TOROS HYDROELECTRIC POWER PLANT

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Project title	Toros Hydroelectric Power Plant
Project ID	1499
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1 PROJECT DETAILS

1.1 Summary Description of the Project

Aydem Yenilenebilir Enerji A.Ş. is to construct Toros Regulator and Hydro Power Plant (HPP) on the Çakıt Stream, within the jurisdiction of Belemedik Village, Pozantı District of Adana Province. The purpose of the project is electricity production using the potential energy of Çakıt Stream as a renewable resource. The purpose of the project is to supply electricity to the Turkish power grid, from a renewable source.

The Project Activity (PA) utilizes the Çakıt Stream 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. Annual net electricity production by the PA is estimated to be 208,570 MWh[1], according to the generation license, licensed on 18/01/2007 by EMRA with number EÜ/1062-2/782. The installed capacity of the project is 49.99 MWe with two turbines each having installed capacity of 24.995 MWe (26.025 MWm). Therefore, the Project Activity is expected to lead to an emission reduction of 96,275 tons CO_2e annually, 962,749 tons CO_2e in total for the crediting period.

The Environmental impacts of the project are kept to a minimum and all the regulations that are in act in Turkey are obeyed during the construction and operation stages of the Toros HPP project. At the planning stage these impacts have been investigated and are presented to the Ministry of Environment and Forestry (MoEF). The report is examined by MoEF and it was decided that there is no need for a detailed Environmental Impact Assessment study for the Projects. 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 passageway) at the downstream and upstream directions of the construction to facilitate fish migration. Since the project is designed as a runoff river reservoir type power plant, the minimum water that is necessary for the sustainability of the aquatic life in the river is always be released. The construction of the project has started in 01/05/2008 and the project has started in 17/05/2013.

Table 1. Milestones of TOROS HYDROELECTRIC POWER PLANT

Milestone	Date
Project registration date	09/11/2015
Toros Feasibility Issuance for Study Report	01/07/2005

[1] Generation License dated 18/01/2007 by EPDK, License Number: EÜ/1062-2/782

Milestone	Date
DSI Approval for Study Report	23/03/2006
Water usage agreement signed with DSI2	28/11/2006
The Electricity Production License is granted	18/01/2007
Construction Started	01/05/2008
Project Loan Agreement	24/09/2009
Contract Signed with the subcontractor	25/09/2009
EIA Exemptions certification issued	23/06/2010
Amendment to the Water Usage Agreement Signed	30/09/2010
Grid Connection	07/12/2010
DOE Contracted for Validation	12/01/2011
Commissioning of both units (Project Start Date)	17/05/2013
The first crediting period	17/05/2013 – 16/05/2023 (10 years)
The second crediting period	17/05/2023 – 16/05/2033 (10 years)

The Toros HPP is going to be made up of one hydro power plant. There will be one regulating body that will be taking up the water from the 700 m elevation level and the tail water level will be 330.00 m. The potential energy of water at approximate gross head level of 370 m will be utilized and the energy will be produced by the Toros Hydroelectric Power Plant. The water will be entering to the regulatory body and the water collecting area over the Çakıt Stream at the 700 m elevation level. Then the water will be settled at the sedimentation pool and will be transferred to a tunnel with a diameter of 3.5 m and a length of 11,860 m. The water that will pass this tunnel will then be transferred to a canal and be transferred to the loading pool via penstock and will be passed to the hydro power plant building where the electricity will be produced. The water will then be left back to

[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.

the Çakıt stream at the 330 m elevation level. See the following figure (Figure 1) that represent the schematic description of the project principles.

According to the methodology[3], 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".

Project boundary is shown in the figure below.

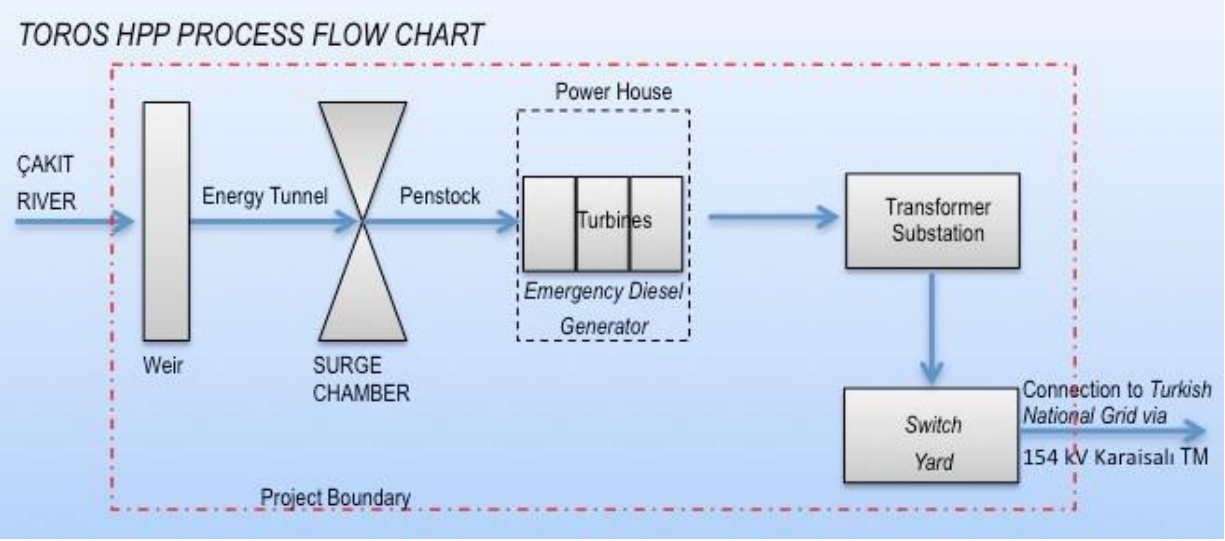

Figure 1. Project boundary

Toros HPP that has 49.99 MW installed capacity is connecting to the Turkish National Power Grid via one of Transformer Substations by 15 km long 154 kV Karaisalı transmission line. As the project is operational, a reliable, continuous, independent from imported fossil fuels, and an uninterrupted high-quality power at 154 kV voltage level is supplied to consumers in Turkey. Thus, launching the project affects positively both Turkey's and region's economy.

The project involves collecting of water, at the 700 m level, by the help of a regulator and a water intake body. After that the water is kept at the settling tanks and passes to the diversion tunnel that is carrying the water for 11.86 km[3]. After the water leaves the diversion tunnel it enters into the penstock and is transferred to two turbines, each with 24.995 MWe capacity, via a surge Tank. The two turbines are

[3] https://cdm.unfccc.int/UserManagement/FileStorage/ZPFJL01OU2RYC6N3HASIXV7K84QBG9

housed within the Hydro Electricity Power Plant Building. The water that hits these two turbines, then leaves the turbines via the tail water canal and a spillway which is located at a level of 330 m.

The following are the facilities to be constructed:

- Toros Regulator to be constructed at approximately 700 m elevation level
- Water Intake Body and the Settling Tank
- Derivation Tunnel
- Penstock
- Surge Tank
- Hydro Electricity Power Plant Building
- Tail water canal and spillway

1.2 Audit History

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification	17-May-2013 – 16-May-2023 (1st crediting period)	VCS	RINA S.p.A (RINA)	10
Verification	17-May-2013 – 30-September-2020 (1st monitoring period)	VCS	Carbon Check	~7
Verification	01-October-2020 – 31-December-2021 (2nd monitoring period)	VCS	Carbon Check	~2 (14 months)

Verification	01-January-2022 – 16-May-2023 (3rd monitoring period)	VCS	Re-carbon Ltd.	~2 (17 months)
Validation	17-May-2023 – 16-May-2033 (2nd crediting period)	VCS	Re-carbon Ltd.	10
Total	-	-	-	10

1.3 Sectoral Scope and Project Type

Sectoral scope[4]	1
Project activity type	Energy Industries (renewable/non-renewable sources)

The project is not an AFOLU project. Hence the following table is not applicable.

