DERELI HYDROELECTRIC POWER PLANT

Project title	Dereli Hydroelectric Power Plant
Project ID	1758
Crediting period	10-January-2024 to 09-January-2034
Original date of issue	24-July-2025
Most recent date of issue	18-December-2025
Version	05
VCS Standard Version	4.7
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1 PROJECT DETAILS

1.1 Summary Description of the Project

Aydem Yenilenebilir Enerji A.S. constructed DERELİ Regulator and Hydro Electric Power Plant (HPP) on the Aksu River, within the jurisdiction of Dereli Town of Giresun Province, Türkiye. The purpose of the project is electricity production using the potential energy of Aksu River 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 Aksu River to generate electricity with zero carbon emissions for the Turkish Power Grid. The project start date is 10-January-2014, which is the date of provisional acceptance protocol. The project was designed as a runoff river reservoir type power plant as per EPDK license states. The EPDK license was initially given to Karhes Elektrik Üretim Anonim Şirketi (this company was a subsidiary of Aydem Yenilenebilir Enerji Anonim Şirketi back then.) with decision date and number of 06-December-2004 and EÜ/391-1/500, respectively. Then this license was terminated and a new license has been given to Aydem Yenilenebilir Enerji Anonim Şirketi with decision date and number of 27-July-2023 and EÜ/11974-5/05740, respectively, as a continuation of the old one.

The project activity is displacing electricity that would otherwise be generated by the existing grid of the host country. The installed capacity of the project is 49.2 MWe/51.25 MWm with two-renewable, hydraulic, and channel typed turbines, each having capacity of 25.625 MWm/24.600 MWe. The annual estimated electricity generation is 152,130 MWh/year, as per the latest generation license. The annual estimated emission reduction for this crediting period is 69,489 tCO_2e/year. This is the second crediting period, and it is between 10-January-2024 and 09-January-2034. The net total electricity generation and the net total emission reduction for this second crediting period is 1,521,300 MWh and 694,889 tCO_2e, respectively.

According to the applied methodology ACM0002[1], “the baseline scenario is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in TOOL07.”.

[1] https://cdm.unfccc.int/UserManagement/FileStorage/R0IJ1X9LQ7W2GOYHSMBFCPE3VKZ685

As per the applied methodology, “the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to”.

The Environmental Impacts of the project is kept to a minimum and all the regulations that are in act in Türkiye is obeyed during the operation stages of the DERELİ HPP project.

The milestones of the project activity are provided in the table below.

Table 1. Milestones of Dereli HEPP

Milestone	Date
Generation License (granted for Karhes Elektrik Üretim Anonim Şirketi)	06-December-2004
Most recent Generation License (granted for Aydem Yenilenebilir Enerji Anonim Şirketi)	27-July-2023
Provisional Acceptance (Project Start Date)	10-January-2014
Water Usage Agreement	04-November-2013
EIA Exemption	27-April-2006
System Usage Agreement	25-January-2019
Connection Agreement	21-June-2019
The first crediting period	10-January-2014 – 09-January-2024
The second crediting period (current)	10-January-2024 – 09-January-2034

The Dereli HEPP is made up of one hydro power plant. There is one controlled weir through which the water is taken up from the 778 m elevation level and is transferred to a derivation tunnel of 8113 m. From there the water arrives to the valve chamber and is fed to a penstock of 630 m where it is pressurized and arrives to the power plant that is built at a level of 495 m. The potential energy of water at approximate gross head level of 263 m is utilized and the electricity is produced by the power plant. The project start period is 10-January-2014 and the project has been operational since that day.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	10-January-2014 – 09-January-2024 (1st crediting period)	*VCS*	*RINA S.p.A (RINA)*	*Ten years*
Verification	10-January-2014 – 30-September-2020 (1st monitoring period of the 1st CP)	*VCS*	*Carbon Check*	*~seven years*
Verification	01-October-2020 – 31-December-2021 (2nd monitoring period of the 1st CP)	*VCS*	*Carbon Check*	*~two years (20 months)*
Verification	01-January-2022 – 09-January-2024 (3rd monitoring period of the 1st CP)	*VCS*	*Re-carbon*	*~two years*
Validation	10-January-2024 – 09-January-2034 (2nd crediting period)	*VCS*	*RINA Services S.p.A (RINA)*	*Ten years*

1.3 Sectoral Scope and Project Type

Sectoral scope[2]	1
Project activity type	Energy Industries (Renewable/Non-Renewable Sources)

1.4 Project Eligibility

[2] *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*

1.4.1 General eligibility

The project activity is included under the scope of the VCS Program and not excluded under Table 2.1 of the VCS Standard. This is the renewal of crediting period, and it is the second crediting period.

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

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

The project meets requirements related to the pipeline listing deadline, the opening meeting with the validation/verification body, and the validation deadline.

The applied methodology (ACM0002) is eligible under the VCS Program. The project is not a fragmented part of a larger project or activity that would otherwise exceed such limits.

The project helps Turkey to stimulate the commercial application of grid connected renewable energy technologies and markets. The specific benefits of the project are:

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

1.4.2 AFOLU project eligibility

This project is not an AFOLU project.

1.4.3 Transfer project eligibility

This project is not a transfer project and CPA seeking registration.

1.5 Project Design

☒ Single location or installation

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

☐ Grouped project

1.5.1 Grouped project design

This is not a grouped project.

