



TOROS HYDROELECTRIC POWER PLANT



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PROJECT DETAILS

1.1 Summary Description of the Implementation Status 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 Beledik Village, Pozantı District of Adana Province, Turkey. 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. There are two hydraulic turbines which has an installed capacity of 26.025 MWm/24.995 MWe each. The installed capacity of the project is 52.05 MWm/49.99 MWe. The project has started operation on 17/05/2013. 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 239,400.00 MWh. Therefore, the Project Activity is expected to lead to an emission reduction of 127,655.26 tons CO_{2e} annually as per PD Ver2.02. During this monitoring period (01/01/2022 – 16/05/2023) the project has produced a net total of 252,454.88 MWh electricity and a total amount of 134,610.00 tCO₂ 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”.

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-May-2008 and the project has started in 17-May-2013.

¹ <https://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA>

Table 1. Milestones of TOROS HYDROELECTRIC POWER PLANT

Milestone	Date
Toros Feasibility Issuance for Study Report	01/07/2005
DSI Approval for Study Report	23/03/2006
Water usage agreement signed with DSI ²	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	17/05/2013
The first crediting period	17/05/2013 – 16/05/2023
The first monitoring period	17/05/2013 – 30/09/2020
The second monitoring period	01/10/2020 – 31/12/2021
The third monitoring period	01/01/2022 – 16/05/2023

The Toros HPP is made up of one hydro power plant. There is one regulating body that takes 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 is utilized and the energy is produced by the Toros Hydroelectric Power Plant. The water is entering to the regulatory body and the water collecting area over the Çakıt Stream at the 700 m elevation level. Then the water is settled at the sedimentation pool and is transferred to a tunnel with a diameter of 3.5 m and a length of 11,860 m. The water that passes this tunnel is then be transferred to a canal and its is transferred to the loading pool via

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

penstock and passes to the hydro power plant building where the electricity will be produced. The water is then left back to the Çakıt stream at the 330 m elevation level. See the following figure (Figure 1) that represent the schematic description of the project principles.

Project boundary is shown in the figure below.

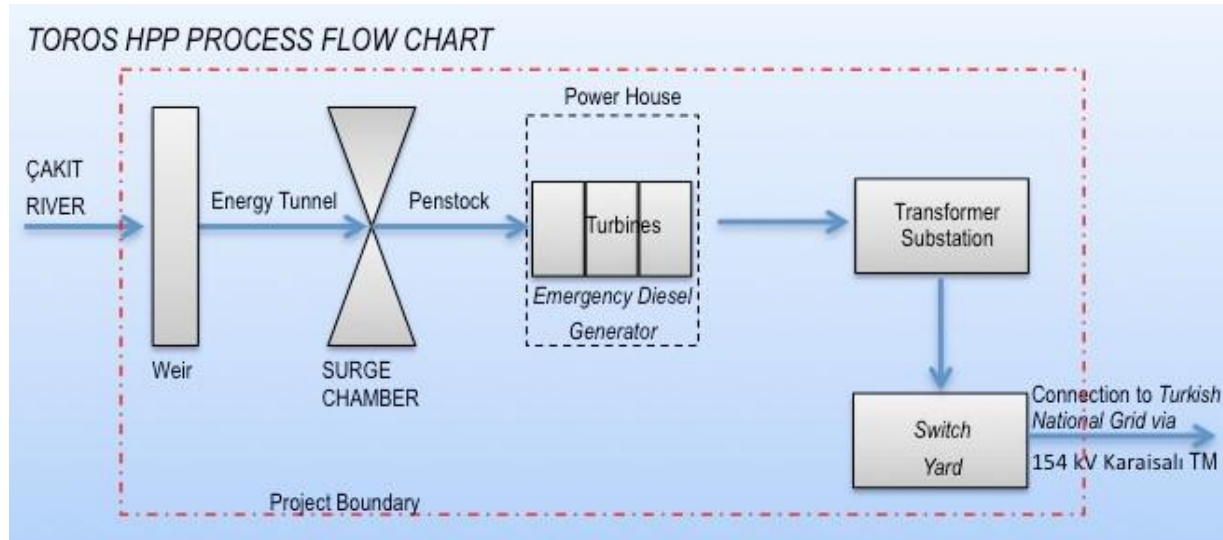


Figure 1. Project boundary

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 km³. After the water leaves the diversion tunnel it enters into the penstock and is transferred to two turbines, each with 26.025MWm / 24.995 MWe capacity, via a surge Tank. The two turbines are 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
- The switch gear area and the transformer