Sectoral scope	
AFOLU project category[5]	
Project activity type	

1.4 Project Eligibility

1.4.1 General eligibility

The concept of hydropower projects undertaken by private sector is a very immature concept in the country. In this sense, the project will help Turkey to stimulate the commercial application of grid connected renewable energy technologies and markets. It will also be a crucial sample of establishing the feasibility of larger grid connected small to medium scale runoff-river HEPPs as a tool to support energy security,

[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*

[5] *See Appendix 1 of the* VCS Standard

improved air quality, alternative sustainable energy, improved local source of income and sustainable renewable energy industry development. The specific benefits of the project are:

- Reduce greenhouse gas emissions in Turkey compared to the business-as-usual scenario,
- Help to stimulate private sector participation in hydro power industry in Turkey,
- Create employment during the construction and the operation phase of the plant,
- Relatively reduce some other pollutants from power generation industry in Turkey, compared to a business-as-usual scenario,
- Help to diminish Turkey's increasing energy deficit,
- Diversify the electricity generation portfolio and reduce dependency on import of other energy sources.

Hydropower presents significant environmental benefits:

- 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. Regular emissions from conventional electricity generation such as sulphur dioxide, nitrogen oxide and particulates will not occur in this case.
- 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.

The project is eligible under the scope of VCS therefore the project meets the requirements below.

- Toros HEPP project is grid-connected renewable power generation project that applies a methodology (ACM0002) eligible under VCS program.
- The implementation of the project activities does not cause the violation of ant applicable law.

This is the renewal of crediting period stage of project activity thereby its eligibility had been already demonstrated at the start of the first crediting period.

1.4.2 AFOLU project eligibility

The project is not an AFOLU project. Hence, this section is not applicable.

1.4.3 Transfer project eligibility

The project is not a transfer project. Hence, this section is not applicable.

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1.5 Project Design

☒ Single location or installation

☐ Multiple locations or project activity instances (but not a grouped project)

☐ Grouped project

1.5.1 Grouped project design

The project is not a part of grouped project. Hence, this condition is not applicable.

1.6 Project Proponent

Organization name	Aydem Yenilenebilir Enerji A.Ş.
Contact person	Özgün Gül Koparan
Title	Environmental Affairs Manager
Address	Gazi Mustafa Kemal Bulvarı 15 Mayıs Mah. 832 Sok. No:2 75.Yıl Esnaf Sarayı K:2 Denizli-Turkey
Telephone	+90 258 242 27 76
Email	ozgun.gulkoparan@aydemenerji.com.tr

1.7 Other Entities Involved in the Project

Organization name	GTE Karbon Sürdürülebilir Enerji Eğitim Danişmanlik Ve Ticaret A.Ş
Role in the project	Consultant

Contact person	M. Kemal DEMİRKOL
Title	Director
Address	Mustafa Kemal Mah. Barış Sitesi 2111. Sokak. No: 5 Çankaya - Ankara – TURKEY
Telephone	+90 312 514 63 63
Email	kemal.demirkol@gte.com.tr

1.8 Ownership

As per the license issued by Energy Market Regulatory Authority (EMRA), all legal rights of the project are given to Aydem Yenilenebilir Enerji A.Ş.

GTE KARBON SURDURULEBILIR ENERJI EGT. DAN. VE TIC. A.S. is a project proponent that is the project developer and consultant.

1.9 Project Start Date

Project start date	17-May-2013
Justification	The commissioning date for both Unit I and Unit II of TOROS HEPP.

1.10 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	17-May-2023 to 16-May-2033

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

☒ < 300,000 tCO2e/year (project)

☐ ≥ 300,000 tCO2e/year (large project)

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO_2e)
17-May-2023 to 31-December-2023	60,402
01-January-2024 to 31-December-2024	96,275
01-January-2025 to 31-December-2025	96,275
01-January-2026 to 31-December-2026	96,275
01-January-2027 to 31-December-2027	96,275
01-January-2028 to 31-December-2028	96,275
01-January-2029 to 31-December-2029	96,275
01-January-2030 to 31-December-2030	96,275
01-January-2031 to 31-December-2031	96,275
01-January-2032 to 31-December-2032	96,275
01-January-2033 to 16-May-2033	35,872
Total estimated ERRs during the first or fixed crediting period	962,749
Total number of years	10
Average annual ERRs	96,275

1.12 Description of the Project Activity

TOROS HES is a large-scale hydro power type, greenfield, grid connected renewable electricity generation project. Toros HPP, that will be built on Çakıt Stream will be approximately at the elevation of 700.00 m. The Toros HPP will be utilizing approximately 370 m of potential energy difference to produce electricity.

Construction phase of the project is expected to carry out approximately 24 months. The construction is expected to start in October 2009 and the project is expected to be commissioned in the first quarter of 2012.

Toros HPP that will have 49.99 MW installed capacity will be connecting to the Turkish National Power Grid via one of Transformer Substations by 15 km long 154 kV Karaisalı transmission line. As the project will be operational, a reliable, continuous, independent from imported fossil fuels, and an uninterrupted high quality power at 154 kV voltage level will be supplied to consumers in Turkey. Thus, launching the project will affect positively both Turkey's and region's economy.

The project will involve collecting of water, at the 700m level, by the help of a regulator and a water intake body. After that the water will be kept at the settling tanks and will pass to the diversion tunnel that will be carrying the water for 11.86 km^3. After the water will leave the diversion tunnel it will enter into the penstock and will be transferred to two turbines, each with 24.995 MWe capacity, via a surge Tank. The two turbines will be housed within the Hydro Electricity Power Plant Building. The water that will hit these two turbines, will then leave the turbines via the tail water canal and a spillway which is going to be located at a level of 330 m.

According to the methodology, 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".

The following are the facilities to be constructed:

- Toros Regulator to be constructed at approximately 700 m elevation level
- Water Intake Body and the Settling Tank
- Derivation Tunnel
- Penstock
- Surge Tank
- Hydro Electricity Power Plant Building
- Tail water canal and spillway

- The switch gear area and the transformer

General technical characteristics of Toros HPP is given in the table below. The manufacturer does not state a set estimated technical lifetime. Therefore, estimates from the literature is used. According to a report by NREL[6], there is low wear on the turbines and little or no wear on generators, meaning that the average service life of the electromechanical equipment is between 60 to 80 years. According to another source, hydroelectric power plants offer an average lifetime of approximately 50–100 years[7] .

Table 2. General technical characteristics of Toros HPP (Based on data provided in the Project Feasibility Report Dated July,2005

The Weir	
Place	The Weir will be located on the Çakıt Stream, at the close proximity of the Belemedik village, in Pozantı Town of Adana Province.
Purpose	According to water flow direction, diverting the Çakıt Stream water to water intake structure.
Flood flow rate of regulator	Q_{10} = 332.0 m^3/s Q_{100} = 666.0 m^3/s
Elevation of the river bed	696.00 m
Type	Free Flow Spillway and Concrete Body
Height from the foundation of the regulator	3.5 m (Approximately)
Height of the regulator from the River Bed	4.00 m
Normative maximum water level	702 m
Environmental maximum Elevation	700 m
Maximum Operation Elevation	700 m
Full Body Crest Length	197 m (including the middle feet)
Gravel Passage Place	Left bank
Gravel Passage Size	3.0 m x3.0 m
Conduit/Tunnel	
Place	(No diversion tunnel, conduit inside river) According to the flow in the right bank
Type	Horse shoe
Project Flow Rate(Flood) acc.	Min water in summer season
Length	11,860.00 m
Water Intake Structure (Socket)	
Place	According to the flow direction at the left side, at the beginning of sedimentation basin

[6] Renewable Energy Technologies: Cost Analysis Series by IRENA, 2012

[7] Comprehensive Energy Systems, 2018, https://www.sciencedirect.com/referencework/9780128149256/comprehensive-energy-systems