1.6 Project Proponent

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

1.7 Other Entities Involved in the Project

Organization name	GTE Karbon Sürdürülebilir Enerji 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 – TÜRKİYE
Telephone	+90 312 514 63 63
Email	kemal.demirkol@gte.com.tr

1.8 Ownership

The Project is owned by the Project owner, AYDEM Yenilenebilir Enerji A.Ş. The generation license issued by the EMRA (Energy Market Regulatory Authority) names the Project owner as the holder of title for this Project activity.

1.9 Project Start Date

Project start date	10-January-2014
Justification	This is the date of the provisional acceptance (commissioning) of the units, when the project began generating electricity, and hence generating GHG emission reductions, as per the VCS Standard, v4.7, Section 3.8.1[3].

1.10 Project Crediting Period

Crediting period	☐ *Seven years, twice renewable* ☐ *Ten years, fixed* ☒ *Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)*
Start and end date of first or fixed crediting period	10-January-2014 to 09-January-2024 (1st Crediting Period, both days included) 10-January-2024 to 09-January-2034 (2nd Crediting Period, both days included) The project has been registered under previous versions of the Project Standard, v3.2, which states that the 10 year crediting period of the project activity can be renewed twice. The duration of the crediting period of the project activity cannot be changed during revalidation.

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

☒ < 300,000 tCO2e/year (project)

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

[3] https://verra.org/wp-content/uploads/2024/04/VCS-Standard-v4.7-FINAL-4.15.24.pdf

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO_2e)
10-January-2024 to 31-December-2024	67,965
01-January-2025 to 31-December-2025	69,489
01-January-2026 to 31-December-2026	69,489
01-January-2027 to 31-December-2027	69,489
01-January-2028 to 31-December-2028	69,489
01-January-2029 to 31-December-2029	69,489
01-January-2030 to 31-December-2030	69,489
01-January-2031 to 31-December-2031	69,489
01-January-2032 to 31-December-2032	69,489
01-January-2033 to 31-December-2033	69,489
01-January-2034 to 31-December-2034	1,523
Total estimated ERRs during the first or fixed crediting period	694,889
Total number of years	10 years
Average annual ERRs	69,489

1.12 Description of the Project Activity

Dereli HEPP is built on Aksu River. The tyrolean type weir is located approximately at 778.75 m elevation. Dereli HEPP utilizes approximately (gross) 263 m of potential energy difference to produce electricity. The installed capacity of the project is 49.2 MWe with two turbines each having installed capacity of 24.6 MWe as was indicated in the generation license dated as 27-July-2023.

The Project Activity (PA) utilizes the Aksu River to generate electricity with zero carbon emissions for the Turkish Power Grid with transmission line of 5.53 km. The project was designed as a runoff river reservoir type power plant as per EPDK license states (EÜ/11974-5/05740).

The information in the following. tables have been obtained from the registered PD of the project activity, dated 11-September-2015.

Table 2. Properties of the Weir

Properties of the Weir	
Elevation of the river bed	778.6 m
Elevation of the foundation	778.6 m
Type	Controlled Weir
Maximum and Minimum Water Level	781.62 m and 781 m

Table 3. Transmission Line

Transmission Line	
Length	5.53 km
Section	1 x 795 MCM

Table 4. Properties of the Energy Tunnel

Properties of the Energy Tunnel	
Shape	Circular, concrete covered, pressurized
Length and Slope	8,109.5 m and 0.0007

Table 5. Turbines

Turbines	
Type	Vertical Axis Francis
Unit numbers	2
Unit powers	24.6 MWe each

Table 6. Generators

Generators	
Model	SF24.6-10/3250
Serial Numbers	08 Orient 071 – 08 Orient 072
Rated Power	24600 kW
Supplier	Zhejiang Orient Engineering Co., Ltd

The commissioning date of both units is 10-January-2014 which is accepted as project start date. Since that date, there is no special event that may have impact on monitoring of GHG emission reductions.

Table 7. Old meter details

	Main Meter	Spare Meter
Serial Number	53077779	53077780
Brand-Type	Actaris - SL761B071	Actaris - SL761B071
Calibration Frequency	10 years	10 years
Meter Removal Date	19-November-2020	19-November-2020
Class	0.2S	0.2S

Table 8. Current meter details

	Main Meter	Spare Meter
Serial Number	9798713	9798714
Brand-Type	EMH LZQJ-XC	EMH LZQJ-XC
First Index Date	19-November-2020	19-November-2020
Next Calibration Date	19-November-2030	19-November-2030
Calibration Frequency[4]	10 years	10 years
Test Date	15-November-2020 24-December-2024	15-November-2020 24-December-2024
Class	0.2S	0.2S

1.13 Project Location

The project is located at the Northern Black Sea region of Türkiye at the Giresun Province as shown in figure below. The coordinates of the weir and the powerhouse are indicated in table below. It is located on the Aksu River, in Giresun District of Dereli Town, Giresun Province in Türkiye.

The nearest settlement to the Project Activity is Dereli Town which is 9 km away.