1.2 Audit History

Audit Type	Period	Program	VVB Name	Number of years
Validation/ Verification	17-May-2013 – 16-May- 2023 (1 st crediting period)	<u>VCS</u>	<u>RINA S.p.A (RINA)</u>	10
Verification	17-May-2013 – 30- September- 2020 (1 st monitoring period)	<u>VCS</u>	<u>Carbon Check</u>	~7
Verification	01-October- 2020 – 31- December- 2021 (2 nd monitoring period)	<u>VCS</u>	<u>Carbon Check</u>	~2 (14 months)
Verification	01-January- 2022 – 16- May-2023 (3 rd monitoring period)	<u>VCS</u>	<u>Re-carbon Ltd.</u>	~2 (17 months)
Total	=	=	=	~21

1.3 Sectoral Scope and Project Type

Sectoral scope ³	1. Energy (renewable/non-renewable)
Project activity type	Non-grouped

This is non-AFOLU project. Thus, this table is N/A.

Sectoral scope	
AFOLU project category ⁴	
Project activity type	

1.4 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

1.5 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

³ 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>

⁴ See Appendix 1 of the VCS Standard

Email kemal.demirkol@gte.com.tr

1.6 Project Start Date

Project start date	17-May-2013
Justification	Commissioning date for both Unit-I and Unit-II of Toros HEPP

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	17-May-2013 to 16-May-2023

1.8 Project Location

The host party is the Republic of Turkey. The project is located in Adana province, along the Çakıt Stream (Figure 2). The nearest settlement is Güllü District and it is located 6-7 km far from the project activity.

