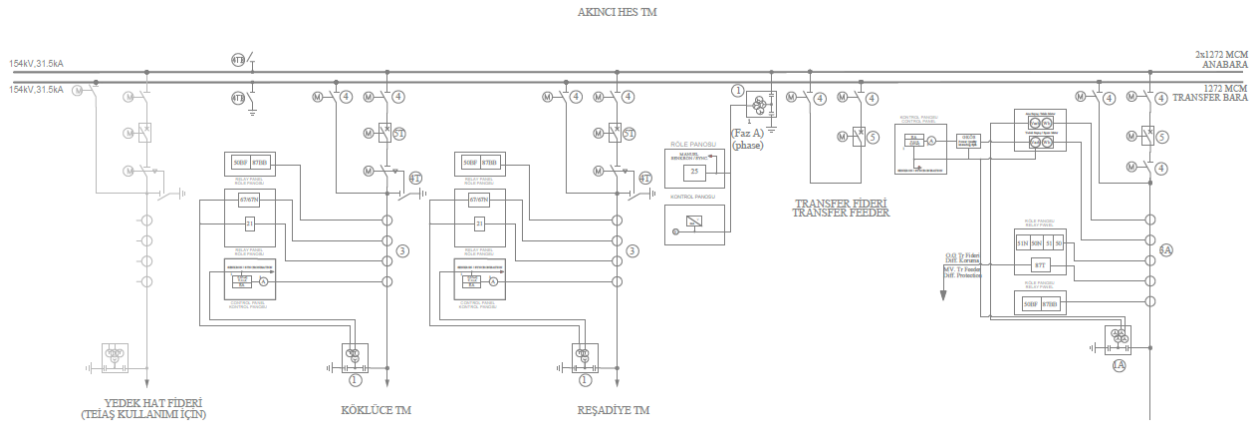


Figure 4. Single Line Diagram of the PA

¹¹ <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5>

3.2 Deviations

3.2.1 Methodology Deviations

The UNFCCC methodology of ACM0002/Ver 15.0.0 and its related tools have been applied without many deviations.

With the exception of the following monitoring parameter; A_{PJ} – Area of the reservoir measured in the surface of the water (when the reservoir is full).

The rational for this can be explained as follows:

Although the methodology (ACM0002, ver 15.0.0) requires reservoir area to be monitored, since the power density of the project activity is very large, the A_{PJ} parameter is not monitored during the crediting period of Akıncı HEPP. The deviation was accepted during validation and can be confirmed from the validated PD (version 2.0).

3.2.2 Project Description Deviations

Bereket Energy was the major shareholder of Fırat Elektrik Üretim and as the Bereket Changed title as a company policy they have dissolved all the individual sister companies that hold licences of facilities (like the Akıncı HPP) (05/07/2019). Then, title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş which is the current project proponent (27/12/2019).

Other than that, the project activity is in compliance with the scenario described at the Project Description and validated by the validation report dated 08/12/2014.

3.3 Grouped Projects

The project category is Sectoral Scope 1: Energy industries (renewable–non -renewable sources). The project is a non-grouped, standalone project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes

☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data - Parameter	$FC_{i,y}$
Data unit	Volume Unit (cubic meter)
Description	Amount of fuel i consumed by relevant power plants in Turkey in years, 2010, 2011, 2012.
Source of data	Official publications at the Turkish Electricity Transmission Company (TEİAŞ) Web Site ¹²
Value applied	Please see Annex 2-Table-1 in the validated PD.
Justification of choice of data or description of measurement methods and procedures applied	Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PD to the DOE for validation
Purpose of Data	Data used for the calculation of $EF_{grid,OM,Simple,y}$
Comments	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.

Data - Parameter	$NCV_{i,y}$
Data unit	GJ-Mass or Volume Unit
Description	Net Calorific Values for fossil fuel type i in year, for the years 2010, 2011 and 2012
Source of data	Regional or national average default values that are reliable and documented in national energy statistics of the Turkish Electricity Transmission Company Web Site ¹³
Value applied	Please see Annex-2-Table-5 in the validated PD (version 2.0)
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.