Table 9. Geographical coordinates of the major components of the project activity

Component's name	Latitude	Longitude

[4] https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=6381&MevzuatTur=7&MevzuatTertip=5

Spill water	40°41'15.00"N	38°26'27.58"E
Powerhouse	40°41'20.42"N	38°26'17.57"E

Figure 1. Project Location

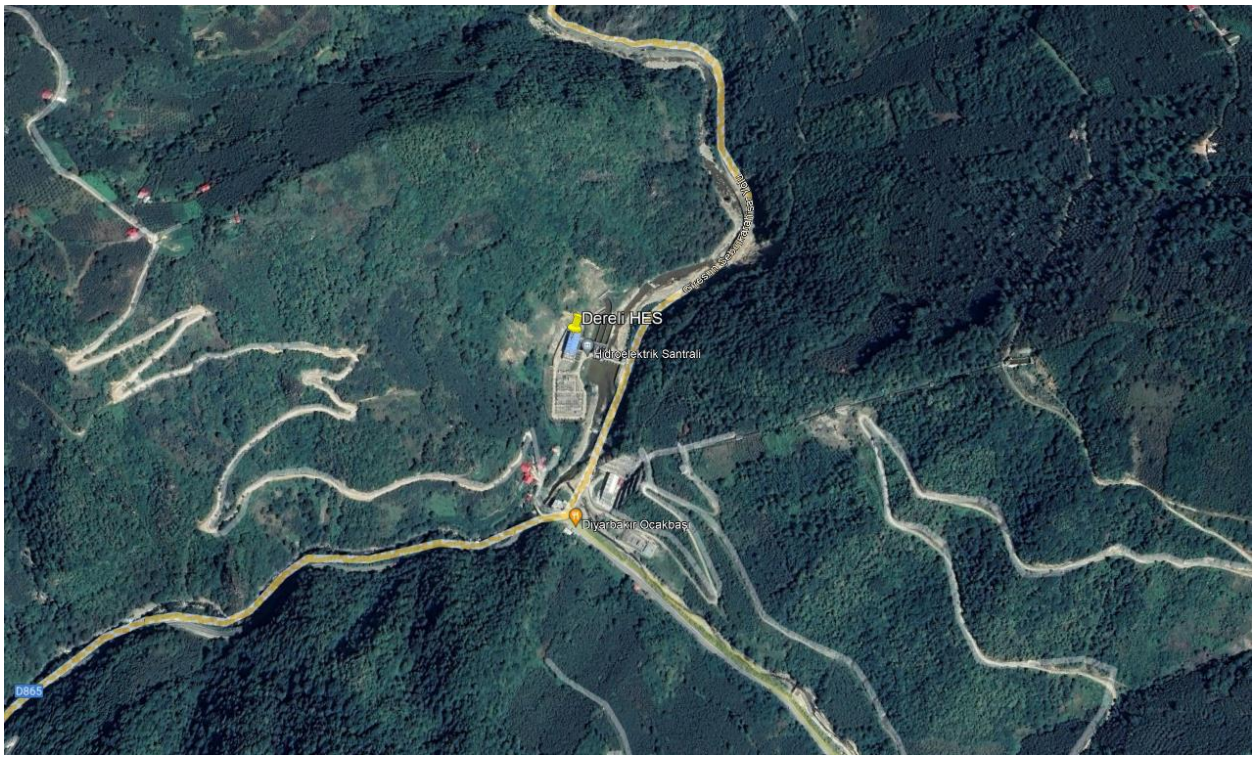


Figure 2. The screenshot of the satellite image of the project location

1.14 Conditions Prior to Project Initiation

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

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

Addition of a new power generation capacity to the grid is regulated by Energy Market Regulatory Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations. The list of the rules and regulations of the host country that a new electricity generation project has tocomply are given in Appendix 2.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

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

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Has the project registered under any other GHG programs?

☐ Yes ☒ No

Is the project active under the other program?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

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

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

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

☐ Yes ☒ No

1.17.2 No Double Claiming with Other Forms of Environmental Credit

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

☐ Yes ☒ No

1.17.3 Supply Chain (Scope 3) Emissions

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

☐ Yes ☒ No

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

☐ Yes ☒ No

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

☐ Yes ☒ No

1.18 Sustainable Development Contributions

The project aims to generate electricity by using hydroelectric power to supply the increasing national electricity demand in a cleaner and sustainable manner. It reduces the air pollution caused by the grid-connected power plants which are mostly fossil fuel fired.

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 crediting period, the total of 1,521,300 MWh renewable electricity is estimated to be 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 for 19 people. All personnel working at the power plant are receiving regular trainings about occupational health and safety.
- 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 is estimated to prevent the total release of 694,889 tCO_2e into the atmosphere in this crediting period.

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

Leakage is neglected according to the UNFCCC tools and methodologies that are used.

1.19.2 Commercially Sensitive Information

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

1.19.3 Further Information

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

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	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. The project site is not a private land.
Stakeholder diversity and changes over time	No changes over time about the stakeholder diversity.
Expected changes in well-being	The project does not have any negative impacts.
Location of stakeholders	Near places to the plant, Alancik and Kurtulmuş Village.
Location of resources	Dereli Sub district which is a close settlement at the project site.

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	09-April-2006
Stakeholder engagement process	There was a "grievance logbook" in coffeehouses and mukhtar's office within the vicinity of the project (Alancik and Kurtulmuş Village) for a continuous grievance policy that is implemented by the project owner. Every month the PP consults with local stakeholders at the book locations and discuss their grievances as well as positive comments.
Consultation outcome	There were no negative comments received. During the last crediting period there were no complaints about or demands from the project.
Ongoing communication	The ongoing communication with stakeholders is achieved with a "grievance logbook" in easily reachable places to the stakeholders.
Stakeholder input	There were no negative comments received.

2.1.3 Free Prior and Informed Consent

Obtaining 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

Development process	No grievance has been raised during the last crediting period of this project. The grievance, negative or positive, can be provided by local stakeholders related to operation of the project activity.
Grievance redress procedure	PP will resolve all the grievances during whole crediting period. Project manager is accessible by locals all the time. There is no

	problem encountered about the project/way of communication so far. There is a grievance box.