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

Table 2. The coordinates of the main project structures

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

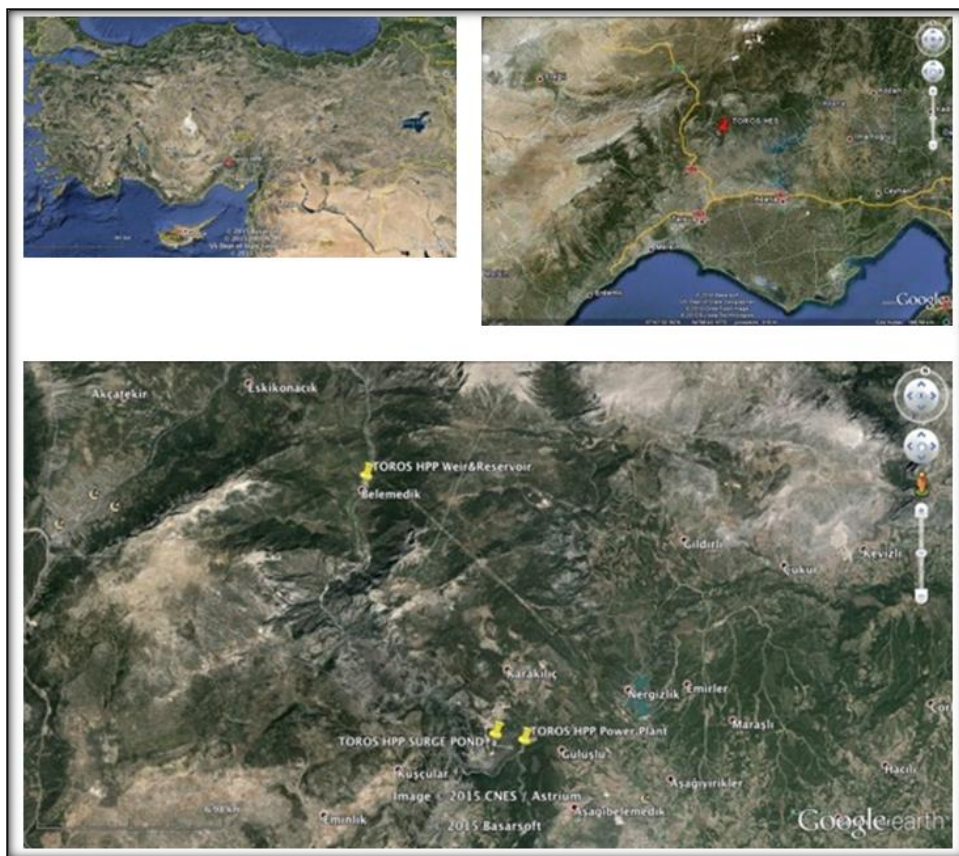


Figure 2. Project location

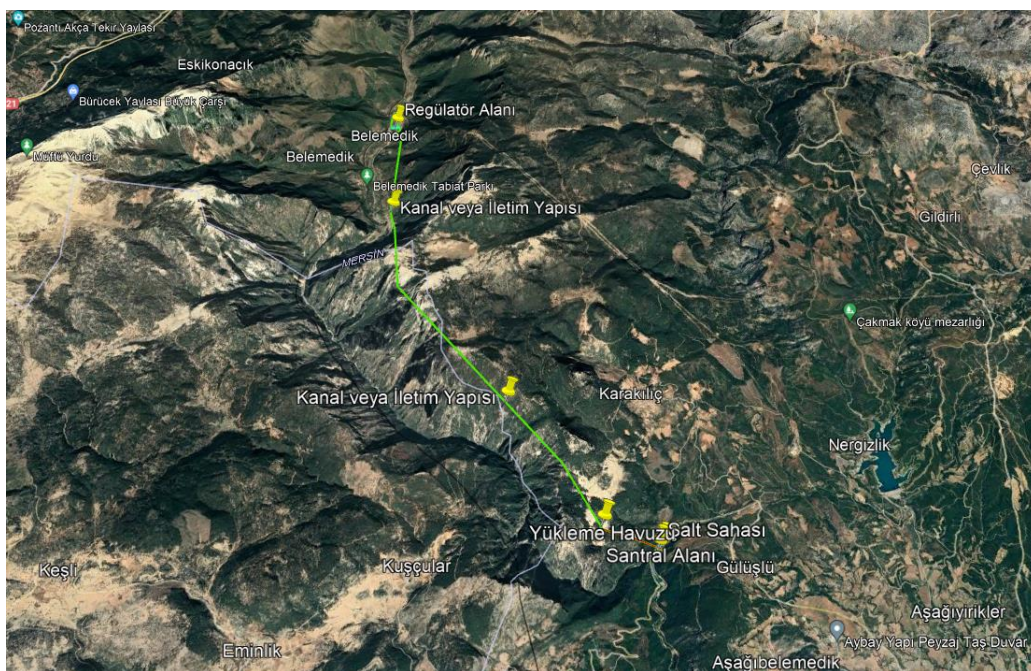


Figure 3. The project location of the Toros HEPP

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Consolidated baseline methodology for grid-connected electricity generation from renewable sources	16.0
Tool	01	Tool for the demonstration and assessment of additionality	07.0
Tool	07	Tool to calculate the emission factor for an electricity system	04.0
Tool	EB 50 Report, Annex 15	Tool to determine the remaining lifetime of equipment	01.0

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

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

1.12 Sustainable Development Contributions

The project helps Turkey to stimulate the commercial application of grid connected renewable energy technologies and markets. It is also 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, improved air quality, alternative sustainable energy, improved local source of income and sustainable renewable energy industry development. The project highly supports the sustainable economic development in the region. It has significant contribution in diminishing carbon emissions and protecting the climate compared to the business-as-usual scenario. It created employment during the construction and the operation phase of the plant. Therefore, the project has positive influences on sustainable development and contributes to UN sustainable development goals (SDG) 13, 8 and 7.

- Climate Action (SDG 13): Renewable energy power plants contribute to “Emission Reductions or Removals and/or Adaptation to Climate Change” by reducing CO₂ emissions caused by fossil fuel-fired power plants that are displaced due to the project activity. The project has reduced CO₂ emissions in an amount of 134,610.00 tons in the whole monitoring period.
- Decent Work and Economic Growth (SDG 8): The project generates employment and income. The project has created permanent job opportunities for 26 people.
- 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. The project, Toros HPPs has generated net 252,454.88 MWh electricity in the whole monitoring period.

Table 3. Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	13.3	Tons of greenhouse gas emissions avoided	Implemented activities to increase	By generating electricity from clean sources, project has prevented 134,610.00 tCO ₂ into the atmosphere during the monitoring period	By generating electricity from clean sources, project has prevented 766,324 tCO ₂ into the atmosphere Over Project Lifetime
2)	8.5	Job opportunities created	Implemented activities to increase	During the monitoring period 26 ⁵ employees were recruited.	-
3)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	The project generated 252,454.88 MWh electricity from hydropower which is a renewable source during the monitoring period	The project generated 1,437,439.62 MWh electricity from hydropower which is a renewable source over project lifetime

⁵ Site visit interview.

