TOROS HYDROELECTRIC POWER PLANT

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Toros Regulator and Hydro Power Plant (HPP) is built on the Çakıt Stream, within the jurisdiction of Pozantı Town of Adana Province. The purpose of the project is electricity production using the potential energy of Çakıt Stream as a renewable resource. Therefore, the electricity is produced without causing airborne pollutants or Green House Gas (GHG) emissions. The construction and operation of theToros regulator and HPP is retarding the addition of conventional thermal power plants to the Turkish National Electricity Grid.

As shown on the EMRA approved electricity production license[1] the established capacity of Toros HPP is 49 MW. The project is expected to produce a total of 239,400 MWh[2] of electricity per year therefore the plant load factor of the project calculates to be, 55.77 %, as shown in the below calculation:

$$\frac{239{,}400\ \mathrm{MWh}}{49\mathrm{MW} \times 365 \times 24\mathrm{h}} = \frac{239{,}400}{429{,}240} = 0.5577 = 55.77\%$$

During this monitoring period the project has produced a net total of 1,329,377.62 MWh electricity and a total amount of 708,702 tCO2e of emission reduction.

The Environmental impacts of the project are kept to a minimum and all the regulations that are in act in turkey is 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 passage way) at the downstream and upstream directions of the construction to facilitate fish migration. Since the project is designed as a run off river type power plant, the minimum water that is necessary for the sustainability of the aquatic life in the river is always released. The construction has started in 01.05.2008 and the project has started in 17.05.2013.

[1]Toros HPP Electricity Production Licence Dated 18/01/2007 numbered EÜ/1062-2/782

[2]Based on Toros Feasibility Study Report pdf page 72 of the file Toros HES Fizibilite 3.pdf.

1.2 Sectoral Scope and Project Type

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

1.3 Project Proponent

Organization name	Aydem Yenilenebilir Enerji A.Ş.[3]
Contact person	Özgün Gül Koparan
Title	Environmental Affairs Manager
Address	AdaletMah.HasanGönüllüBulvarı No:15-1 Merkezefendi,Denizli-Turkey
Telephone	+90 258 242 27 76
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1.4 Other Entities Involved in the Project

Organization name	Ekobil Environmental Services and Consultancy Limited[4]
Role in the Project	Preparation of the Project Description Document[5]
Contact person	Dr. Aslı Sezer Özçelik
Title	Partner
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[3]Title of the company changed from Bereket Enerji Üretim San. ve Tic. A. Ş. to Aydem Yenilenebilir A.Ş. Therefore, the contact changed.

[4] Ekobil was contracted by "Turkuaz Karbon Varlık Yönetimi Enerji Projeve Dan. San. İth. İhr. Ltd. Şti." for the preparation of PD and now Ekobil Environmental Services and Colsuntancy Ltd.is directly contacted by project proponent for monitoring report preparation

[5]Ekobil is a limited liability company registered to the Ankara Chamber of Commerce with the registration number of 145009 and with the full title of EkobilÇevreHizmetleriDanışmanlıkEğitimTarımHayvancılıkMadencilikİnşaatİthalatİhracatTurizmveTicaret Limited Şirketi

1.5 Project Start Date

17 May 2013 is the date when the project started to supply electricity to the Turkish grid as substantiated by the partial acceptance letter sent to the Governance of Adana Province, Adana-Turkey.

1.6 Project Crediting Period

The project crediting period is 10 years: 17.05.2013 to 16.05.2023 (both days inclusive).Renewable twice.

1.7 Project Location

The project is located in Adana province, along the Çakıt Stream (Figure1).

The following are the coordinates of the major project structures (Table1):

Table 1: The Geographic coordinates of the major project structures:

Name of Structure	Latitude	Longitude
Toros Power House	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 1:The Google Earth Image showing the Project Location. (The related .kml file is provided to the validating DOE).

1.8 Title and Reference of Methodology

The following UNFCCC methodology and its related tools are utilised:

Approved consolidated baseline and monitoring methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources.” Version 16.0.