2.1.5 Public Comments

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

2.2.1 Management Experience

The project owner periodically provides necessary trainings to employees. The records of the trainings have been provided to VVB. The trainings include Emergency Plan Information, Emergency Training, Fire Training and Drill, First Aid Training, HES General Training, Risk Assessment Training, Safe Vehicle Usage Training, Work Equipment Safe Use Training, Working at Height Training, and Waste Management Training.

2.2.2 Risk Assessment

	Risks identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	There is no risk identified for the stakeholder's wellbeing.	-
Risks to stakeholder participation	There is no risk identified for the stakeholder participation.	-
Working conditions	There is no risk identified for the working conditions.	-
Safety of women and girls	There is no risk identified for the safety of women and girls.	-
Safety of minority and marginalized groups, including children	There is no risk identified for the safety of minority and marginalized groups, including children.	-
Pollutants (air, noise, discharges to water,	There is no risk identified for any environment (air, water, soil, etc...)	-

generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)		

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified[5]	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Sexual harassment	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Equal pay for equal work	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Gender equity in labor and work	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially secured by the PO and protected by employment agreements.
Forced labor	No risk identified	Türkiye has ratified ILO convention 100, 111, 122 and 142. All the workers are socially

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

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

2.3.2 Human Rights

The PO recognizes, respects, and promotes the protection of the rights of LCs, and customary rights holders in line with applicable international human rights law. Türkiye has ratified ILO convention[6]. 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. This section is not applicable.

2.3.4 Property Rights

No expropriation was required during the implementation period. There are no lands which was occupied by IPs. The project site is not a private land. On the contrary it is a government land that classified as forestry area. The property is leased to the project owner by the government until the end of the generation license.

2.3.5 Benefit Sharing

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

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

2.4 Ecosystem Health

There are fish passages for them to have not harm due to the project activity. The wastewater, and wastes from the project activity are handled as per the regulations and without giving any harm to the environment.

	Risks identified	Mitigation or preventative measure(s) taken
Impacts on biodiversity and ecosystems	No risk identified	Since there are no risk identified, there are no mitigation or preventative measure(s) taken.
Soil degradation and soil erosion	No risk identified	Since there are no risk identified, there are no mitigation or preventative measure(s) taken.
Water consumption and stress	No risk identified	Since there are no risk identified, there are no mitigation or preventative measure(s) taken.

2.4.1 Rare, Threatened, and Endangered Species

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

☐ Yes ☒ No

Since the project is not located in or adjacent to habitats for rare, threatened, or endangered species, this section is not applicable.

2.4.2 Introduction of Species

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

2.4.3 Ecosystem Conversion

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

3 APPLICATION OF METHODOLOGY

3.1 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	22.0
Tool	TOOL01	Tool for the demonstration and assessment of additionality	07.0.0
Tool	TOOL07	Tool to calculate the emission factor for an electricity system	07.0
Tool	TOOL11	Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period	03.0.1

3.2 Applicability of Methodology

The ACM0002 (version 22.0.0) methodology is applicable to grid-connected renewable power generation project activities that:

(a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant);

(b) involve a capacity addition;

(c) involve a retrofit of (an) existing plant(s); or

(d) involve areplacement of (an) existing plant(s).

The project activity is suitable for the application of the ACM0002 version 22.0 because it is the installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant).

The choice of methodology ACM0002, Version 22.0, is justified as the project activity meetsthe following applicability criteria:

Methodology ID	Applicability condition	Justification of compliance
ACM0002, v22.0		
5	This methodology is applicable to grid-connected renewable energy power	The Dereli HEPP project activity is the installation of a new hydro power plant at a

	generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plant(s)/unit(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e)Involve a replacement of (an) existing plant(s)/unit(s); or (f) Install a Greenfield power plant together with a grid-connected Greenfield pumped storage power plant. The greenfield power plant may be directly connected to the PSP or connected to the PSP through the grid.	site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant). Hence, condition (a) is met.
6	In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity	This project does not include an integration of a BESS. Hence, this condition is N/A. a) This project does not include an integration of a BESS. Hence, this condition is N/A. b) This project does not include integration a BESS together with implementing a capacity addition to (an) existing solar

	addition to (an) existing solar photovoltaic1 or wind power plant(s)/unit(s); (c) Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s). (e) Integrate a BESS together with a Greenfield power plant that is operating in coordination with a PSP. The BESS is located at site of the greenfield renewable power plant.	photovoltaic or wind power plant(s)/unit(s). Hence, this condition is N/A. c) This project does not include integration of a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s). Hence, this condition is N/A. d) This project does not include integration of a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s). Hence, this condition is N/A. e) This project does not include integration of a BESS together with a Greenfield power plant that is operating in coordination with a PSP. Hence, this condition is N/A.
7	The methodology is applicable under the following conditions:	(a) Dereli HEPP is a hydro power plant.

	(a) Hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity; (c) In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall	Hence, this condition is met. (b) Since there is no capacity additions, this condition is N/A. (c) This project does not include an integration of a BESS. Hence, this condition is N/A. (d) This project does not include an integration of a BESS. Hence, this condition is N/A. (e) The project activity does not involve PSP. Hence, this condition is N/A.

	demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents); (d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.	