1.13 Commercially Sensitive Information

There was 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	Gülüşlü Village
Location of resources	Gülüşlü Village

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.
Date(s) of stakeholder consultation	According to the rules and regulations at the time of licence 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. However, in order to comply with the rules and regulations

	of the host country, the project owner officially corresponded with all the relevant authorities that can as well be considered as stakeholders.
Communication of monitored results	There was a “grievance box” in the mukhtars’ office in the vicinity of the project (Gülüşlü Village) for a continuous grievance policy that is implemented by the project owner.
Consultation records	There was a “grievance box” in the mukhtars’ office in the vicinity of the project (Gülüşlü Village) for a continuous grievance policy that is implemented by the project owner.
Stakeholder input	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.

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	No risk identified.	No mitigation or preventative measure should be taken since there is no risk identified for stakeholder participation.
Working conditions	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	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	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)	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 employers.
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 26 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 convention. 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.
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2.4.1 Rare, Threatened, and Endangered species

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 17/05/2013. Since that date, there is no special event that may have impact on monitoring of GHG emission reductions.

Table 4. Milestones of TOROS HYDROELECTRIC POWER PLANT

12/01/2021	Water Use Agreement renewal	Water Use Agreement
27/12/2019	Status Change for “Bereket Enerji Üretim Anonim Şirketi” to “Aydem Yenilenebilir Enerji A.Ş.”	Official Gazette
20/06/2021	Energy Meter Change	First Index Protocol

The turbine and generator technology is explained in the table below.

Properties	
Project flow rate	16 m ³ /s
Installed capacity	49.99 MWe
Unit number	2
Turbine type	3 phased synchronized
Rated net fall	354.68 m
Rated flow rate	16 m ³ /s
Generator	

Type	3 phase, AA, synchronous generator, vertical
Rated power	32000 kVA (kW)
Voltage	10.5 kV

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

Project boundary is shown in the figure below.

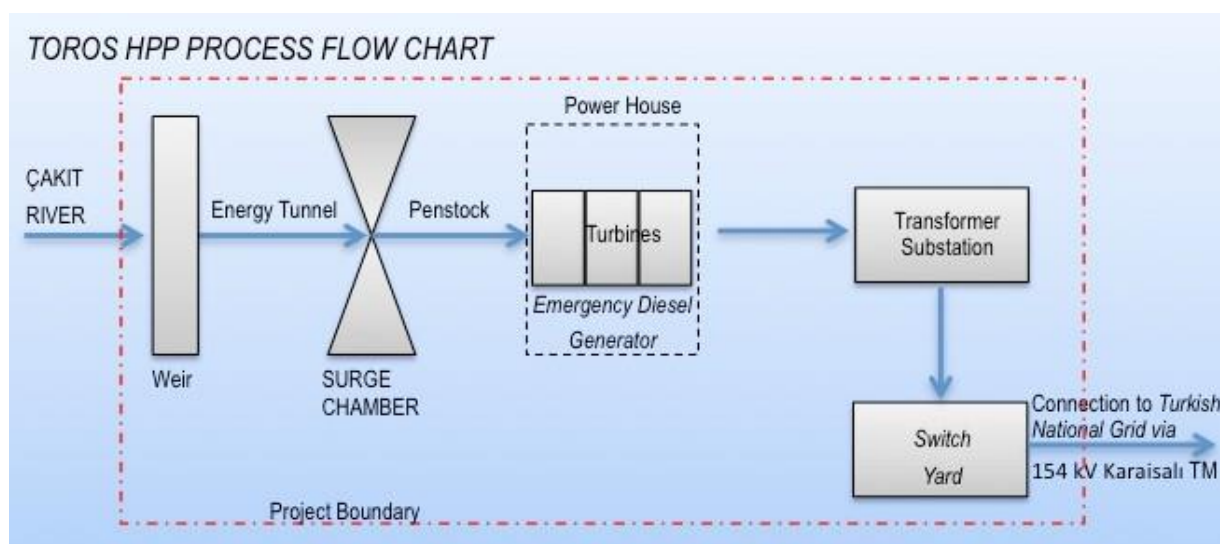


Figure 4. Project boundary

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 km³. After the water leaves the diversion tunnel it enters into the penstock and is transferred to two turbines, each with 24.50 MWe capacity, via a surge Tank. The two turbines are 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
- The switch gear area and the transformer

The details of the currently installed meters are given in table below.