¹² <https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri>

¹³ <https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri>

Purpose of Data	Data used for the calculation of $EF_{grid,OM,Simple,y}$
Comments	As data on the NCV is not published directly on the TEİAŞ website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year.

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 Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied	Please see Annex-2,Table-2 in the validated PD.
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” version 04.0.0 , 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	Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$
Comments	-

Data - Parameter	EG_y
Data unit	MWh
Description	Net electricity generated in the project electricity system in other words, net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost - must-run power plants - units, in year y
Source of data	Turkish Electricity Transmission Company Web Site ¹⁴
Value applied	Please see Appendix-2-Table 3 and Table 4 in validated PD version 2.00.
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	Data used for the calculation of $EF_{grid,OM,Simple,y}$

¹⁴ <https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri>

Comments	-
Data - Parameter	$EG_{m,y}$
Data unit	MWh
Description	Net electricity generated and delivered to the grid by power unit m in year y
Source of data	Turkish Electricity Transmission Company Web Site (www.teias.gov.tr). Data is extracted from the relevant annexes of the capacity projection reports for the years 2010, 2011 and 2012 ¹⁵ .
Value applied	Please see Appendix-2-Table 8 in validated PD version 2.00.
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	Data used for the calculation of $EF_{grid,BM,y}$
Comments	-

Data - Parameter	$\eta_{m,y}$
Data unit	-
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	The default values provided at the Annex 1 of the “Tool to calculate emission factor for an electricity system (Version 04.0.0)” are used
Value applied	Please see Annex 1 of the “Tool to calculate emission factor for an electricity system (Version 04.0.0)”
Justification of choice of data or description of measurement methods and procedures applied	According to the “Tool to calculate emission factor for an electricity system”, Version 04 if documented manufacturer’s specifications or data from the utility, the dispatch center or official records are not available then the default values given in Annex 1 of the tool shall be used. The first two options are not available for the power plants supplying the Turkish grid, therefore the default values are used.
Purpose of Data	Data used for the calculation of $EF_{grid,BM,y}$
Comments	-

¹⁵ <https://www.elektrikport.com/uploads/content/TEIAS%20Uretim%20Kapasite%20Projeksiyonu%202011-2020.pdf>

4.2 Data and Parameters Monitored

Data - Parameter	EGPP-Gross Generation, y																					
Data unit	MWh																					
Description	Quantity of electricity exported by the power plant to the Grid in year y																					
Source of data	The Primary source of data is the EPIAS screenshots and the cross-check source is TEİAŞ meter readings.																					
Description of measurement methods and procedures to be applied	Measurements are to be made by an electricity meter that belongs to the grid operator, TEİAŞ. There is one main meter that record the electricity import and export. The meter is in compliance with the collected data. Data is used to calculate the net electricity supplied to the grid. The meter readings are accessible via an Automatic Meter Reading Software remotely by the project owner. The data is also automatically recorded to the EPIAŞ-MFRC servers to be obtained as monthly screen outputs. As a general practice, only the main meter readings are accessible but there is also one back up meter to ensure that data recording in case of main meter failure, are not interrupted.																					
Frequency of monitoring-recording	Recorded continuously, read remotely by TEİAŞ, and accessible monthly via the EPIAŞ-MFRC web site, Reported annually on the Monitoring Report.																					
Value monitored	558,062.30 MWh																					
Monitoring equipment	<table><tr><th>Properties</th><th>Main Meter</th><th>Spare Meter</th></tr><tr><td>Serial no.</td><td>7019918</td><td>7019919</td></tr><tr><td>Brand</td><td>EMH</td><td>EMH</td></tr><tr><td>First Index Protocol</td><td>25/10/2018</td><td>25/10/2018</td></tr><tr><td>Calibration date</td><td>19/11/2020₁₆</td><td>19/11/2020</td></tr><tr><td>Last calibration Date</td><td>21/11/2022</td><td>21/11/2022</td></tr><tr><td>Class</td><td>0.2S</td><td>0.2S</td></tr></table>	Properties	Main Meter	Spare Meter	Serial no.	7019918	7019919	Brand	EMH	EMH	First Index Protocol	25/10/2018	25/10/2018	Calibration date	19/11/2020 ₁₆	19/11/2020	Last calibration Date	21/11/2022	21/11/2022	Class	0.2S	0.2S
Properties	Main Meter	Spare Meter																				
Serial no.	7019918	7019919																				
Brand	EMH	EMH																				
First Index Protocol	25/10/2018	25/10/2018																				
Calibration date	19/11/2020 ₁₆	19/11/2020																				
Last calibration Date	21/11/2022	21/11/2022																				
Class	0.2S	0.2S																				