The Approved Methodology refers to the following tools:

- Tool for the demonstration and assessment of additionality” (Version 07.0.0)
- Tool to calculate the emission factor for an electricity system”. (Version 04.0)
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02)
- Combined tool to identify the baseline scenario and demonstrate additionality” (Version 5.0.0).
- Tool to determine the remaining lifetime of equipment” (EB 50 Report, Annex 15 version 0.1),

Only the following tools are utilized:

- Tool for the demonstration and assessment of additionally” (Version 07.0.0)
- Tool to calculate the emission factor for an electricity system”. (Version 04.0.0).

- Tool to determine the remaining lifetime of equipment" (EB 50 Report, Annex 15 version 0.1),
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02).

1.9 Participation under other GHGPrograms

The project has not participated in any other GHG Programs.

1.10 Other Forms of Credit

Not Applicable

- Host country does not have an emissions trading scheme and the project activity is not taking place in any other form of environmental credit.
- Other Forms of Environmental Credit: The project has not sought or received any other form of GHG-related environmental credit, including renewable energy certificates, during this monitoring period.

1.11 Sustainable Development

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

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

SDG 7 on access to affordable, reliable, and sustainable energy, as the project is not relying on imported fossil fuels. In this monitoring period, 1,329,377.62 MWh renewable electricity has supplied to national grid that supports to increase the renewable energy share in the energy mix.

SDG-8 decent work and economic growth. As the project is providing a decent and secure work environment. All personnel working at the power plant are receiving regular trainings about occupational health and safety.

SDG-12 Responsible consumption and production as the hydroelectric power plants are producing clean source of energy. They are replacing the fossil fuel based national grid. Because of that these plants drives people to consume more sustainable type of energy.

SDG 13 on urgent action to combat climate change, as the project is replacing the fossil fuel based national grid and it is producing emission reductions. In this particular project the power plant prevented the release of 708,702 tCO2 into the atmosphere.

2 SAFEGUARDS

2.1 No Net Harm

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. During this monitoring period the project has produced a net total of 1,329,377.62 MWh electricity and a total amount of 708,702 tCO2e of emission reduction. The effects of the project are given below.

Air Quality: Necessary precautions, such as watering roads, careful loading and unloading and covering the top of loaded trucks by tarpaulin; is taken in order to minimize the dust formed during excavation.

Water & Wastewater Management: Water for domestic use is supplied by tankers to the site and wastewater is collected in septic tanks which is emptied regularly. The wastewater is discharged in accordance with Water Pollution Control Regulations.

The waste oil: Any kind of waste oil that may result during construction or operation stages, is collected in impermeable containers and transferred to recycling centres in accordance with Hazardous Waste Control Regulations and Waste Oil Control Regulations.

Solid Waste: Solid waste is collected and recyclables is separated to be sent to recycling centres. The rest is disposed to the nearest landfill site in coordination with Pozantı Municipality.

Biodiversity: The region is defined to include some of species under conservation by international conventions. Necessary precautions are taken if any seen on the site. Also a fish passage is constructed to ease up and down stream movements of the fish living in Çakıtriver.

2.2 Local 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. Because, at the time of licence 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 stakeholders 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 I), the project owner officially corresponded with all the relevant authorities that can as well be considered as stakeholders.

The project owner sent letters with the project information attached to government institutions such as Adana Provincial Directorate of Environment and Forestry, Adana Special Provincial Authority, to EMRA, to municipality etc.

Please also note that at the close proximity of the project activity there are not much settlements and there were only two privately owned land parcels that the owners were contacted on an ad hoc basis about the project activity. Yet, the relations with public are monitored within the framework of the Social Carbon Standard Report.