Table 5. The details of the current meters

Meter	Main Meter (current)	Spare Meter (current)
Serial Number	10172377	10172378
Brand	EMH	EMH
Calibration Year	2021	2021
Valid Until	2031	2031
Test Dates	04/06/2021	04/06/2021
Accuracy Class	0.2S-0.5S	0.2S-0.5S

3.2 Deviations

3.2.1 Methodology Deviations

The UNFCCC methodology of ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” Version 16.0 and its related tools are applied as they are without any deviation from methodology.

3.2.2 Project Description Deviations

In the registered VCS PD, the PP is “Bereket Enerji Üretim Anonim Şirketi”. Then, title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir Enerji A.Ş.⁶ which is the current project proponent. The project activity is in compliance with the scenario described at the Project Design Document and validated by the validation report dated 11/05/2015.

In registered VCS PD Ver 2.02, the Cap_{pj} (Installed capacity of the hydropower plant were stated as 49,990,000 W). However, in the EPDK license with a registration number of EÜ/1062-2/782 and date of 18/01/2007, the installed capacity was stated as 49.99 MWe (49,990,000 W). Hence, the Cap_{pj} value was corrected in the sections 4.2 and 5.2 of MR version 2.02. This deviation does not cause any change for chosen methodology of ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” Ver 16.0 as the installed capacity is under 50 MWe⁷.

3.3 Grouped Projects

The project scope 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

⁶ Turkey Trade Registry Gazette (Date; 27/12/2019, No: 9982, Page 219)

⁷<https://cdm.unfccc.int/UserManagement/FileStorage/OX6IERWMG92J7V3B8OTKFSL1QZH5PA>

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data – Parameter	$FC_{i,y}$
Data unit	m^3
Description	Amount of fuel i consumed by relevant power plants in Turkey in years, 2009, 2010, 2011
Source of data	Turkish Electricity Transmission Company (TEİAŞ) Web Site ⁸
Value applied	Please see Appendix 2 (Table 1) in the validated PDD (version 2.02)
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 $EF_{grid,OM,Simple,y}$
Comments	-

Data - Parameter	NCV
Data unit	GJ-Mass or Volume Unit
Description	Net Calorific Values for fossil fuels in years 2009, 2010 and 2011
Source of data	Turkish Electricity Transmission Company Web Site ⁹
Value applied	Please see Appendix-2 –Table 5 in the validated PDD (version 2.02).
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 $EF_{grid,OM,Simple,y}$
Comments	Data used for the calculation of $EF_{grid,OM,Simple,y}$. 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.

⁸ <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri>

⁹ <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri>

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	0.1481 tCO ₂ /GJ
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 7.0, 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
Value applied	Please see Appendix 2, Table 3 and Table 4 in the validated PDD (version 2.02)
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}
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 ¹⁰ . Data is extracted from the relevant annexes of the capacity projection reports for the years 2010, 2011, and 2012 ¹¹ .
Value applied	Please see Appendix-2-Table 8 in the validated PDD version 2.02
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 5.0, EB87Annex 9)” are used
Value applied	Please see Annex 1 of the “Tool to calculate emission factor for an electricity system (Version 05.0; EB87Annex 9)” in the validated PDD version 2.02.
Justification of choice of data or description of measurement methods and procedures applied	According to the “tool to calculate emission factor for an electricity 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 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	-

4.2 Data and Parameters Monitored

Data - Parameter	EGy
Data unit	MWh

¹⁰ <https://www.teias.gov.tr/tr-TR/turkiye-elektrik-uretim-iletim-istatistikleri>

¹¹ <https://www.elektrikport.com/uploads/content/TEIAS%20Uretim%20Kapasite%20Projeksiyonu%202011-2020.pdf>