¹⁶ <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5>

	Both the main meter and the backup meter is in compliance with the communiqué for Metering Devices to be used in the Electricity Market.
QA-QC procedures to be applied	Measurements is carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The monthly reported meter reading by the main meter, is cross-checked against the Main back up meter by a technician that visits and record the backup meter readings on a monthly basis.
Purpose of the data	Data is used to calculate net electricity supplied to the grid.
Calculation method	Direct continuous measurement
Comments	-

Data - Parameter	EGPP-self consumption, y
Data unit	MWh
Description	Quantity of electricity imported by the power plant from the Grid for self-consumption, in year y
Source of data	The Primary source of data is the TEIAS meter readings recorded remotely and accessible via the EPIAŞ-MFRC web site .
Description of measurement methods and procedures to be applied	Measurements are to be made by an electricity meter that belong to the grid operator, TEIAS. There is one bidirectional meter that record the electricity imported from the grid. The meter is in compliance with the collected data. Data is used to calculate the net electricity supplied to the grid. The meter reading is accessible via an Automatic Meter Reading Software remotely by the project owner. The data is automatically recorded to the EPIAŞ- servers to be obtained as monthly screen outputs. As a general practice, only the main meter readings are accessible but there is also one back up meter to ensure that data recording in case of main meter failure, is not interrupted.
Frequency of monitoring-recording	Recorded continuously, read remotely by TEIAS, and accessible monthly via the EPIAŞ- web site, Reported annually on the Monitoring Report.
Value monitored	298.89 MWh
Monitoring equipment	Both the main meter and the backup meter is in compliance with the communiqué for Metering Devices to be used in the Electricity Market
QA-QC procedures to be applied	Measurements is carried out in compliance with the communiqué for Metering Devices to be used in the Electricity Market. The monthly reported meter reading by the main meter, is cross-

	checked against the Main back up meter by a technician that visits and record the backup meter readings on a monthly basis.
Purpose of the data	Data is used to calculate net electricity supplied to the grid.
Calculation method	Direct continuous measurement
Comments	-

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 computers with SCADA system and the turbine name plates.
Description of measurement methods and procedures to be applied	Observed via the SCADA system of the project activity.
Frequency of monitoring-recording	Once for each monitoring period
Value monitored	99,000,000 W
Monitoring equipment	SCADA System of the Project activity
QA-QC procedures to be applied	Turbine labels checked with SCADA System reading.
Purpose of the data	To monitor capacity of the project
Calculation method	N-A
Comments	

4.3 Monitoring Plan

Objectives of the monitoring program

The Monitoring plan is developed to ensure that the Project Activity is well organized from the start in terms of the collection and archiving of complete and reliable data that is needed to ensure reliable and accurate measurements of actual emission reductions.

Data to be monitored

Given that the emission factor is calculated on an ex-ante basis, the first data to be monitored is the electricity net supplied to the grid. The second data to be monitored is the installed capacity of the Project Activity. Using the SCADA system installed capacity is measured automatically.

Monitoring procedures

The monitoring is conducted by the Verified Emission Reduction (VER) Monitoring Team. The VER Team Members, and their position and duties for the monitoring is outlined in the following Table.