2.3 AFOLU-Specific Safeguards

The Project is a non-AFOLU project

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project start date is 17.05.2013.A maintenance work was carried out in June , 2013 due to a turbine malfunction .Since that date, there is no special event that may have impact on monitoring of GHG emission reductions. The following table summarizes the project milestones:

Table 2: Major Project Milestones

Date	Milestone	Reference
01/07/05	Toros Feasibility Study Report was issued	Toros FSR
23/03/06	DSI Approved the Feasibility study Report	DSI Correspondence
28/11/06	Water usage agreement (WUA) signed with DSI	WUA
18/01/07	Electricity Production License numbered EÜ/1062-2/782 was issued by EMRA	License
01/05/08	Construction Started	NHS Records
24/09/09	Project Loan Agreement was signed	Loan Agreement
25/09/09	Contract signed with the subcontractor for the construction of major structures	Inarma Contract
23/06/10	EIA Exemptions certification issued	Certificate
30/09/10	Amendment to the WUA signed	Amendment declaration later
07/12/10	Grid connection agreement signed	Agreement
12/01/11	DOE Contracted for Validation	Contract

3.2 Deviations

3.2.1 Methodology Deviations

The UNFCCC methodology of ACM0002 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 which is the current project proponent. Also in the registered VCS PD the other entities involved in the project name was Turkuaz Karbon Varlık Yönetimi Enerji Proje ve Danç San. Ith. Ihr. Ltd. Şti. Ekobil was contracted by “Turkuaz Karbon Varlık Yönetimi Enerji Projeve Dan. San. İth. İhr. Ltd. Şti.” for the preparation of PD and now Ekobil Environmental Services and Consultancy Ltd. is directly contracted by project proponent for monitoring report preparation.

Other than that, 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.

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.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data Unit / Parameter	FCi,y
Data unit	Mass or Volume Unit (Tonnes or cubic meter)
Description	Amount of fuel i consumed by relevant power plants in Turkey in years, 2009, 2010, 2011
Source of data	Turkish Electricity Transmission Company (TEIAŞ) Web Site https://webapi.teias.gov.tr/file/303fcd3e-6f03-462a-88b3-7a96d9078dad?download
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 Unit / 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 https://webapi.teias.gov.tr/file/46d3ce93-0127-4536-ac81-27e66e736af6?download
Value applied	Please see Appendix-2 –Table 5 in the validated PDD(version 2.02).
Justification of choice of data or description of	Data used is taken from the TEİAŞ website, which is the website of the Turkish Electricity Distribution Company. The data published on the

measurement methods and procedures applied	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 EFgrid,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.
Comments	-

Data Unit / Parameter	$EF_{CO2,i,y}$
Data unit	tCO2/GJ
Description	CO2 emission factor of fossil fuel type i in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied	Please see Appendix 2-Table 2 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 the emission factor for an electricity system" version 2, 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 Unit / Parameter	EGy
Data unit	MWh
Description	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 $EF_{grid,BM,y}$
Comments	-

Data / Parameter	$EG_{m,y}$
Data unit	MWh
Description	Net electricity generated and delivered to the grid by power unit m in yeary

Source of data	Turkish Electricity Transmission Company Web Site (www.teias.gov.tr). Data is extracted from the relevant annexes of the capacity projection reports for the years 2010[6], 2011[7]and 2012[8].
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

[6]http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf

[7]http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf

[8]http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2012.pdf

	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 system"(version 5.0; EB87,Annex 9), if documented manufacturer's specifications or data from the utility, the dispatch centre 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

The following are the data and parameters monitored:

Data Unit / Parameter	EGy
Data unit	MWh
Description	Electricity
Source of data	Net Amount of Electricity supplied to the "Turkish National Grid" by the proposed project
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	Total 1,329,377.62 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: Actaris,Serial Number: 65000768 Back-up Electricity Meter: Actaris-Serial Number:65000769 Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market[9]. 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 monitoredvia the operator by the help of PMUM trading software for internal monitoring. The Calibration dates of the meters and their validity is as follows[10]:

Meter number	Calibration done	Valid Until
Main Meter:65000768	2011	2021
Spare Meter :65000769	2011	2021

Purpose of data	Data to be used for the calculation of Baseline Emissions.
Calculation method:	Direct Continuous Measurement
Comments	The collected data is kept by AydemYenilenebilirEnerjiAS.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.