Description	Quantity of net electricity generation supplied by the project plant to the grid in MP																					
Source of data	Electricity Meters EPIAS screenshots are the main source, and TEIAS readings are used in cross-check.																					
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	252,454.88 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 ⁸ . By regulation, the accuracy class is 0.2%. Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market. They have an accuracy class of Class 002 indicating an accuracy range of 0.2%.																					
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 EPIAS trading software for internal monitoring. The Calibration dates of the meters and their validity is as follows: <table><tr><td></td><td>Main Meter (Current)</td><td>Spare Meter (Current)</td></tr><tr><td>Serial no.</td><td>10172377</td><td>10172378</td></tr><tr><td>Brand</td><td>EMH</td><td>EMH</td></tr><tr><td>Calibration date</td><td>2021</td><td>2021</td></tr><tr><td>Calibration due</td><td>2031</td><td>2031</td></tr><tr><td>Test Dates</td><td>24/10/2023</td><td>24/10/2023</td></tr><tr><td>Class</td><td>0.2S-0.5S</td><td>0.2S-0.5S</td></tr></table>		Main Meter (Current)	Spare Meter (Current)	Serial no.	10172377	10172378	Brand	EMH	EMH	Calibration date	2021	2021	Calibration due	2031	2031	Test Dates	24/10/2023	24/10/2023	Class	0.2S-0.5S	0.2S-0.5S
	Main Meter (Current)	Spare Meter (Current)																				
Serial no.	10172377	10172378																				
Brand	EMH	EMH																				
Calibration date	2021	2021																				
Calibration due	2031	2031																				
Test Dates	24/10/2023	24/10/2023																				
Class	0.2S-0.5S	0.2S-0.5S																				
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 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 – EPIAŞ web site which is accessible by a password available to the electricity generation companies. The electricity generation data at the Market Financial Reconciliation Centre (MFRC/EPIAŞ) web page exhibits the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from EPIAŞ 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 _{PI}
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.
Measured / Calculated / Default:	Indirectly measured based on the reservoir area map provided in Appendix 2
Source of data:	Surface area determined using the lake surface area map provided in Appendix-2
Description of measurement methods and procedures to be applied:	The reservoir area corresponding to maximum operational level has been determined via the topographic map showing the lake area, presented in Appendix-2.
Frequency of monitoring/recording:	Once during each monitoring period
Value applied:	42,835 m ²
Monitoring equipment:	-
QA/QC procedures to be applied:	Can be checked and compared to satellite imagery available by Google Earth.
Purpose of the data:	Data to be used for the calculation of Baseline Emissions.
Calculation method:	N/A
Any comment:	-

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 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 V.

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 6. 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 EPIAŞ 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 – EPIAŞ 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/EPIAŞ) web page exhibits the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from EPIAŞ web site needs to be multiplied by the transmission loss factor of the grid.

Each period, the monitoring report is submitted to DOE for the verification. The report covers the monitoring of grid-connected power generation, check report, report on calculation of the emission reductions and records of monitoring instrument repair and calibration, etc. 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.

TEİAŞ is the responsible body for the meters and ensures the quality and accuracy of the measurements. Calibration of the meters are handled by TEİAŞ; hence no internal audit is performed by the power plant employees. Calibrations are done according to the national regulations by the distribution company. Calibrations are done according to the Measuring Instruments Directive¹². Calibration of the meters are valid for 10 years based on Regulation on Metering and Metering Devices¹³. The generation is zero for the period where the meters are being replaced. Meter replacements are done on the same day. Meters are tested every two years, according to the System Use Agreement between the PP and the distribution company TEİAŞ. Testing is done by TEİAŞ.

The two electricity metering devices were replaced with new ones on 20/06/2021 as the previous ones reached their end of validity period of 10 years.

Meter	Serial Number	Brand	Calibration Year	Valid Until	Accuracy Class
Main Meter	10172377	EMH	2021	2031	0.2S-0.5S
Control Meter	10172378	EMH	2021	2031	0.2S-0.5S

¹² 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>

¹³ 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>

The single line diagram can be seen in the figure below.