Table 5. Positions and responsibilities of the VER monitoring team members.

Position	Responsibility
Akinci HPP Manager	- Day to day operation of the Akinci HPP, - Compliance of the project activity with the host country rules and regulations - Coordination of the data collection and recording for the monitoring report.
Chief Electrical Technician	- Day to day follow up of electrical equipment - Recording and monitoring of the electricity generation data via the meters located at the Akinci Powerhouse. - Making regular checks of the consistency of the backup meters to ensure the operation of the main meters.
Accounts Manager	- Data keeping for power sales - Extracting the main meter readings from the EPIAŞ-MFRC website with the help of the account credentials assigned to the project owner.
Chief Mechanical Technician	- Day to day operation of the power plant - Keeping records of malfunctions and repairs
Carbon Consultant	- Emission reduction calculations - Scripting of the periodic monitoring report - Follow up of the verification process

The power imported from the grid and exported to the grid is planned to be recorded continuously via one bidirectional meter that belongs to the Grid operator TEİAŞ. The data is measured continuously and recorded on an hourly basis to the EPIAŞ-MFRC servers. Data can be accessed remotely via the Automated Meter Reading Software installed to the project owners' computers but is also continuously recorded to the EPIAŞ-MFRC servers. Each month the internal and external consumption recorded hourly by the meters are extracted the EPIAŞ-MFRC servers automatically calculate the overall grid loss of the country and reflect it in the monthly meter reading outputs of each meter, alongside with the direct meter readings. The amount indicated with loss are not used in the emission reduction calculations as the loss calculated by the grid operator is beyond the project boundary.

Monitoring equipment

Data was being monitored continuously by redundant metering devices, which was provide the data for the monthly invoicing to TEİAŞ. All meters were in compliance with the communiqué for Metering Devices to be used in the Electricity Market¹⁷. Meters' location can be seen in single line diagram (Appendix 1). Information about the meters is given in the table below.

Table 6. Properties of the Meters

Properties	Main Meter	Spare Meter
Serial no.	7019918	7019919
Brand	EMH	EMH
First Index Protocol	25/10/2018	25/10/2018
Date of previous calibration	14/11/2017	14/11/2017
Calibration date	19/11/2020 ¹⁸	19/11/2020
Due Date of Calibration	18/11/2022	18/11/2022
Test date	21/11/2022	21/11/2022
Class	0.2S	0.2S

¹⁷ The latest version of the communiqué (in Turkish) can be found in the following link:
<https://www.epdk.gov.tr/Detay/Icerik/3-0-0-128/tebligler>

¹⁸ <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5>

Electricity meters

The main and back-up electricity meter is bi-directional for quantifying the electricity delivered by the Project Activity to the grid. The meters are in compliance with the standards of the Turkish Standards Institute and have obtained a “Type and System Approval” certificate from the Ministry of Trade and Industry. In case there are modifications to the standards, the modified standard shall be valid; and in case a valid standard is cancelled or abolished, the new standard shall be valid. The standards that are used are TS-620 EN 60044-1 and TS718 IEC60044.2 for main and back-up meter, respectively. The meters shall be factory calibrated by the manufacturer before installation. Records of the meter (type, made, model and calibration documentation) are retained in the quality control system.

Data collecting and recording

I. The net electricity generation by the project activity. Based on the baseline scenario presented above, this amount of electricity would have been produced by the Turkish National Grid. The electricity produced is exported to TEİAŞ. Therefore, TEİAŞ measures the electricity produced. TEİAŞ also conducts the calibration and maintenance of the meters and thus, ensures the accuracy and quality of the measurements. The quality standards that the meters need to comply is “The ICE-TSE 62053-22: Electricity metering equipment (a.c) – Particular requirements - Part 22: Static meters for active energy (Classes 0,2 S and 0,5 S)” The calibration of the meters are done and the meters are checked continuously if there is a difference of ± 0.5 % in the readings of the main and the back-up meters, the calibration is repeated. Calibrations are done according to the Measuring Instruments Directive¹⁹. Calibration of the meters are valid for 10 years based on Regulation on Metering and Metering Devices²⁰.