Type	Intake opening with a grid, cofferdam slot cover, operation gate (from the plant control)
Power Plant Building	
Gross fall	370 m
Net fall	354,68 m
Total Installed Capacity (Bar)	49.99 MW
Project Flow Rate	16 m^3/s
Annual Energy Production:	
Firm Energy	53.31 GWh/year
Secondary Energy	186.09 GWh/year
Total Energy	239.40 GWh/year
Unit Number	2
Unit Flow Rate	8 m^3/s
Net Fall	354,68 m
Unit Installed Capacity (generator output)	24.995 MW
Plant and switchyard Equipment	
Project Flow Rate	16 m^3/s
Installed Capacity	49.99 MWe (Generator output)
Unit Number	2 (Two) Pieces
Turbine Type	3 Phased synchronized generator
Rated Net Fall	354,68 m
Rated Flow Rate	16 m^3/s
Generators	
Type	3 phase, AA, synchronous generator, vertical
Rated Power	32000 kVA (kW)
Voltage	10,5 kV
Unit Transformer	
Transformer Number	(1) pieces
Type	3 phase, two wings, oily, external type
Capacity	50/62 MVA
Strain Ratio	154 / 10,5 kV
Switchyard	
Type	12 kV, metal shielded, 40 kA,4000 A, internal switchyard cell
Type	170 kV, metal shielded, 31,5 kA, external type
Operating Voltage - Maximum Operating Voltage	154 kV – 10,5 kV
Emergency Diesel Generator	1 (One) piece
Rated Capacity	100 kVA
Main Measurement to Energy Sales	Unit transformers on the YG side
Control Systems	Automatically and SCADA
Communication	Fiber optic cable and with PLC

1.13 Project Location

The host party is the Republic of Turkey. The project is located in Pozantı Town of Adana province, along the Çakıt Stream (Figure 2).

The following are the exact coordinates of the main project structures, as shown in the figures below.

Name of Structure	Latitude	Longitude
Toros Powerhouse	37°16'50.82"N	34°59'59.35"E
Toros Weir Point 1	37°21'38.73"N	34°54'54.15"E
Toros Weir Point 2	37°21'40.01"N	34°54'59.19"E
Toros Surge Pond	37°16'54.80"N	34°59'12.33"E

Figure 2. Project location[8]

1.14 Conditions Prior to Project Initiation

The project is a renewable energy project, prior the project initiation, there was no other hydroelectric power plant installation at the project site.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

[8] Google earth image of the project activity, provided in the registered PD of the first crediting period.

It is important to note that there are no local laws and regulations in Turkey because it is not a federal state. The Toros Hydropower Plant, Turkey is in compliance with relevant national laws and regulations related to the project. The general scheme of the regulations this kind of facilities in line with, are defined by The Renewable Energy Law and Environmental Law. 5,6 Such laws also include land use regulations, forest use permissions and environmental risk management regulations. The company has had the Pre-Assessment Report, Energy Production Licence and water use agreement until now. In addition to these, company will have to have TEİAŞ Connection Agreement, System Usage Agreement and then Substantial Completion Agreement in the coming months.

The Project is in compliance with all required relevant regulations but is not a mandatory Project. There is no breach of any legislation and all required permits are obtained.

	Name of the Law	Related Law Nr.	Compliance in this crediting period
1	Electricity Market Balancing and Settlement Regulation[9]	12985	Yes
2	Regulation Concerning Electricity Demand Forecast[10]	21528	Yes
3	Communiqué Regarding Preparation of Retail Contract in The Electricity Market[11]	36132	Yes
4	Electricity Transmission System Supply Reliability and Quality Regulation	19217	Yes
5	Electricity Market Grid Regulation[12]	4628	Yes
6	Electricity Market Import and Export Regulation[13]	19679	Yes
7	Electricity Market Distribution Regulation[14]	19217	Yes

[9] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=12985&MevzuatTur=7&MevzuatTertip=5

[10] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=21528&MevzuatTur=7&MevzuatTertip=5

[11] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=36132&MevzuatTur=7&MevzuatTertip=5

[12] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=4628&MevzuatTur=1&MevzuatTertip=5

[13] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=19679&MevzuatTur=7&MevzuatTertip=5

[14] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=19217&MevzuatTur=7&MevzuatTertip=5

8	Communiqué Regarding Wind and Solar Measurements[15]	19796	Yes
9	Electricity Market Customer Services Regulation[16]	24630	Yes
10	Electricity Market Tariffs Regulation	19217	Yes
11	Electricity Market Licensing Regulation[17]	18985	Yes
12	Electricity Market Law[18]	6446	Yes
13	Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[19]	5346	Yes
14	Energy Efficiency Law[20]	5627	Yes
15	Forest Law[21]	6831	Yes

Addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has to comply is given in Appendix 1.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

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

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

[15] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=19796&MevzuatTur=9&MevzuatTertip=5

[16] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=24630&MevzuatTur=7&MevzuatTertip=5

[17] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=18985&MevzuatTur=7&MevzuatTertip=5

[18] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6446&MevzuatTur=1&MevzuatTertip=5

[19] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=5346&MevzuatTur=1&MevzuatTertip=5

[20] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=5627&MevzuatTur=1&MevzuatTertip=5

[21] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6831&MevzuatTur=1&MevzuatTertip=3

Has the project registered under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

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

1.17.1 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

1.17.2 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

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.18 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:

- Climate Action (SDG 13): Renewable energy power plants contribute to "Emission Reductions or Removals and/or Adaptation to Climate Change" by reducing CO_2 emissions caused by fossil fuel-fired power plants that are displaced due to the project activity.
- Decent Work and Economic Growth (SDG 8): The project generates employment and income. The project has created permanent job opportunities.
- Affordable and Clean Energy (SDG 7): Increasing the number and percentage of renewable energy power plants provides substantial increase in the share of renewable energy in the global energy mix and ensure universal access to affordable, reliable, and modern energy services.

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

There are no leakage management. Hence, this section is not applicable.

1.19.2 Commercially Sensitive Information

There is no commercially sensitive information. Hence, this section is not applicable.

1.19.3 Further Information

There is no further information about project activity. Hence, this section is not applicable.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	According to the rules and regulations at the time of license application for electricity

	production the project was given a certificate of Exemption for the EIA process, by the Adana Provincial Directorate of Environment and Forestry. Because, at the time of license application the Hydro Power Plants that had installed capacity lower than 50 MW was considered to be out of scope according to EIA regulation that was active during the period of application. And since no EIA process was followed, there was no stakeholder's consultation meeting held for the project activity. However, in order to comply with the rules and regulations of the host country (also listed in Appendix 2), the project owner officially corresponded with all the relevant authorities that can as well be considered as stakeholders.
Legal or customary tenure/access 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. On the contrary it is a government land that classified as forestry area. The property is leased to the project owner by the government until the end of the generation license.
Stakeholder diversity and changes over time	There was no indication that the diversity in stakeholders takes place over time.
Expected changes in well-being	According to registered PD Version 2.02, Section 5, the project would not have any negative impacts on stakeholders' well-being.
Location of stakeholders	The project is located in Pozantı Town of Adana province, along the Çakıt Stream.
Location of resources	The project is located in Pozantı Town of Adana province, along the Çakıt Stream.

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	-
Stakeholder engagement process	Since there were no EIA process was followed (EIA not required decision-23/06/2008), there was no stakeholder consultation. However, in order to comply with the rules and regulations of the host country (Appendix 2), the project owner officially corresponded with all the relevant authorities that can as well be considered as stakeholders. Some of the authorities are as follows; Adana Provincial Directorate of Environment and Forestry, Adana Special Provincial Authority, and EMRA.
Consultation outcome	The topics and correspondents have been identified in the registered PD for the first crediting period.
Ongoing communication	There is a grievance box in Gülüşlü Village, where anyone can provide feedback about the project activity. The grievance box has been regularly checked, and if there are demands or complaints, the project owner is addressing these.
Stakeholder input	There is no input received from the stakeholders during the consultation.[22]

2.1.3 Free Prior and Informed Consent

Obtaining consent	As a part of the EIA process, in line with the article 9 of EIA Regulation, to obtain consent of the stakeholders, the community meetings were organized. 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.

[22] A signed document by muhktar that there is no comment received has been provided to VVB.

	At the end of these meetings, all stakeholders were content that environment-friendly energy production was going to be realized.
Outcome of FPIC	EIA not required decision has been made for Toros HEPP on 23/06/2008.