[9] The latest version of the communiqué (in Turkish) can be found in the following link: https://www.epdk.gov.tr/Detay/DownloadDocument?id=+6B2PMv4N4A=

[10] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5Within the scope of this Regulation, the stamp year is taken as the basis and the year it is stamped is counted as the first year, regardless of the date of the year.

Data / Parameter:	CapPJ
Data unit:	W
Description:	Installed capacity of the hydropower plants 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:	49,000,000
Monitoring equipment:	SCADA system of the Project Activity
QA/QC procedures to be applied:	Can be confirmed also by the parameter readings on the design plates of each turbine and by summing the two units.
Purpose of the data:	Data to be used for the calculation of Baseline Emissions.
Calculation method:	N/A
Any comment:	-

Data / Parameter:	APJ
Data unit:	m2
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:	Surface area determined using the lake surface area map provided in Appendix-V in the validated PDD(version 2.02).
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-V.
Frequency of monitoring/recording:	Once during each monitoring period
Value monitored:	42,878 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

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 Vin the validated PDD (version 2.02).

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 whichis 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.

There are two meters that backup each other. Generated electricity is also monitoredvia the operator by the help of PMUM trading software for internal monitoring. Metering points can be observed in single line diagram(Appendix 1).

The Calibration dates of the meters and their validity is as follows:

Meter number	Calibration done on	Valid Until
Main Meter:65000768	2011	2021
Spare Meter :65000769	2011	2021

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: Position and duties of the 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 PMUM 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

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The baseline emissions (BE_y) are calculated based on the following formula:

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

Where:

BE_y = Baseline emissions in year y (tCO2-yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh-yr)

$EF_{grid,CM,y}$ = Combined margin CO2 emissions factor in year y (tCO2-MWh)And

And

$EG_{PJ,y} = EG_{Facility,y}$

$EG_{Facility,y}$ = Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh-y)

The Combined margin CO_2 emissions factor in year y (tCO_2 -MWh), $EF_{grid,CM,y}$, is fixed ex-ante for the duration of the crediting period, and is 0.53323 tCO_{2e}/MWh(see table 4).

The following table shows the original data as reported in the monthly meter reading records, which are the result from remote meter readings sent by TEIAS staff at the end of each month. The meter reading records serve as basis for all sub-sequent processes, especially settlement and billing for electricity supplied to the grid. The following table is the Baseline emissions of the project calculated for the monitoring period.

Table 4: Baseline emissions of the project calculated for the monitoring period (National Grid Emission FactorEF_{CM} is0.53323 tCO_{2e}/MWh).

		A-Gross Electricity Production	B-Self Electricity Consumption	C-Net electricity production C=A-B	Baseline Emissions = $EG_{PP\text{-}net,y}$ * EF_{CM}
	Symbol	$EG_{PP\text{-}gross,\ y}$	$EG_{PP\text{-}self\ consumption,\ y}$	$EG_{PP\text{-}net,\ y}$	BE1
YEAR	**Units**	MWh	MWh	MWh	tCO_2e
2013	May	1,151.01	66.15	1,084.86	578.48
	June	0.00	13.03	-13.03	-6.95
	July	4,647.64	16.79	4,630.85	2,469.31
	August	2,535.27	21.99	2,513.28	1,340.16
	September	1,781.18	24.98	1,756.20	936.46
	October	2,556.14	20.23	2,535.91	1,352.22
	November	3,129.00	15.41	3,113.59	1,660.26
	December	3,603.67	17.86	3,585.81	1,912.06
Total in 2013		19,403.91	196.44	19,207.47	10,241
2014	January	5,043.32	13.95	5,029.37	2,681.81
	February	5,956.88	0.13	5,956.75	3,176.32
	March	17,124.99	0.08	17,124.91	9,131.52
	April	16,259.59	0.04	16,259.55	8,670.08
	May	24,418.03	0.01	24,418.02	13,020.42
	June	17,989.07	0.17	17,988.90	9,592.22
	July	6,878.50	3.63	6,874.87	3,665.89
	August	3,105.79	17.73	3,088.06	1,646.65
	September	2,808.20	19.19	2,789.01	1,487.18
	October	5,923.48	6.07	5,917.41	3,155.34
	November	6,160.36	2.61	6,157.75	3,283.50
	December	16,510.57	0.20	16,510.37	8,803.82
Total in 2014		128,178.78	63.81	128,114.97	68,314
2015	January	11,377.76	2.70	11,375.06	6,065.52
	February	16,319.60	1.49	16,318.11	8,701.31
	March	33,830.95	0.06	33,830.89	18,039.65
	April	34,070.16	0.12	34,070.04	18,167.17
	May	35,288.36	0.00	35,288.36	18,816.81
	June	33,122.68	0.48	33,122.20	17,661.75
	July	14,927.58	1.09	14,926.49	7,959.25
	August	4,871.93	7.03	4,864.90	2,594.11
	September	2,793.03	19.69	2,773.34	1,478.83
	October	3,332.95	23.91	3,309.04	1,764.48
	November	4,852.19	4.25	4,847.94	2,585.07
	December	3,504.09	15.98	3,488.11	1,859.96
Total in 2015		198,291.28	76.80	198,214.48	105,693