At the end of each month, the monthly generation is accessed remotely via the EPIAŞ-MFRC web site by the Project owners account manager to determine the invoiced generation amount. In case of failure of any of the main meters, their relevant control meters are used to determine the invoiced generation amount. The net electricity produced ($EG_{PP-net, y}$) in year y is calculated by subtracting the total electricity consumed by the hydroelectric power plant ($EG_{PP-self\ consumption, y}$) , from the gross electricity generation ($EG_{PP-gross, y}$) . After obtaining the net electricity production value, the emission reductions are calculated by multiplying the net electricity with the Ex-ante Combined Margin Emission Factor calculated above.

¹⁹ Regulation on Measuring And Measuring Instruments (Official Gazette Date & No : 25/07/1994 & 22000)
<https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5>

²⁰ Regulation on Measuring And Measuring Instruments (Official Gazette Date & No : 25/07/1994 & 22000)
<https://www.mevzuat.gov.tr/anasayfa/MevzuatFihristDetayIframe?MevzuatTur=7&MevzuatNo=6381&MevzuatTertip=5>

All data collected as part of monitoring is archived electronically and kept at least for 2 years after the end of the last crediting period. The company establishes a dedicated maintenance system to ensure the data availability for the required period.

Measuring Installed Capacity

By means of the SCADA system established in the plant all kinds of technical parameters related with turbines and generators including installed capacity is measured and stored in the system on real time basis. The installed capacity of the plant is measured from SCADA once a year while the plant is operated with full load and the related data is stored as per the monitoring program.

Data management

At the end of each month, electricity supplied to the grid is transferred into an electronic spread sheet titled raw data, so that it can be processed for verified emission reduction calculations. The data to be measured for installed capacity is entered into an electronic spread sheet at the end of each year. The electronic files are backed up on both hard drives and on a Compact Discs (CD).

Quality Control and Assurance (QC-QA)

All of the main and back-up meters are owned and installed by the grid operator, TEIAS. The Project Owner has signed an agreement with the grid operator to specify the QA procedure for measurement and calibration to ensure the measurement accuracy of the main and back-up meters are in compliance with national regulations. The Calibrations of the electricity meters are valid for the next 10 years after calibration, the grid operator's Metering Officer should be notified of any failure of one of the meters. TEIAS is the only one entity, authorized to deal with fixing, calibrating, or changing the meters, which are done either by the grid operator or by a company authorized by the grid operator.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emission is calculated according to the formula

$$BE_y = EG_y \times EF_y$$

Where:

EG_y = Net electricity delivered to the grid by the project activity in year y excluding transmission losses of the grid.

EF_y = Emission factor calculated according to selected methodology

$$557,763.41 \text{ MWh} \times 0.514 \text{ tCO}_2/\text{MWh} = 286,690 \text{ tCO}_2$$

$$BE_y = 286,690 \text{ tCO}_2$$

5.2 Project Emissions

As per ACM0002 "Grid-connected electricity generation from renewable sources", v15.0.0,

"For most renewable energy project activities, PE_y = 0. However, for the following categories of project activities, project emissions have to be considered following the procedure described in the Version 15.0.0 of ACM0002.

- Emissions related to the operation of geothermal power plants (e.g. non-condensable gases, electricity/fossil fuel consumption)
- Emissions from water reservoirs of hydro power plants"

Therefore, as per ACM0002: Grid-connected electricity generation from renewable sources, v15.0.0

The proposed project activity involves the generation of electricity by hydroelectric power plant therefore project activity does not result in greenhouse gas emissions.