2.1.4 Grievance Redress Procedure

Development process	Contact information of the project owner is given to the Gülüşlü Village Mukhtar's Office. Project manager is accessible by locals all the time. There is no problem encountered about the project/way of communication so far. If there is an input or grievance, locals can express them directly or via mukhtar.
Grievance redress procedure	The grievance, negative or positive, can be provided by local stakeholders related to operation of the project activity. PP will resolve all the grievances during the whole crediting period.

2.1.5 Public Comments

Comments received	Actions taken
No comment received from the stakeholders.	-

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The project owner periodically provides necessary trainings to employees. The records of the trainings have been provided to VVB.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure(s) taken

Natural and human-induced risks to stakeholders' wellbeing	No risk identified	-
Risks to stakeholder participation	No risk identified	-
Working conditions	• Occupational accidents due to the use of vehicles, machinery and equipment • Fire risk	• Basic occupational health and safety training • Emergency drill Training • Training on working at height • Training on safe driving techniques The training records are shared with the VVB.
Safety of women and girls	No risk identified	-
Safety of minority and marginalized groups, including children	No risk identified	-
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	Risks identified with generation of wastewater and solid wastes	- Domestic wastewater will be collected in a septic tank to prevent the spread of wastewater to the environment. - Domestic solid wastes are collected in closed sealed containers and sent to appropriate landfill area by municipality. - It is not possible to have air emissions during operational activities. - During operational activities, noise from the power plant will be generated. However, this noise is an indoor noise and is not expected to have a negative impact on the environment.

		- To prevent the negative impact of the power plant on the stream bed, life water will be released to the stream.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified[23]	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Sexual harassment	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Equal pay for equal work	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Gender equity in labor and work	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Forced labor	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.

[23] The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

Child labor	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Human trafficking	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.

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 convention[24]. 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.

Risks identified	Mitigation or preventative measure(s) taken
No risks identified	-

2.3.3 Indigenous Peoples and Cultural Heritage

There are no lands which was occupied by IPs. This section is not applicable.

Risks identified	Mitigation(s) or preventative measure taken
No risks identified	-

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. On the contrary it is a government land that classified as forestry area. The property is leased to the project owner by the government until the end of the generation license.

[24] https://www.ilo.org/wcmsp5/groups/public/---europe/---ro-geneva/---ilo-ankara/documents/genericdocument/wcms_645630.pdf

Risks identified	Mitigation or preventative measure(s) taken
No risks identified	-

2.3.5 Benefit Sharing

As explained in Section 2.3.4, the project does not impact property rights. Therefore, this section is not applicable.

Process used to design the benefit sharing plan	-
Summary of the benefit sharing plan	-
Approval and dissemination of benefit sharing plan	-

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure(s) taken
Impacts on biodiversity and ecosystems	No risk identified	-
Soil degradation and soil erosion	No risk identified	-
Water consumption and stress	No risk identified	-

2.4.1 Rare, Threatened, and Endangered Species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

Since the project is not located in or adjacent to habitats for rare, threatened, or endangered species, the following tables are not applicable.

Species and habitat	-
Areas needed for habitat connectivity	-
...	...

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species		
Areas for habitat connectivity		

2.4.2 Introduction of Species

There are no species introduced. Hence, this section is not applicable.

Species introduced	Classification	Justification for use	Adverse effects and mitigation

Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species		

2.4.3 Ecosystem Conversion

The project is not an ARR, ALM, WRC or ACoGS project. Hence, this section is not applicable.

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion		

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Grid-connected electricity generation from renewable sources	21.0
Tool	01	Tool for the demonstration and assessment of additionality	07.0
Tool	07	Tool to calculate the emission factor for an electricity system	07.0
Tool	10	Tool to determine the remaining lifetime of equipment	01.0
Tool	11	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	03.0.1

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
ACM0002 (1)	This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	TOROS HEPP is a large-scale hydro power type, greenfield, grid connected renewable electricity generation project. So, the project meets (a) Install a Greenfield power plant.
(2)	In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity addition to (an) existing solar	This project does not include an integration of a BESS. Hence, this condition is N/A.

	photovoltaic1 or wind power plant(s)/unit(s); (c) Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s).	
(3)	The methodology is applicable under the following conditions: (a) Hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of	(a) Toros HEPP is a hydro power plant unit with reservoir. (b) There were no capacity additions. (c) This project does not include an integration of a BESS. Hence, this condition is N/A. (d) This project does not include an integration of a BESS. Hence, this condition is N/A.

	five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity; (c) In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents); (d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section	

	5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.	
(4)	In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m^2; or	The project is a hydro power plant. (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs.

	(c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and	

	b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
(5)	In the case of integrated hydro power projects, project participants shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river,	The project is not an integrated hydro power project. Hence, this condition is N/A.

	tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.	
(6)	The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	a) The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity. b) The project is not a biomass fired power plant.
(7)	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project does not involve retrofits, rehabilitations, replacements, or capacity additions. Hence, this condition is N/A.
(8)	In addition, the applicability conditions included in the	Given below.

	tools referred to below apply.[25]	

Methodology ID	Applicability condition	Justification of compliance
TOOL07	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g., demand-side energy efficiency projects).	The project activity supplies electricity to a grid. Hence, this condition is met.
	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e., option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at	CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system is determined by calculating the "combined margin" emission factor (CM) of the electricity system.

[25] The condition in "TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants; does not apply to this methodology, as this methodology only refers to some steps of this tool.

	least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project electricity system is not located partially or totally in an Annex I country. Hence, this condition is N/A.
	Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The project does not involve biofuels in any way.

Methodology ID	Applicability condition	Justification of compliance
TOOL01	The use of the "Tool for the demonstration and assessment of additionality" is not mandatory for project participants when proposing new methodologies. Project participants may propose alternative methods to demonstrate additionality for consideration by the Executive Board. They may also submit revisions to	Tool for the demonstration and assessment of additionality is applied in this project since there is no new methodologies proposed. Hence, this condition is N/A.

	approved methodologies using the additionality tool.	
	Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	The additionality tool is applied using this methodology.

Methodology ID	Applicability condition	Justification of compliance
TOOL10	Option (a): Use manufacturers information for the technical lifetime of equipment and compare to the date of first commissioning. In this option, the remaining lifetime is determined as a difference between the technical lifetime and the operational time. This option can only be applied if: (i) Manufacturer s information for the technical lifetime of the equipment is available; (ii) The project participants can demonstrate that the equipment has been operated and maintained according to the	The manufacturer does not provide an information for the technical lifetime of equipment. This option is N/A.

		recommendations of the equipment supplier to ensure that the technical lifetime specified by the manufacturer is not reduced; and	
		(iii) There are no periodic replacement schedules or scheduled replacement practices specific to the industrial facility, that require early replacement of equipment before the expiry of the technical lifetime;	
		(iv) The equipment has no design fault or defect and did not have any industrial accident due to which the equipment cannot operate at rated performance levels.	

	Option (b): Obtain an expert evaluation. In this option, an independent expert having relevant experience in evaluating the remaining lifetime for the type of equipment can be requested to determine the remaining lifetime of the equipment. The information that could be evaluated includes an analysis of • The operational history of the equipment to identify the past performance, equipment retrofits, failures/accidents, capacity upgrades/degradations, replacements etc.; • The current operation and maintenance practices; • Documented specific sectoral/industry practices for replacements; • Conducting tests on the equipment, such as magnetic particle examinations, ultrasonic testing, metallurgical analysis, etc.	An evaluation from an expert did not obtained. This option is N/A.
	Option (c): Use default values. In this option, project participants may use the	The default values have been used. For hydro turbines, the

	following default values for the technical lifetime and determine the remaining lifetime as the difference of the technical lifetime and the operational time. This option can only be applied if: (i) The project participants can demonstrate that the equipment has been operated and maintained according to the recommendations of the equipment supplier; (ii) There are no periodic replacement schedules or scheduled replacement practices specific to the industrial facility, that require early replacement of equipment before the expiry of the technical lifetime; and (iii) The equipment has no design fault or defect	technical lifetime is 150,000 hours[26].

[26] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

		and did not have any industrial accident due to which the equipment cannot operate at rated performance levels.	

Methodology ID	Applicability condition	Justification of compliance
TOOL11	*T*his tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.	This is the renewal of the crediting period. Therefore this tool is applicable.