2016	January	7,126.11	7.26	7,118.85	3,795.98
	February	12,413.84	2.10	12,411.74	6,618.31
	March	17,008.60	0.00	17,008.60	9,069.50
	April	17,135.35	0.06	17,135.29	9,137.05
	May	22,933.70	0.00	22,933.70	12,228.94
	June	18,307.60	0.03	18,307.57	9,762.15
	July	4,026.41	13.93	4,012.48	2,139.57
	August	1,047.56	37.05	1,010.51	538.83
	September	718.08	35.62	682.46	363.91
	October	1,176.52	34.04	1,142.48	609.20
	November	1,158.04	33.78	1,124.26	599.49
	December	3,819.86	32.26	3,787.60	2,019.66
Total in 2016		106,871.67	196.13	106,675.54	56,882
2017	January	16,486.47	0.13	16,486.34	8,791.01
	February	15,837.62	0.00	15,837.62	8,445.09
	March	34,650.32	0.54	34,649.78	18,476.30
	April	34,128.42	0.17	34,128.25	18,198.21
	May	36,547.87	0.00	36,547.87	19,488.42
	June	32,445.96	0.21	32,445.75	17,301.05
	July	15,385.88	0.01	15,385.87	8,204.21
	August	4,990.03	12.62	4,977.41	2,654.10
	September	2,522.49	23.32	2,499.17	1,332.63
	October	275.59	43.14	232.45	123.95
	November	2,122.88	30.06	2,092.82	1,115.95
	December	5,274.67	10.79	5,263.88	2,806.86
Total in 2017		200,668.20	120.99	200,547.21	106,937
2018	January	17,323.61	0.20	17,323.41	9,237.36
	February	23,305.13	0.07	23,305.06	12,426.96
	March	23,833.01	0.35	23,832.66	12,708.29
	April	34,847.77	0.00	34,847.77	18,581.88
	May	35,305.56	0.70	35,304.86	18,825.61
	June	29,748.08	0.62	29,747.46	15,862.24
	July	10,969.49	0.26	10,969.23	5,849.12
	August	4,253.48	12.24	4,241.24	2,261.56
	September	2,674.84	22.77	2,652.07	1,414.16
	October	4,895.11	19.16	4,875.95	2,600.00
	November	6,151.33	0.02	6,151.31	3,280.06
	December	25,104.65	0.03	25,104.62	13,386.54
Total in 2018		218,412.06	56.42	218,355.64	116,433
2019	January	31,165.33	0.07	31,165.26	16,618.25
	February	29,927.00	2.05	29,924.95	15,956.88
	March	33,416.02	0.71	33,415.31	17,818.05
	April	35,634.05	0.06	35,633.99	19,001.11
	May	36,031.49	1.27	36,030.22	19,212.39