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

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)

- Since this project uses hydroelectric power, PE_{GP,y} is "0" (t CO₂/yr)

- The only emission source in the plant is the diesel generator which is used as auxiliary power source when there is no electricity generation in the plant or supply by the grid. In urgent cases, a diesel powered generator will be operated for the daily consumption of personnel and the building, which is negligible. Project emissions are taken as zero. The same is also stated in para 33 of “ACM0002: Grid-connected electricity generation from renewable sources”. Hence it is neglected. Therefore; $PE_{FF,y} = 0$ (t CO₂/yr).

Beside of the diesel generator, other potential project emission for this proposed project is $PE_{HP,y}$.

However, if the power density of the project activity is greater than 10 W/m² than $PE_{HP,y} = 0$.

Therefore, as per ACM0002: Grid-connected electricity generation from renewable sources, v15.0.0:

The proposed project activity involves the generation of electricity by hydroelectric power plant therefore project activity does not result in greenhouse gas emissions. Power density of the projects higher than 10 W-m² for 99 MWe installed capacity and 150,000 m² maximum lake area.

The power density of the project activity (PD) is calculated as follows (Equation 3 in the applied methodology):

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity (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.

For proposed project HEPP,

Cap_{PJ} = 99,000,000 We

Cap_{BL} = 0.0 W

$$A_{PJ} = 150,000 \text{ (m}^2\text{)}^{21}$$

$$A_{BL} = 0.0 \text{ (m}^2\text{)}$$

Therefore, PD is calculated as;

$$PD = \frac{99,000,000 - 0}{150,000 - 0}$$

$$PD = 660 \text{ W - m}^2$$

5.3 Leakage Emissions

The energy generating equipment is not transferred from or to another activity. Therefore, leakage is also considered as “0”.

$$LE_y = 0$$

5.4 GHG Emission Reductions and Carbon Dioxide Removals

Total Emission Reduction has been determined as;

$$ER_y = BE_y - PE_y - LE_y$$

Where;

ER_y = Emission reductions in year y (tCO₂)

BE_y = Baseline emissions in year y (tCO₂)

PE_y = Project Emissions in year y (tCO₂)

LE_y = Leakage emissions in year y (tCO₂)

The project emissions and leakage are considered as “0”. Thus, ER_y = BE_y

²¹ Ayrancilar HEPP reservoir area, Google Earth

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)
01-October-2021 to 31-December-2021	5,856	0	0	5,856	0	5,856
01-January-2022 to 31-December-2022	162,941	0	0	162,941	0	162,941
01-January-2023 to 31-July-2023	117,893	0	0	117,893	0	117,893
Total	286,690	0	0	286,690	0	286,690

For projects required to assess permanence risk:

i) Provide the requested information using the table below:

State the non-permanence risk rating (%)	N/A
Has the non-permanence risk report been attached as either an appendix or a separate document?	☐ Yes ☒ No
For ARR and IFM projects with harvesting, state, in tCO ₂ e, the Long-term Average (LTA).	N/A
Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No
State, in tCO ₂ e, the expected total GHG benefit to date.	N/A
If a loss occurred (including a loss event or reversal), state the amount of tCO ₂ e lost:	N/A

Vintage period	Ex-ante estimated reductions/removals (tCO ₂ e)	Achieved reductions/removals (tCO ₂ e)	Percent difference	Explanation for the difference
01-October-2021 to 31-December-2021	56,458	5,856	89.6	Since the project is a HEPP, seasonal effects are significant on the monthly generation rates and deviations from the calculated values are acceptable.
01-January-2022 to 31-December-2022	225.831	162,941	27.8	Since the project is a HEPP, seasonal effects are significant on the monthly generation rates and deviations from the calculated values are acceptable.
01-January-2023 to 31-July-2023	131,735	117,893	10.5	Since the project is a HEPP, seasonal effects are significant on the monthly generation rates and deviations from the calculated values are acceptable.
Total	414,024	286,690	30.8	Since the project is a HEPP, seasonal effects are significant on the monthly generation rates and deviations from the calculated values are acceptable.

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

There is no commercially sensitive information about the project.

Section	Information	Justification