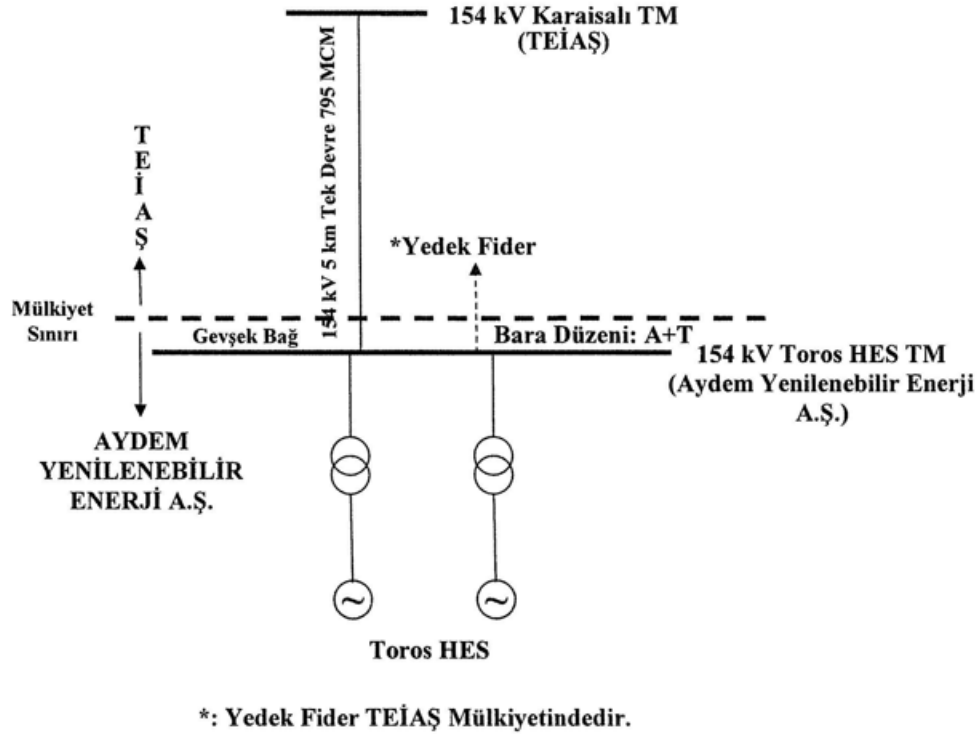


Figure 5. The single line diagram of the project activity

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

$$252,454.88 \text{ MWh} \times 0.53323 \frac{\text{tCO}_2}{\text{MWh}} = 134,610.00 \text{ tCO}_2$$

$$BE_y = 134,610.00 \text{ tCO}_2$$

5.2 Project Emissions

As per ACM0002 "Grid-connected electricity generation from renewable sources", v16.0, page 12,

"For most renewable power generation project activities, $PE_y = 0$. 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 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 geothermal power plants due to the release of non-condensable gases 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 35 of "ACM0002: Grid-connected electricity generation from renewable sources" ver 16. Hence it is neglected. Therefore; $PE_{FF,y} = 0$ (t CO₂/yr).

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 49,990 MWe installed capacity and 42,835 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} = 49,990,000 We

Cap_{BL} = 0.0 W

A_{PJ} = 42,835 (m²)¹⁴

A_{BL} = 0.0 (m²)

Therefore, PD is calculated as;

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

$$PD = 1167.04 \text{ W} - m^2$$

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

5.3 Leakage Emissions

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

$$LE_y = 0$$

¹⁴ Toros HEPP reservoir area, Appendix 2

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, $ER_y = BE_y$.

Table 7. Calculations for net total values

EGy	Net Generation (MWh) During Monitoring Period	252,454.88
EFy	Emission Factor (tCO ₂ -MWh)	0.53323 ¹⁵
BEy	Baseline emissions in year y (tCO ₂) During Monitoring Period	134,610.00
PEy	Project Emissions (tCO ₂)	0
LEy	Leakage Emissions (tCO ₂)	0
ERy	Net Emission Reduction (tCO ₂) During Monitoring Period	134,610.00

Thus, the net emission reduction (in tons CO₂) in this monitoring period (01-January-2022 to 16-May-2023) is calculated as given in table below.

¹⁵ Fixed ex-ante CM as per registered PD ver 2.02

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCU (tCO ₂ e)	Removal VCU (tCO ₂ e)	Total VCUs (tCO ₂ e)
01-Jan-2022 to 31-Dec-2022	110,594.0	0	0	110,594.0	0	110,594.0
01-Jan-2023 to 16-May-2023	24,016.00	0	0	24,016.00	0	24,016.00
Total	134,610.00	0	0	134,610.00	0	134,610.00