	(e) In case the project activity involves PSP, the PSP shall utilize the electricity generated from the renewable energy power plant(s) that is operating in coordination with the PSP during pumping mode.	
8	In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple	The project is a hydro power plant. The project activity satisfies condition (c), as it results in a new reservoir and the power density of the project activity is 12,729.62 W/m^2 which is greater than 4 W/m^2.

	reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
9	In the case of integrated hydro power projects, project participants shall:	The project is not an integrated hydro power project. Hence, this condition is N/A.

	(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.	

10	In the case of PSP, the project participants shall demonstrate in the PDD that the project is not using water which would have been used to generate electricity in the baseline.	The project does not include a PSP. Hence, this condition is N/A.
11	The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	a) The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity. b) The project is not a biomass fired power plant.
12	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project	The project activity does not include retrofits, rehabilitations, replacements, or capacity additions. Hence, this condition is N/A.

	activity and undertaking business as usual maintenance".	
13	In addition, the applicability conditions included in the tools referred to below apply.[7]	Given below.

Methodology ID	Applicability condition	Justification of compliance
TOOL07	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g., demand-side energy efficiency projects).	The project activity supplies electricity to a grid. Hence, this condition is met.
	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e., option IIa and option IIb. If option IIa is	CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system is determined by calculating the "combined margin" emission factor (CM) of the electricity system[8].

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

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

	chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	
	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project electricity system is not located partially or totally in an Annex I country. Hence, this condition is N/A.
	Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	The project does not involve biofuels in any way.

Methodology ID	Applicability condition	Justification of compliance
TOOL01	The use of the "Tool for the demonstration and assessment of additionality" is not mandatory for project participants when proposing new methodologies. Project	Tool for the demonstration and assessment of additionality is applied in this project since there is no new methodologies proposed. Hence, this condition is N/A.

	participants may propose alternative methods to demonstrate additionality for consideration by the Executive Board. They may also submit revisions to approved methodologies using the additionality tool.	
	Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	The additionality tool is applied using this methodology.

Methodology ID	Applicability condition	Justification of compliance
TOOL11		
	This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.	The scope of the project activity is renewal of crediting period. Therefore, the tool is applicable and has been applied to assess whether the current baseline is valid or invalid. The steps of Tool 11 has been explained in Section 3.4 of this PD.

3.3 Project Boundary

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

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

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey's Grid)	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	N/A
Project	Emission from the reservoir of the proposed project	CO_2	No	Minor emission source
		CH_4	No	Minor emission source (Power density greater than 10 W/m^2)
		N_2O	No	Minor emission source
		Other	No	N/A
	Auxiliary Diesel Generator	CO_2	Yes	Neglected[9]
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	N/A

[9] ACM0002 Version 22.0.0 indicates that "...For all renewable energy power generation project activities, emissions due to the use of fossil fuels for the backup generator can be neglected." (Page 15 paragraph 42).

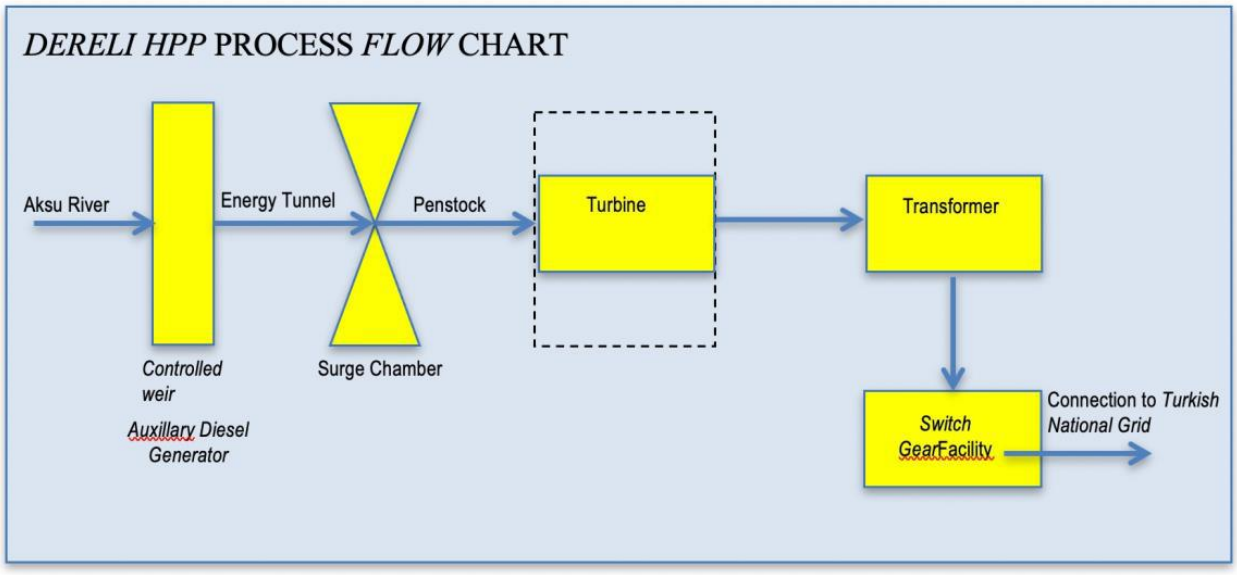


Figure 3. Project Boundary

3.4 Baseline Scenario

Since the proposed project activity is the installation of a new grid-connected wind power plant, that is renewable power plant and therefore, the baseline scenario is defined as thefollowing based on ACM0002 (Version 22.0):

"If the project activity is the installation of a Greenfield power plant with or without a BESS as described under paragraph 5(a) or paragraph 7(a) or paragraph 7(e) above (in ACM0002, v22.0), the baseline scenario is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in TOOL07."