	June	35,051.45	0.34	35,051.11	18,690.30
	July	16,614.57	0.06	16,614.51	8,859.36
	August	5,160.87	6.75	5,154.12	2,748.33
	September	3,550.94	17.35	3,533.59	1,884.22
	October	29.52	40.72	-11.20	(5.97)
	November	4,624.80	10.28	4,614.52	2,460.60
	December	10,083.27	4.52	10,078.75	5,374.29
Total in 2019		241,289.31	84.18	241,205.13	128,617
2020	January	21,780.28	0.07	21,780.21	11,613.86
	February	26,994.10	2.29	26,991.81	14,392.84
	March	34,145.05	1.48	34,143.57	18,206.38
	April	34,971.12	0.72	34,970.40	18,647.27
	May	36,499.52	0.35	36,499.17	19,462.45
	June	33,531.94	0.32	33,531.62	17,880.07
	July	17,940.38	0.02	17,940.36	9,566.34
	August	7,528.81	0.44	7,528.37	4,014.35
	September	3,683.97	12.30	3,671.67	1,957.84
Total in 2020		217,075.17	17.99	217,057.18	115,741
Grand Total		1,330,190.38	812.76	1,329,377.62	708,858

5.2 Project Emissions

As methodology states the PEy in case of a hydro power project will be calculated:

"Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoir, estimated as follows:"

"...the power density of the project activity (PD) is greater than 4 W/m^2 and less than or equal to 10 W/m^2:"

As shown by the following calculation, The project has a power density of 1'142.78 W/m^2 ' this is greater than 10 W/m^2,

Project Activity	Installed Capacity	/	Reservoir Area	=	Power Density:
Toros HPP	49'000'000 W	/	42'878 m^2	=	1'142.78 W/m^2

therefore:

$PE_{HP,y} = 0$

Where:

PEHP,y = Project emissions from water reservoirs (tCO2e/yr)

There are 3 auxiliary diesel generators. However, they are only utilized as a back-up or emergency generators. The emissions resulting from the occasional use of these generators are going to be calculated based on the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" (Version 02).

The actual diesel consumption records were not available for the entire current monitoring period. Thus, PP has calculated the diesel consumption based on available working hours data for each generator and opted highest value of working hours of the generator during the monitoring period of the year i.e. year 2019 as the working hours values shows increasing trend for the entire monitoring period. The resultant diesel consumption values have been then considered to calculate the project emissions for each generator as a conservative approach.

By converting diesel consumption into Gigagrams, and using the formula given in the tool for the

calculation of diesel consumption, the project emissions related to diesel consumption calculates to be 21 tCO_2e/year, as shown in the table below (Table 5):

Table 5: Calculation for Project Emissions/year

Generator Serial Number:87672776		
Parameter	Value	Unit
Electricity Production by the Diesel Generator	250	kWh
Standby Rating	200	KVA
	160	kW
Average load factor during verification period	0.5	
Work hours during verification Period at 50%load	123	h
Diesel consumption per hour	21	L
Total Diesel consumption during verification	2583	L
Project Emissions due to diesel consumption : Pe = (FDy) × NCVdiesel x COEFdiesel FDy : Annual diesel fuel consumption (Litres) NCVdiesel: Net Calorific Value for diesel oil (TJ/m3 COEFdiesel: CO2 emission coefficient for diesel oil (tCO2/TJ)		
Parameter	Value	Units:
Density of Fuel	0.845	kg/L
M=dxV	2182.635	kg
Fuel in Gigagrams:	0.0021826	Gg
EFCO2,i,y	74,800	$kgCO_2/TJ$
$NCV_{i,y}$	43.3	TJ/Gg
$COEF_{i,y}$	3238.840	$kgCO_2/Gg$
PE=COEFXFuel in Gigagrams	7.0691	tCO_2 e
PEy=	7	tCO_2 e
Generator Serial Number:11017507		
Parameter	Value	Unit
Electricity Production by the Diesel Generator	33	kWh
Standby Rating	33	KVA
	26.4	kW
Average load factor during verification period	0.5	
Work hours during verification Period at 50%load	278	h
Diesel consumption per hour	3.4	L
Total Diesel consumption during verification	945	L