Total emission reductions were realized as 134,610.00 tCO₂ for this monitoring period. When the estimated electricity generation figure of the power plant for each year in the validated VCS PD (239,400 MWh-year) is considered, the total emission reductions should be approximately 127,655 tCO₂ for the monitoring period (17 months). Percent difference is calculated as 25.4%, which means the project reduced 25.4% less CO₂ than the estimated amount. Since the project is a HEPP, seasonal variations in the amount of precipitation and temperature affect the monthly generation rates and may create deviations from the estimated values. According to the values revealed by the General Directorate of Meteorology, Turkey, in Adana province, the maximum temperature and lowest precipitation are reached in July, August and September¹⁶. This fact reflects on the electricity generation obtained in August and September by TOROS HEPP. Moreover, in the Mediterranean region where the power plant is located in, it was recorded that the precipitation decreases between October 2020-September 2021, according to the report named "Evaluation of Areal Precipitation in 2021" published by Directorate General of Meteorology of Turkey. These natural effects cause significant decrease in electricity generation by the plant¹⁷. On the other hand, the electricity generation is dependent on water flow estimation, which is a natural phenomenon and cannot be estimated with 100% accuracy.

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
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¹⁶ <https://www.mgm.gov.tr/veridegerlendirme/il-ve-ilceler-istatistik.aspx?m=ADANA>

¹⁷ <https://www.mgm.gov.tr/FILES/arastirma/yagis-degerlendirme/2021AlansalYagisDegerlendirmesi.pdf>

01-Jan-2022 to 31-Dec- 2022	127,655.26	110,594.00	13.4	Since the project is a HEPP, seasonal variations in the amount of precipitation and temperature affect the monthly generation rates and may create deviations from the estimated values.
01-Jan-2023 to 16-May- 2023	52,810.81	24,016.00	54.5	Since the project is a HEPP, seasonal variations in the amount of precipitation and temperature affect the monthly generation rates and may create deviations from the estimated values.
Total	180,466.07	134,610.00	25.4	Since the project is a HEPP, seasonal variations in the amount of precipitation and temperature affect the monthly generation rates and may create deviations from the estimated values.

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

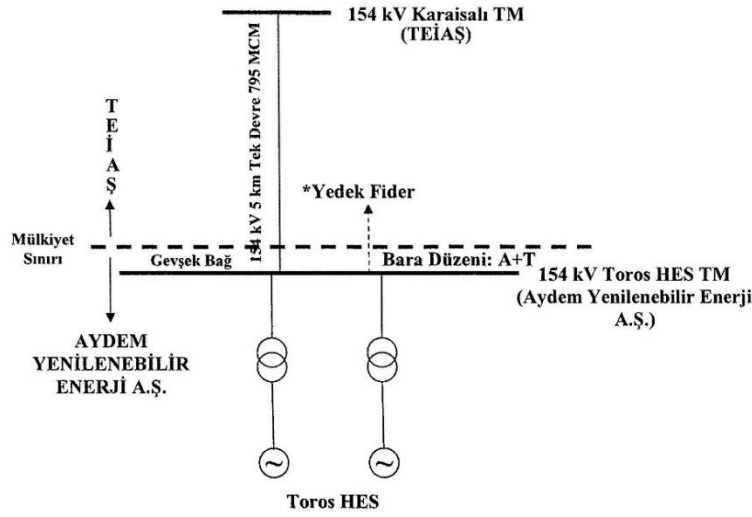
There is no commercially sensitive information about the project.

Section	Information	Justification

APPENDIX 2: PROJECT'S SINGLE LINE DIAGRAM

BAĞLANTI ANLAŞMASI EK-3 MÜLKİYET SINIRLARI

- a) Mülkiyet sınırının yazılı ifadesi: : Üretim Tesisi Şalt Sahasından sonraki nihayet direği ile Üretim Tesisi Şalt Sahası arasındaki gevşek bağlantı hariç, tesis edilecek enerji iletim hatları TEİAŞ'ın mülkiyetindedir.
- b) Mülkiyet sınırının Prensip Tek Hat Şeması üzerinde gösterimi:



*: Yedek Fider TEİAŞ Mülkiyetindedir.

AYDEM YENİLENEBİLİR
ENERJİ A.Ş.
Ticaret Sicil No: 270900, Şişli, No:15/1
M. Nispetiye, İstanbul, Türkiye
Ticaret Sicil No: 270900, Şişli, No:15/1
Ticaret Sicil No: 270900, Şişli, No:15/1



APPENDIX 3: PROJECT'S RESERVOIR AREA