Since the proposed project activity is going to be connected to the Turkish national grid, the baseline scenario of the proposed project is the supply of the equivalent amount of annual power output by the existing Turkish national grid which is the continued operation of existingpower plants that are mainly natural gas and coal and the addition of new sources to meet electricity demand. In 2013, power plants containing a total of 6.985 MW additional capacity were added to the system, and our capacity has risen to around 64.044 MW. 43.8% of our electricity output in 2013 came from natural gas, 24.5% from coal, 24.8% from hydraulic energy, %2 from liquid fuels, and 4% from other renewable sources".[10]

[10] http://www.enerji.gov.tr/en-US/Pages/Electricity

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

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

The sub-steps for the Step 1 are:

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

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

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

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

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

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

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

No	Applicability Conditions	The Project
Step 1.1	If the current baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation or the submission of the previous request for renewal of the crediting period and are applicable at the time of requesting renewal of the crediting period, go to Step 1.2.	There is no change in national/sectoral policies affecting project implementation. Hence Step 1.2 can be evaluated.

	If the current baseline does not comply with relevant mandatory national and/or sectoral policies, then assess based on the examination of current practice in the country or region in which the policies apply, whether those policies are systematically not enforced and that non-compliance with those requirements is widespread in the country or region.	
Step 1.2	Assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario. In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period. Evaluate whether the conditions used to determine the baseline emissions in the previous crediting period are still valid. Assess the availability of new fuels or raw materials and the impact of electricity or fuel prices in the identification of the current practice for the baseline emissions.	The combined margin is updated as per OM & BM calculations by Ministry of Energy and Resources.
Step 1.3	This sub-step should only be applied if the baseline scenario identified at the validation of the project activity was the continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology. Assess whether the remaining technical lifetime of the equipment that would have continued to be used in the absence of the project activity, as determined in the CDM-PDD or CDM-PDD-REN, exceeds the crediting period for which renewal is requested. Take into consideration the market penetration of different technologies. Evaluate the penetration rate of different technologies that are available in the market and evaluate how they could affect the baseline.	The project is a greenfield activity. Since it includes a new investment and the use of new equipment, this step is not applicable.
Step 1.4	Assess whether data and parameters that were only determined at the start of the crediting period and not monitored during the crediting period are still valid or whether	The combined margin is updated as per OM & BM calculations by

	they should be updated. Updates should be undertaken in the following cases: Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC; Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values, or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity. If the application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline as well as data and parameters are still valid for the subsequent crediting period, then this baseline, data and parameters can be used for the renewed crediting period. Otherwise, proceed to Step 2.	Ministry of Energy and Resources. Hence the assessment should proceed to Step 2.
Step 2.1	Update the current baseline emissions for the subsequent crediting period, without reassessing the baseline scenario, based on the latest approved version of the methodology applicable to the project activity. The procedure should be applied in the context of the sectoral policies and circumstances that are applicable at the time of request for renewal of the crediting period.	The latest version of the applicable methodology and current circumstances have been used for the second crediting period.
Step 2.2	If the application of Step 1.4 showed that the data and/or parameter(s) that were only determined at the start of the crediting period and not monitored during the crediting period are not valid anymore, project participants should update all applicable data and parameters, following the guidance in Step 1.4.	The data and the parameters are updated for the second crediting period.

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

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

The trend in Turkey to date and given historically slow development of alternative energy resources is to build an increasing number of thermal power plants in the future to satisfy the annual growth in energy consumption demand.

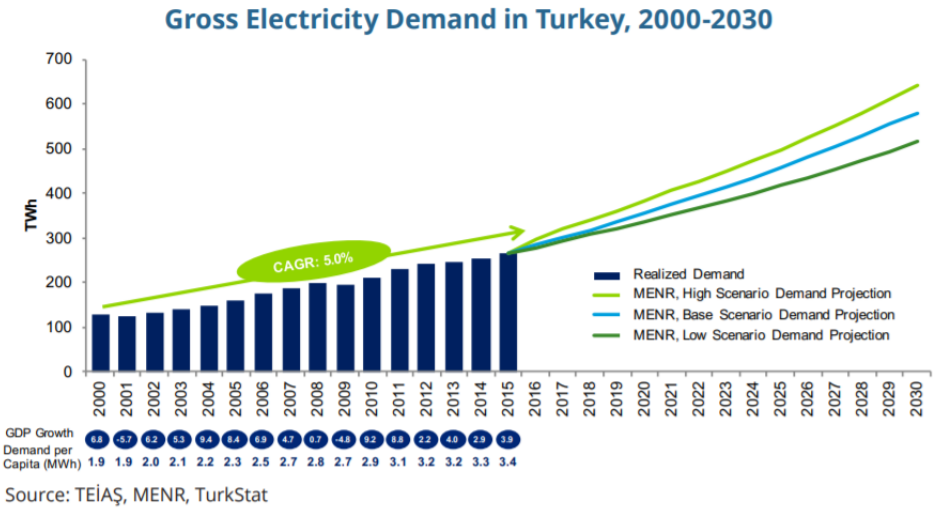


Figure 4. Projection of Turkey's electricity demand[11]

Turkey as an advanced developing nation has looked at dealing with energy security by developing and constructing high-capacity coal and natural gas power plants. The development of thermal power plants has been also encouraged by the large natural resource availability in Turkey, especially the abundance of economically accessible lignite. The statistics from TEIAS webpage show that the installed capacity that utilize lignite in Turkey has always showed an increasing trend, based on the available information covering the years from 1940 to 2019[12] [13] [14].