3.3 Project Boundary

CO_2 emission is included in the baseline but the project activity does not emit any of the gases listed, in the table below.

The project boundary is considered as the National Electricity Grid of Turkey according to applied tool. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the power plant is connected to.

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey's Grid)	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	N/A	N/A
Project	Emission from the reservoir of the proposed project	CO_2	No	Minor emission source
		CH_4	No	Minor emission source (Power density is 12,634.11 W/m^2 and is greater than 10 W/m^2)
		N_2O	No	Minor emission source
		Other	N/A	N/A
	Auxiliary Diesel Generator	CO_2	Yes	Neglected
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	N/A	N/A

The project boundary can be seen in the figure below.

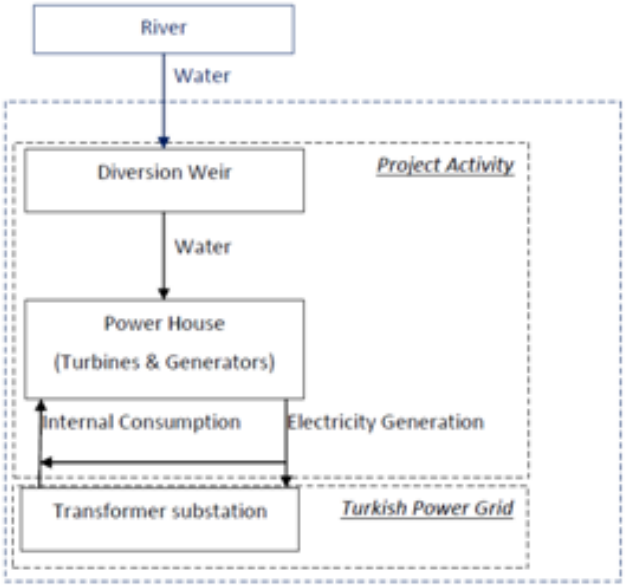
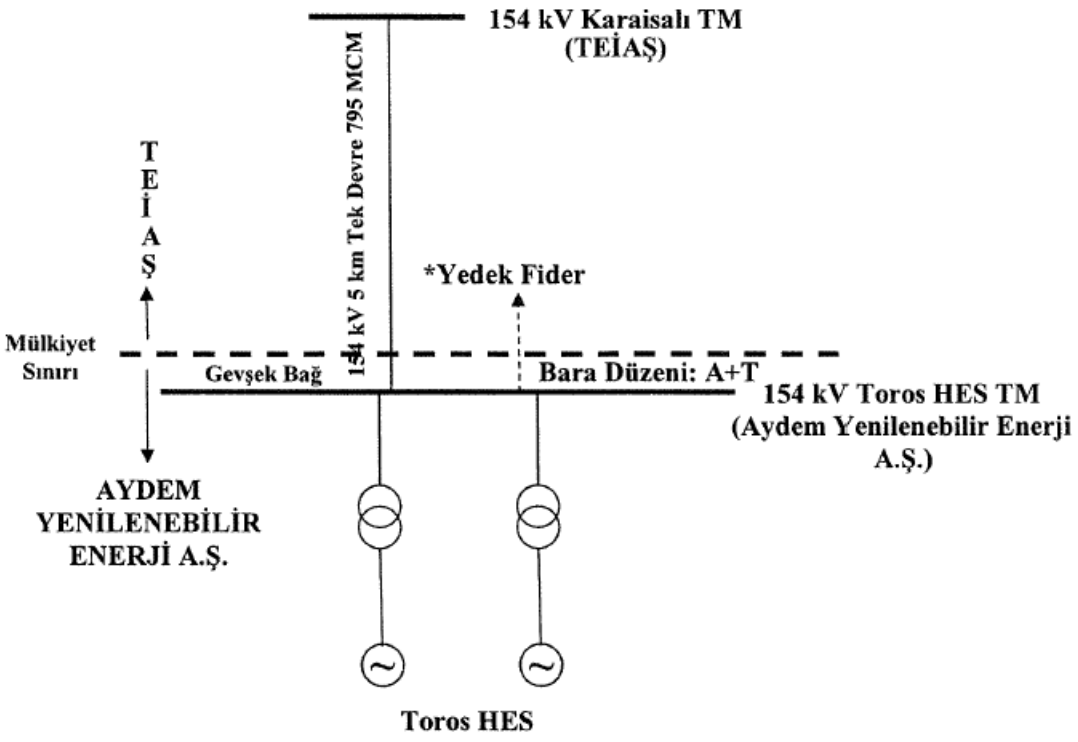


Figure 3. Project boundary

The single line diagram of the project activity has been given in the figure below.



*: Yedek Fider TEİAŞ Mülkiyetindedir.

Figure 4. Single line diagram of the project activity

3.4 Baseline Scenario

According to the Tool 11: Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, Version 3.0.1, there are some requirements:

The tool offers 2 steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.

The sub-steps for the Step 1 are:

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies: There is no change in national/sectoral policies affecting project implementation. All policies are still valid in the second crediting period.

Step 1.2: Assess the impact of circumstances: The baseline circumstances are not valid in the second crediting period since the national grid properties / shares of each technology, etc. have been changed.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested: There is no change in the investment type and technology in the second crediting period.

Step 1.4: Assessment of the validity of data and parameters: The default values and ex-ante values have been changed.

Although there is no change in national/sectoral policies affecting project implementation (Step 1.1), investment and technology (Step 1.3), the current situations such as margin calculations (Step 1.2) and parameters not monitored (Step 1.4) have been changed. Therefore, Step 2 has been applied.

Step 2.1: Update current baseline: The latest version of the applicable methodology and current circumstances have been used for the second crediting period.

The applicability conditions of Tool 11 are given below in detail:

No	Applicability Conditions	The Project
Step 1.1	If the current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the	There is no change in national/sectoral policies affecting

	submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, go to Step 1.2. If the current baseline does not comply with relevant mandatory national and/or sectoral policies, then assess based on the examination of current practice in the country or region in which the policies apply, whether those policies are systematically not enforced and that non-compliance with those requirements is widespread in the country or region.	project implementation. Hence Step 1.2 can be evaluated.
Step 1.2	Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario. In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period. Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions.	The combined margin is updated as per OM & BM calculations by Ministry of Energy and Resources.
Step 1.3	This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology. Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project activity, as determined in the CDM-PDD or CDM-PDD-REN, exceeds the crediting period for which renewal is requested. Take into consideration the market penetration of different technologies. Evaluate the penetration	The project is a greenfield activity. Since it includes a new investment and the use of new equipment, this step is not applicable.

	rate of different technologies that are available in the market and evaluate how they could affect the baseline.	
Step 1.4	Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether they should be updated. Updates should be undertaken in the following cases: • Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC; • Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values, or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity. *If the application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period, then this baseline, data and parameters can be used for the renewed crediting period. Otherwise, proceed to Step 2.*	The combined margin is updated as per OM & BM calculations by Ministry of Energy and Resources. Hence the assessment should proceed to Step 2.
Step 2.1	Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.	The latest version of the applicable methodology and current circumstances have been used for the second crediting period

Step 2.2	If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4.	The data and the parameters are updated for the second crediting period.

According to the methodology, 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".

Turkish electricity generation is mainly composed of thermal power plants and the share of renewable resources. Since Turkey is an advanced developing country, there is an increasing demand for electricity which is fully expected to continue in the foreseeable future.

The trend in Turkey to date and given historically slow development of alternative energy resources is to build an increasing number of thermal power plants in the future to satisfy the annual growth in energy consumption demand. Turkey as an advanced developing nation has looked at dealing with energy security by developing and constructing high-capacity coal and natural gas power plants. The development of thermal power plants has been also encouraged by the large natural resource availability in Turkey, especially the abundance of economically accessible lignite. The statistics from TEIAS webpage show that the installed capacity that utilize lignite in Turkey has always showed an increasing trend, based on the available information covering the years from 1940 to 2019[27] [28] [29].

In the absence of the project activity, the same amount of electricity is required to be supplied via either the current power plants or by increasing the number of thermal power plants thus increasing GHG emissions.