Project Emissions due to diesel consumption : Pe = (FDy) × NCVdiesel x COEFdiesel FDy : Annual diesel fuel consumption (Litres) NCVdiesel: Net Calorific Value for diesel oil (TJ/m3 COEFdiesel: CO2 emission coefficient for diesel oil (tCO2/TJ)		
Parameter	Value	Units:
Density of Fuel	0.845	kg/L
M=dxV	798.69	kg
Fuel in Gigagrams:	0.00079869	Gg
EFCO2,i,y	74,800	$kgCO_2/TJ$
$NCV_{i,y}$	43.3	TJ/Gg
$COEF_{i,y}$	3238.840	$kgCO_2/Gg$
PE=COEFXFuel in Gigagrams	2.59	tCO_2 e
PEy=	3	tCO_2 e
Generator Serial Number:12043126		
Parameter	Value	Unit
Electricity Production by the Diesel Generator	90	kWh
Standby Rating	90	KVA
	72	kW
Average load factor during verification period	50%	
Work hours during verification Period at 50%load	412	h
Diesel consumption per hour	10	L
Total Diesel consumption during verification	4123	L
Project Emissions due to diesel consumption : Pe = (FDy) × NCVdiesel x COEFdiesel FDy : Annual diesel fuel consumption (Litres) NCVdiesel: Net Calorific Value for diesel oil (TJ/m3 COEFdiesel: CO2 emission coefficient for diesel oil (tCO2/TJ)		
Parameter	Value	Units:
Density of Fuel	0.845	kg/L
M=dxV	3483.77	kg
Fuel in Gigagrams:	0.00348377	Gg
EFCO2,i,y	74,800	$kgCO_2/TJ$
$NCV_{i,y}$	43.3	TJ/Gg
$COEF_{i,y}$	3238.840	$kgCO_2/Gg$
PE=COEFXFuel in Gigagrams	11.28	tCO_2 e
PEy=	11	tCO_2 e
Total Project Emissions/year	21	tCO2 e

5.3 Leakage

There are no leakage emissions related to project activity.