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

[11] https://www.dunyaenerji.org.tr/wp-content/uploads/2017/10/turkish-energy-market-outlook.pdf

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

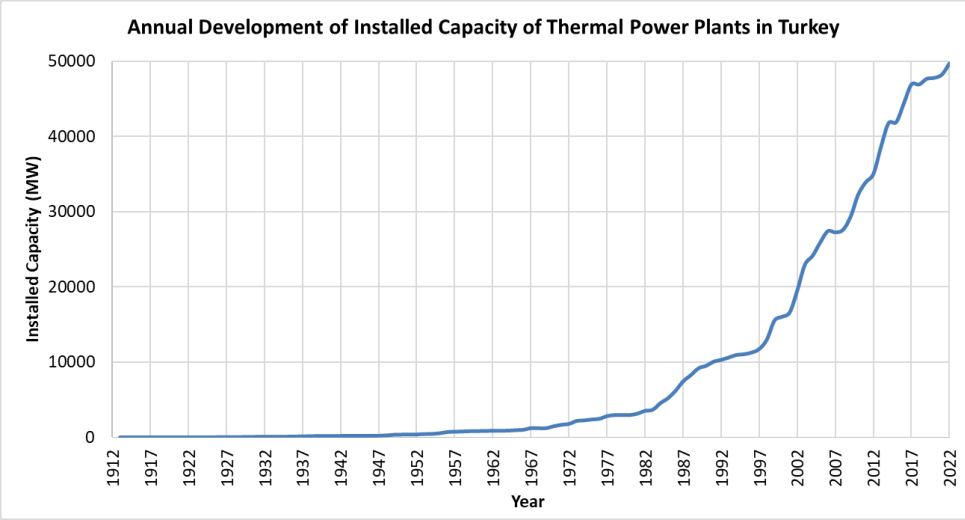


Figure 5. Development of Turkey's Thermal Power Plants' Installed Capacity[15]

According to the Ministry of Energy and Natural Resources statistics16, share of WPPs together with geothermal power plants could hardly reach 11% in 2020 whereas share of Coal and natural gas are 20.46% (lignite and imported coal together) and 22.53%, respectively. When we look at the annual development of Turkey's gross generation in recent years, we see that grid is dominated by thermal power plants and which is boosted by increasing energy demand in parallel to increase population and per capita income. Hence, baseline of Turkey's electricity grid will continue to be dominated by fossil fuel power plants which is seen as the quickest solution in short term to meet the demand and enable energy security in supply side.

[15] Published by TEİAŞ in 2023 https://webim.teias.gov.tr/file/0c1d3422-3ffc-4a38-843f-3dd39300dd14?download

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

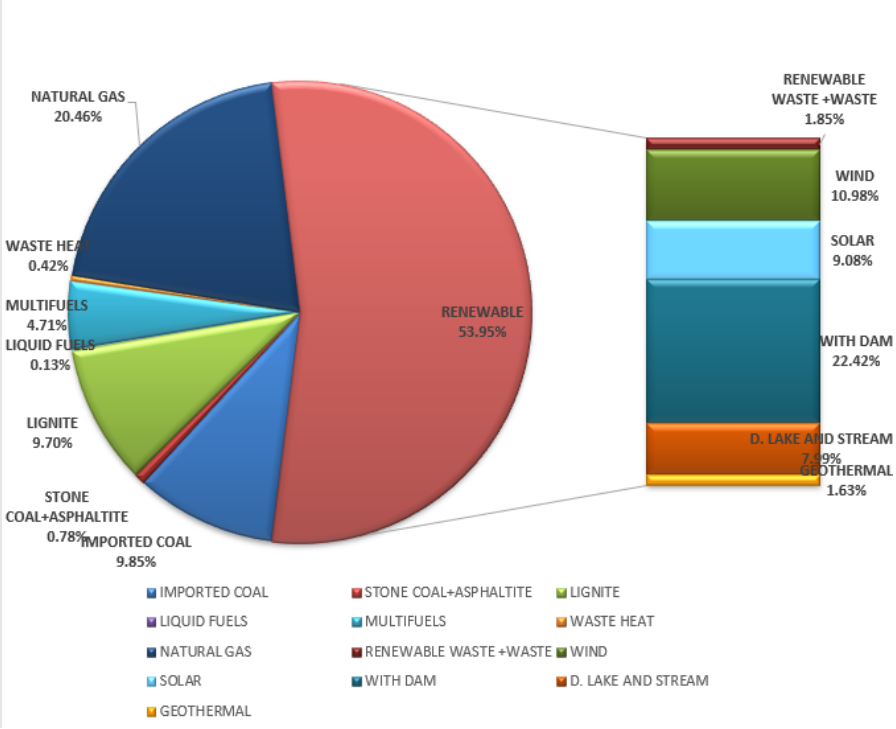


Figure 6 Distribution of installed capacity by primary energy resources, 2023[17]

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

Emission factor calculated according to selected methodology. In the Turkey's National Electricity Network Emission Factor Factsheet[18], OM is calculated as 0.7108 tCO_2/MWh whereas BM is 0.3721 tCO_2/MWh). Therefore, CM is calculated as whereas 0.75 and 0.25 weightage factor given to OM and BM, respectively (since this is the second crediting period).