[27] https://webapi.teias.gov.tr/file/18800125-dc32-4c4e-8a3e-c771863e5a49?download
[28] https://webapi.teias.gov.tr/file/07f76c00-d256-4ccb-b25e-9478c9dedc04?download
[29] https://webapi.teias.gov.tr/file/163dfadf-80d8-4271-baf8-bc0b76710177?download

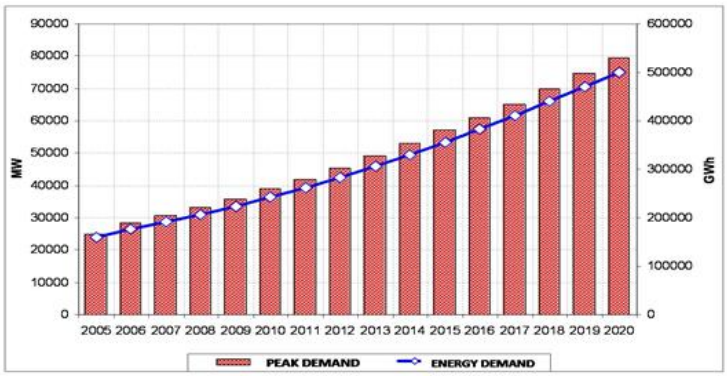
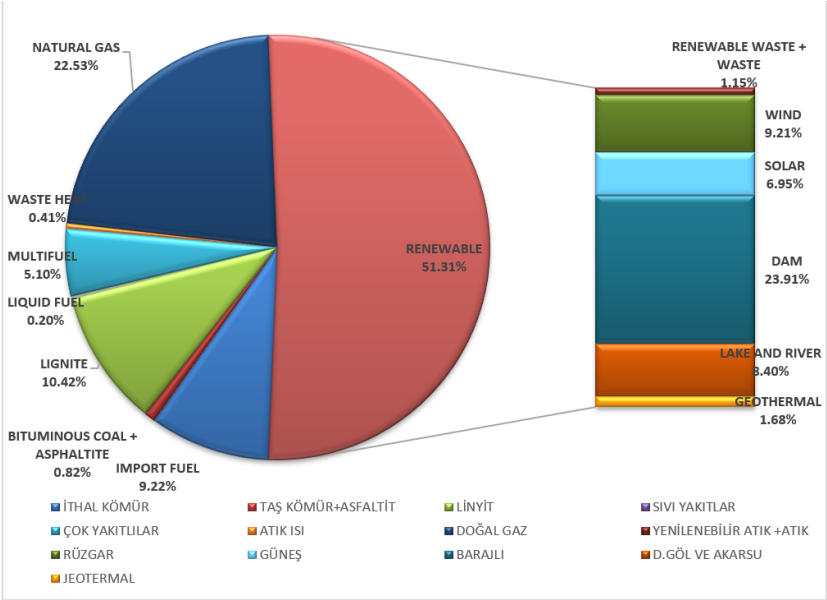


Figure 5. Peak Load and consumption projection for Turkish electricity system between 2005-2020[30]

According to the Ministry of Energy and Natural Resources statistics31, share of WPPs together with geothermal power plants could hardly reach 11% in 2020 whereas share of Coal and natural gas are 20.46% (lignite and imported coal together) and 22.53%, respectively. When we look at the annual development of Turkey's gross generation in recent years, we see that grid is dominated by thermal power plants and which is boosted by increasing energy demand in parallel to increase population and per capita income. Hence, baseline of Turkey's electricity grid will continue to be dominated by fossil fuel power plants which is seen as the quickest solution in short term to meet the demand and enable energy security in supply side.



[30] http://www.teias.gov.tr/apkuretimplani/veriler.htm

[31] https://webapi.teias.gov.tr/file/39abb292-4b3e-4e70-9e08-914d0ba9bd43?download

Figure 6. Distribution of installed capacity by primary energy resources[32]

Step 2.2.: Update data and parameters: Default values and ex-ante values have been revised. Combined margin is revised as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times 0.25 + EF_{grid,BM,y} \times 0.75$$

$$EF_{grid,CM,y} = 0.7424 \times 0.25 + 0.3680 \times 0.75 = 0.4616\ tCO_2/MWh$$

Therefore, new combined margin is calculated using values by Ministry of Energy and Natural Resources which is 0.4616 tCO_2/MWh[33].

3.5 Additionality

The proposed project activity reduces GHG emissions by substituting fossil fuel based electricity generation by renewable resources (hydro) based electricity generation.

This part refers to the "Tool for the Demonstration and Assessment of Additionality Version 7.0.0" and the numbering in this section reflects the Tool's Guidelines provided at EB 39.

For the assessment of the viability of the project activity the Equity IRR is calculated with a post-tax approach and compared to the benchmark. The equity IRR is worked out as 10.30 % which is below the bench mark of 12.75%.

There has been no capacity change in the project between the first and the second crediting period. The Project is following all required relevant regulations but is not a mandatory Project. There is no change in the relevant national and/or sectoral regulations with respect to project activity or its technology till date through which the project activity is not found mandated by regulations. There is no breach of any legislation, and all required permits are obtained. Laws and regulations that apply for power generation facilities in the host country are mentioned in section 1.14 of this PD. Hence this project is a regulatory surplus.

3.5.1 Regulatory Surplus

Is the project located in an UNFCCC Annex 1 or Non-Annex 1 country?

☒ Annex 1 country ☐ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

[32] https://webapi.teias.gov.tr/file/39abb292-4b3e-4e70-9e08-914d0ba9bd43?download

[33] https://enerji.gov.tr/Media/Dizin/EVCED/tr/ÇevreVeİklim/İklimDeğişikliği/TUESEmisyonFktr/Belgeler/Bform2020.pdf

☒ Yes ☐ No

If the project is located inside a Non-Annex 1 country and the project activities are mandated by a law, statute, or other regulatory framework, are such laws, statutes, or regulatory frameworks systematically enforced?

☐ Yes ☐ No

3.5.2 Additionality Methods

There are no additionality methods. Hence, this section is not applicable.

3.6 Methodology Deviations

There are no methodology deviations. Hence, this section is not applicable.

4 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 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

$$BE_y = 208{,}570 \frac{\text{MWh}}{\text{year}} \times 0.4616 \frac{\text{tC02}}{\text{MWh}}$$

$$BE_y = 96{,}275\ tCO2/year$$

4.2 Project Emissions

As per ACM0002 "Grid-connected electricity generation from renewable sources", v21.0[34], page 14,

"For most renewable power generation project activities, PEy = 0. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

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

Where:

PE_y = Project emissions in year y (t CO_2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO_2e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO_2e/yr)

- Since this project uses hydroelectric power, $PE_{GP,y}$ is "0" (t CO_2/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 30 of "ACM0002: Grid-connected electricity generation from renewable sources" ver 21. Hence it is neglected. Therefore; $PE_{FF,y}$ = 0 (t CO_2/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/m^2 than $PE_{HP,y}$ = 0.

Therefore, as per ACM0002: Grid-connected electricity generation from renewable sources, v21.0;

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/m^2 for 49,990 MWe installed capacity and 42,835 m^2 maximum lake area.

The power density of the project activity (PD) is calculated as follows:

[34] https://cdm.unfccc.int/UserManagement/FileStorage/ZPFJL01OU2RYC6N3HASIXV7K84QBG9

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

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} = 49,990,000 We

Cap_{BL} = 0.0 W

A_{PJ} = 42,835 (m²)[35]

A_{BL} = 0.0 (m²)

Therefore, PD is calculated as;

$$PD = \frac{49{,}990{,}000 - 0}{42{,}835 - 0}$$

$$PD = 1{,}167.04\ W/m^2$$

Since the power density (PD) of the project activities is greater than 10 W/m², Project Emissions (PE) are considered 0.