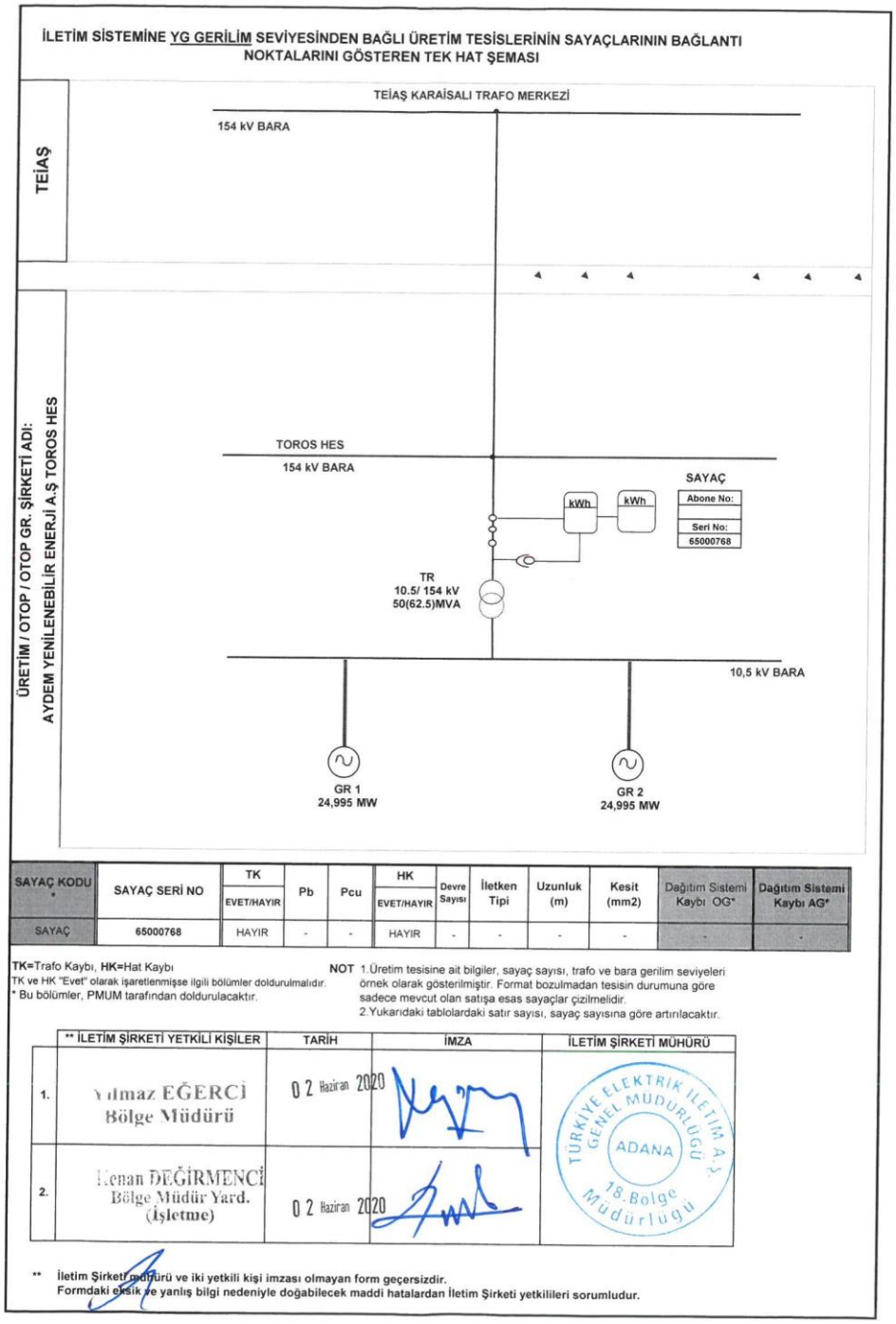
5.4 Net GHG Emission Reductions and Removals

The following table (Table 6) gives a summary of the project activity related emission reductions with respect to vintage years:

Table 6 : Project activity related emission reductions with respect to vintage years.

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2013 (May 17th to December 31st)	10,241	14	0	10,227
2014 (January 1st to December 31st)	68,314	21	0	68,293
2015 (January 1st to December 31st)	105,693	21	0	105,672
2016 (January 1st to December 31st)	56,882	21	0	56,861
2017 (January 1st to December 31st)	106,937	21	0	106,916
2018 (January 1st to December 31st)	116,433	21	0	116,412
2019 (January 1st to December 31st)	128,617	21	0	128,596
2020 (January 1st to September 30th)	115,741	16	0	115,725
Total	708,858	156	0	708,702

APPENDIX 1: PROJECT'S SINGLE LINE DIAGRAM



SAYAÇ KODU *	SAYAÇ SERİ NO	TK EVET/HAYIR	Pb	Pcu	HK EVET/HAYIR	Devre Sayısı	İletken Tipi	Uzunluk (m)	Kesit (mm2)	Dağıtım Sistemi Kaybı OG*	Dağıtım Sistemi Kaybı AG*
SAYAÇ	65000768	HAYIR	-	-	HAYIR	-	-	-	-	-	-

TK=Trafo Kaybı, HK=Hat Kaybı
TK ve HK "Evet" olarak işaretlenmişse ilgili bölümler doldurulmalıdır.
* Bu bölümler, PMUM tarafından doldurulacaktır.

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1.	Yılmaz EĞERCİ Bölge Müdürü	02 Haziran 2020		TÜRKİYE ELEKTRİK İLETİM A.Ş. GENEL MÜDÜRLÜĞÜ ADANA 18. Bölge Müdürlüğü
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