[35] Toros HEPP reservoir area, Appendix 2

4.3 Leakage Emissions

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

$$LE_y = 0$$

4.4 Estimated 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 (tCO_2)

BE_y = Baseline emissions in year y (tCO_2)

PE_y = Project Emissions in year y (tCO_2)

LE_y = Leakage emissions in year y (tCO_2)

The project emissions and leakage are considered as "0". Thus, $ER_y = BE_y$

This project does not require to assess permanence risk. Hence, the following table has been completed for the project crediting period:

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)
17-May-2023 to 31-December-2023	60,402	0	0	60,402	60,402	60,402
01-January-2024 to 31-December-2024	96,275	0	0	96,275	96,275	96,275

01-January-2025 to 31-December-2025	96,275	0	0	96,275	96,275	96,275
01-January-2026 to 31-December-2026	96,275	0	0	96,275	96,275	96,275
01-January-2027 to 31-December-2027	96,275	0	0	96,275	96,275	96,275
01-January-2028 to 31-December-2028	96,275	0	0	96,275	96,275	96,275
01-January-2029 to 31-December-2029	96,275	0	0	96,275	96,275	96,275
01-January-2030 to 31-December-2030	96,275	0	0	96,275	96,275	96,275
01-January-2031 to 31-December-2031	96,275	0	0	96,275	96,275	96,275
01-January-2032 to 31-	96,275	0	0	96,275	96,275	96,275

December-2032						
01-January-2033 to 16-May-2033	35,872	0	0	35,872	35,872	35,872
Total	**962,749**	0	0	**962,749**	**962,749**	**962,749**

For projects required to assess permanence risk, the following two table should be filled. Since this project does not require a permanence risk assessment. Hence, the following two tables has not been used, and not applicable for this project.

State the non-permanence risk rating (%)	*Example: 20%*
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 tCO2e, the Long-term Average (LTA).	
Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☐ No If no, provide justification.
State, in tCO_2e, the expected total GHG benefit to date.	
Is the number of GHG credits issued below the LTA?	☐ Yes ☐ No If no, provide justification.

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated buffer pool allocation (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCU issuance (tCO_2e)
DD-MMM-YYYY to 31-Dec-YYYY	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

01-Jan-YYYY to 31-Dec-YYYY							
01-Jan-YYYY to DD-MMM-YYYY							
Total							

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,y}$
Data unit	tCO_2/MWh
Description	CO_2 emission factor of the grid electricity in year y
Source of data	Combined margin emission factor calculated by Turkey Ministry of Energy and Natural Resources[36]
Value applied	0.4616
Justification of choice of data or description of measurement methods and procedures applied	"Tool to calculate the emission factor for an electricity system", version 07.0[37]
Purpose of Data	Baseline emission calculation
Comments	$EF_{grid,CMy}$ value (0.4616 tCO_2/MWh) is valid for the duration of the crediting period.

5.2 Data and Parameters Monitored

[36] https://enerji.gov.tr/Media/Dizin/EVCED/tr/ÇevreVeİklim/İklimDeğişikliği/TUESEmisyonFktr/Belgeler/Bform2020.pdf

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

Data/Parameter	EG_y
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant to the grid in MP
Source of data	Electricity Meters
Description of measurement methods and procedures to be applied	Data is measured directly from the electric meter and remotely recorded on TEIAS (grid owner) computerized systems.
Frequency of monitoring-recording	Annually
Value monitored	208,570 MWh
Monitoring equipment	Data is monitored continuously by redundant metering devices. The recording meter is in compliance with the communiqué for Metering Devices to be used in the Electricity Market. By regulation, the accuracy class is 0.2% Main Electricity Meter: Serial Number: 10172377 Back-up Electricity Meter: Serial Number: 10172378 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market[8]. They have an accuracy class in the range of 0.2S-0.5S.
QA-QC procedures to be applied	There are two meters that backup each other. Generated electricity is also monitored via the operator by the help of EPİAŞ trading software for internal monitoring. The Calibration dates of the meters and their validity is as follows:
Purpose of the data	Data to be used for the calculation of Baseline Emissions.
Calculation method	Direct Continuous Measurement. Main source: The power generation meter readings are performed by using the main metering device and the auxiliary metering device for accuracy checks only. Data from metering devices is recorded by TEİAŞ

	Main Meter	Spare Meter
Serial no.	10172377	10172378
Brand	EMH	EMH
Current Calibration date	20/06/2021[38]	20/06/2021
Calibration Due Date	20/06/2031	20/06/2031
Class	0.2S-0.5S	0.2S-0.5

[38] https://www.resmigazete.gov.tr/eskiler/2019/12/20191215-10.htm

	remote reading computerized systems, that can be retrieved on a monthly basis. This forms the basis for invoicing. In addition to the readings of the main metering device, generation data of the Toros HPP can be cross checked, via the TEİAŞ – EPİAŞ web site (https://seffaflik.epias.com.tr/transparency/) which is accessible by a password available to the electricity generation companies. The electricity generation data at the Market Financial Reconciliation Centre (MFRC/EPİAŞ) web page exhibits the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from EPİAŞ web site needs to be multiplied by the transmission loss factor of the grid.
Comments	The collected data is kept by Aydem Yenilenebilir Enerji AS. During the crediting period and until two years after the last issuance of VERs for the "Toros Hydroelectricity Power Plant" project activity for that crediting period.

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	49,990,000
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	

Data/Parameter	AP_J
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 at its maximum fullness.
Source of data	Indirectly measured based on the reservoir area map provided in Appendix
Description of measurement methods and procedures to be applied	Surface area determined using the lake surface area map provided in Appendix
Frequency of monitoring-recording	The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area, presented in Appendix.
Value monitored	Once during each monitoring period
Monitoring equipment	42,835 m^2
QA-QC procedures to be applied	-
Purpose of the data	Can be checked and compared to satellite imagery available by Google Earth.
Calculation method	Data to be used for the calculation of Baseline Emissions.
Comments	N/A

5.3 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 net electricity 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. The third data to be monitored is the reservoir area of the

Project Activity. The reservoir area corresponding to maximum operational level has been determined as a certain value according to the topographical maps. In order to make verification of the reservoir area, the reservoir lake can be visited during the verification site visit and be compared to the reservoir area map, presented in Appendix 3.

The electricity produced is sold to TEİAŞ. Therefore, TEİAŞ measures the electricity produced by one meter placed on the switchgear station where the power plant gets connected to the Turkish national grid. This meter provides official data which is remotely read and recorded by TEİAŞ systems for invoicing. TEİAŞ also conducts the calibration and maintenance of these 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 is done, and the meters are checked continuously if there is a difference of 0.2 % in the readings of the main and the auxiliary meters, the calibration is repeated.

The net electricity produced is calculated by subtracting the total electricity consumed by the hydroelectric power plant, from the gross electricity generation. After obtaining the net electricity production value, the emission reductions are calculated by multiplying the net electricity with the Combined Margin calculated above.

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 3. Positions and responsibilities of the VER monitoring team members

Position	Responsibility
Toros HPP Manager	Day to day operation of the Toros HPP, Compliance of the project activity with the host country rules and regulations Coordination of the data collection and recording for the VCS monitoring report.
Chief Electrical Engineer	Day to day follow up of electrical equipment Recording and monitoring of the electricity generation data
Accounts Manager	Data keeping for power sales Data entry to EPİAŞ system
Chief Mechanical Engineer	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 generation meter readings are performed by using the main metering device and the auxiliary metering device for accuracy checks only. Data from metering devices is recorded by TEİAŞ remote reading computerized systems, that can be retrieved on a monthly basis. This forms the basis for invoicing. In addition to the readings of the main metering device, generation data of the Toros HPP can be cross checked, via the TEİAŞ – EPİAŞ web site (https://seffaflik.epias.com.tr/transparency/) which is accessible by a password available to the electricity generation companies. The electricity generation data at the Market Financial Reconciliation Centre (MFRC/EPİAŞ) web page exhibits the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from EPİAŞ web site needs to be multiplied by the transmission loss factor of the grid.

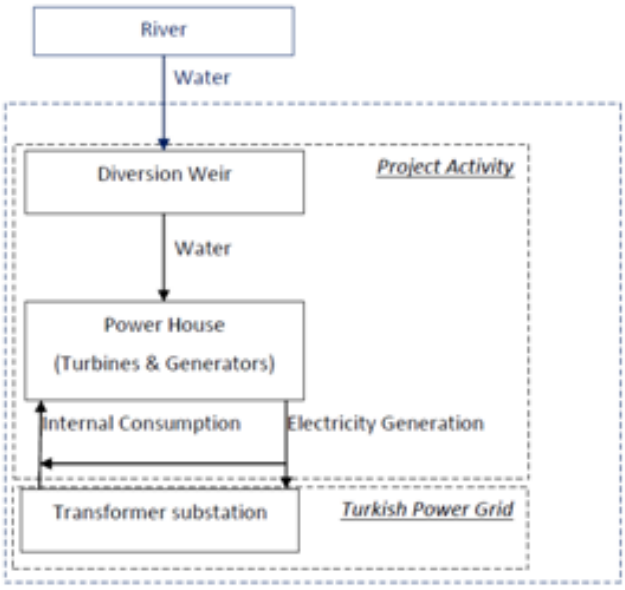
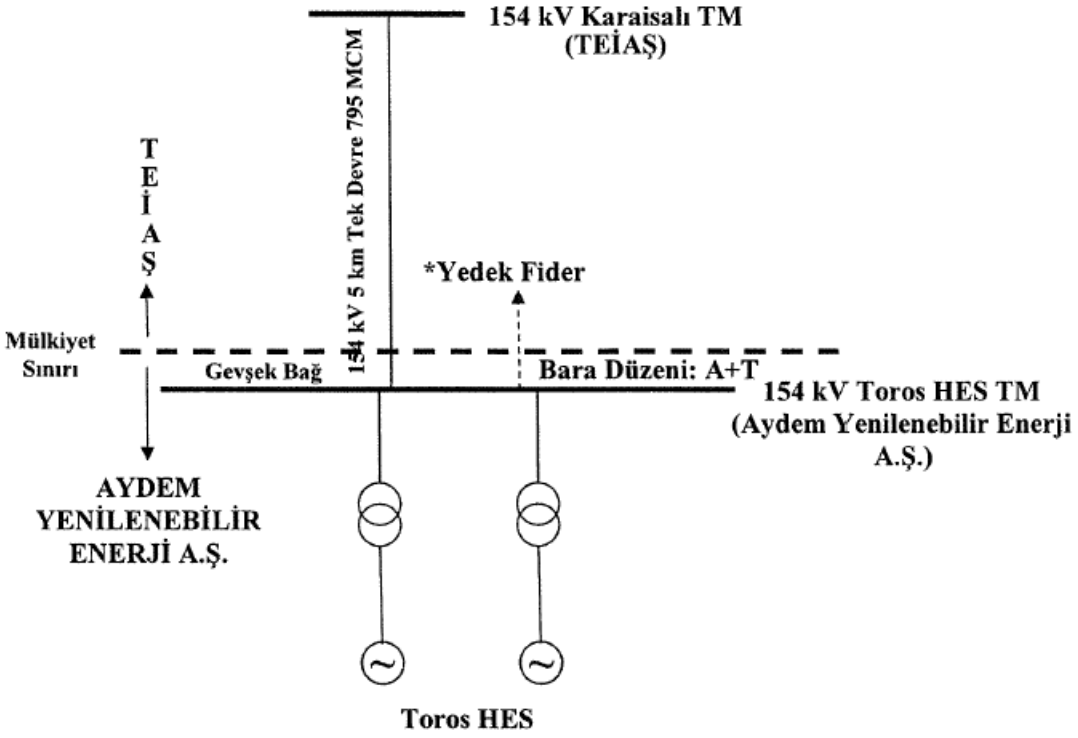


Figure 7. Project boundary

The single line diagram of the project activity has been given in the figure below.



*: Yedek Fider TEİAŞ Mülkiyetindedir.

Figure 8. Single line diagram of the project activity

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

There is no commercially sensitive information about the project activity. Hence, this section is not applicable.

Section	Information	Justification

APPENDIX 2: THE LEGAL FRAMEWORK OF THE HOST COUNTRY THAT BINDS THE PROJECT

The Environmental Law (No. 2872), which was published in Turkish Official Gazette No. 18132 dated August 11, 1983 and revised in Turkish Official Gazette No. 26167 dated May 13, 2006 (Law No.

5491) provides the legislative framework for the regulation of industries and their potential impact on the environment. Industrial projects are subject to varying levels of review that begin while projects are in the development and pre-operation phases. Additional regulations apply to facilities once they are in operation.

The Environmental Law authorized the promulgation of a number of regulations. Those that pertain to development and operation of renewable energy projects are the following:

- Environmental Impact Assessment Regulation, Official Gazette No. 26939 dated July 17, 2008.
- Water Pollution Control Regulation, Official Gazette No. 25687 dated December 31, 2004 and revised in Official Gazette No. 26786 dated February 13, 2008;
- Regulation on Construction of Cesspits where there is no Wastewater Collection System, Official Gazette No. 13783 dated March 13, 1971;
- Hazardous Chemicals Regulation, Official Gazette No.21634 dated July 11, 1993 and revised in Official Gazette No. 27092 dated December 26, 2008;
- Regulation on General Principles of Waste Management, Official Gazette No. 26927 dated July 5, 2008;
- Hazardous Wastes Control Regulation, Official Gazette No. 25755 dated March 14, 2005;
- Waste Oil Control Regulation, Official Gazette No. 26952 dated July 30, 2008 and revised Official Gazette No. 27304 dated July 31, 2009;

- Vegetative Waste Oil Control Regulation, Official Gazette No. 25791 dated April 19, 2005; and revised Official Gazette No. 27305 dated July 31, 2009
- Solid Waste Control Regulation, Official Gazette No. 20814 dated March 14, 1991 and revised in Official Gazette No. 25777 dated April 5, 2005;
- Medical Waste Control Regulation, Official Gazette No. 25883 dated July 22, 2005;
- Environmental Audit Regulation, Official Gazette No. 27061 dated November 21, 2008;
- Packaging Waste Control Regulation, Official Gazette No. 26562 dated June 24, 2007 and revised in Official Gazette No. 27046 dated November 6, 2008; and
- Waste Batteries and Accumulators Control Regulation, Official Gazette No. 25569 dated August 31, 2004 and revised in Official Gazette No. 25744 dated March 03, 2005;
- The Excavation, Construction and Demolition Waste Control Regulation, Official Gazette No. 25406 dated March 18, 2004;
- Soil Pollution Control Regulation, Official Gazette No. 25831 dated May 31, 2005;
- Regulation Related to Workplace Opening and Operation Permits, Official Gazette No. 25902 dated August 10, 2005 and revised in Official Gazette No. 26492 dated April 13, 2007;
- Industrial Air Pollution Control Regulation, Official Gazette No.27277 dated July 3, 2009
- Air Quality Assessment and Management Regulation, Official Gazette No. 26898 dated June 6, 2008 and revised in Official Gazette No. 27219 and dated May 5, 2009;
- Air Pollution Control Regulation For Heating Sources, Official Gazette No. 25699 dated January 13, 2005 and revised in Official Gazette No. 27134 dated February 07, 2009;
- Exhaust Gases Emission Control Regulation, Official Gazette No. 27190 dated April 04, 2009; and
- Regulation on Protection of Wetlands, Official Gazette No. 25818 dated May 17, 2005.

In addition to the Environmental Law and its associated regulations, there are several other laws that directly or indirectly include environmental review, and thus, are applicable to the proposed project. The project complies with the 4857 numbered Labour Law and its regulations stated below:

- Health and Safety Regulation for Construction Works, Official Gazette No. 25325 dated December 23, 2003;
- Regulation on Health and Safety Regarding Temporary Works, Official Gazette No. 25463 dated May 15, 2004.

Other regulations that the project complies with can be listed as follows:

- 5346 numbered Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy;
- Regulation on Protection and Usage of Agricultural Lands, Official Gazette No. 25766 dated March 25, 2005;
- 2863 numbered Law on Protection of Cultural and Natural Heritage (revised by 5226 numbered Law);
- 4342 numbered Pasture Law;
- 6831 numbered Forestry Law (amended by 5192 numbered Revision in Forestry Law); Regulation on Buildings located on the Disaster Areas, Official Gazette No. 26582 dated July 14, 2007.

APPENDIX 3: RESERVOIR AREA