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

$$EF_{grid,CM,y} = 0.7108 \times 0.25 + 0.3721 \times 0.75 = 0.4568 \ tCO_2/MWh$$

$$EF_{grid,CM,y} = 0.4568 \ tCO_2/MWh$$

Therefore, new combined margin is 0.4568 tCO_2/MWh.

3.5 Additionality

[17] Published by TEİAŞ in 2023 https://webim.teias.gov.tr/file/2acaeaa8-542e-47a7-a9f5-73e013bb93ff?download

[18] https://enerji.gov.tr//Media/Dizin/EVCED/tr/ÇevreVeİklim/İklimDeğişikliği/TUESEmisyonFktr/Belgeler/Sebeke_EF_Bilgi_Formu_2022.pdf

The proposed project activity reduces GHG emissions by substituting fossil fuel based electricity generation by renewable resources (hydro) based electricity generation. This is the second crediting period. In the first crediting period, additionality of the project was presented. There has been no capacity change in the project between the first and the second crediting period. The Project is in compliance with all required relevant regulations but is not a mandatory Project. There is no change in the relevant national and/or sectoral regulations with respect to project activity or its technology till date through which the project activity is not found mandated by regulations. There is no breach of any legislation, and all required permits are obtained.

3.5.1 Regulatory Surplus

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

☒ Annex 1 country ☐ Non-Annex 1 country

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

☐ Yes ☐ No

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

☐ Yes ☐ No

3.5.2 Additionality Methods

In the first crediting period, additionality of the project was presented. There has been no capacity change in the project between the first and the second crediting period.

3.6 Methodology Deviations

There are no methodological deviations in the project.

4 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Accordingly, the baseline emissions BE_y are calculated as following:

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

where,

BE_y	Baseline emissions (tCO_2e)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of TOOL07 (v 07.0) "Tool to calculate the emission factor for an electricity system" (tCO_2e/MWh)

Emission factor calculated according to selected methodology. In the Turkey's National Electricity Network Emission Factor Factsheet[19], OM is calculated as 0.7108 tCO_2/MWh whereas BM is 0.3721 tCO_2/MWh). Therefore, CM is calculated as whereas 0.75 and 0.25 weightage factor given to OM and BM, respectively (since this is the second crediting period).

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

$$EF_{grid,CM,y} = 0.7108 \text{ x } 0.25 + 0.3721 \text{ x } 0.75 = 0.4568 \ tCO_2/MWh$$

Accordingly, BE_y is calculated as follows:

$$BE_y = 152{,}130\ MWh/y \times 0.4568\ tCO2/MWh = 69{,}489\ MWh$$

4.2 Project Emissions

As per ACM0002 "Grid-connected electricity generation from renewable sources", v22,

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

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

where:

[19] https://enerji.gov.tr//Media/Dizin/EVCED/tr/ÇevreVeİklim/İklimDeğişikliği/TUESEmisyonFktr/Belgeler/Sebeke_EF_Bilgi_Formu_2022.pdf

PE_y = Project emissions in year y (tCO_2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y ($t\ CO_2e/yr$)[20]

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/yr)

- Since this project uses hydroelectric power, $PE_{GP,\ y}$ is "0" (tCO_2/yr)
- The only emission source in the plant is the diesel generator which is used as auxiliary power source when there is no electricity generation in the plant or supply by the grid. In urgent cases, a diesel-powered generator will be operated for the daily consumption of personnel and the building, which is negligible. Project emissions are taken as zero. The same is also stated in paragraph 33 of "ACM0002: Grid-connected electricity generation from renewable sources, v22.0". Hence it is neglected. Therefore, $PE_{FF,\ y} = 0$ (tCO_2/yr)

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

However, if the power density of the project activity is greater than 10 W/m^2 than $PE_{HP,y} = 0$

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

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

Where:

PD = Power density of the project activity (W/m^2)

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 (m^2)

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 (m^2). For new reservoirs, this value is zero.

For proposed project HEPP,

Cap_{PJ} = 49,200,000 We

[20] https://enerji.gov.tr//Media/Dizin/EVCED/tr/%C3%87evreVe%C4%B0klim/%C4%B0klimDe%C4%9Fi%C5%9Fikli%C4%9Fi/TUES

Cap_{BL} = 0.0 W

A_{PJ} = 3865 (m^2)[21]

A_{BL} = 0.0 (m^2)

Therefore, PD is calculated as;

$$PD = \frac{49{,}200{,}000 - 0}{3865 - 0}$$

$$PD = 12729.62\ W - m^2$$

Since the power density of the project activity is greater than 10 W/m^2, $PE_{HP,y}$ = 0. Therefore;

$$PE_y = 0$$

4.3 Leakage Emissions

The energy generating equipment is not transferred from or to another activity. Therefore, leakage is also considered as "0".[22]

$$LE_y = 0$$

As a result, Total Emission Reduction is:

$$ER_y = BE_y$$

4.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

Vintage period	Estimated baseline emissions (tCO_2e)	Estimated project emissions (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated reduction VCUs (tCO_2e)	Estimated removal VCUs (tCO_2e)	Estimated total VCUs (tCO_2e)

[21] Reservoir area, Annex 6 of registered PD

[22] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf

10-Jan-2024 to 31-Dec-2024	67,965	0	0	67,965	67,965	67,965
01-Jan-2025 to 31-Dec-2025	69,489	0	0	69,489	69,489	69,489
01-Jan-2026 to 31-Dec-2026	69,489	0	0	69,489	69,489	69,489
01-Jan-2027 to 31-Dec-2027	69,489	0	0	69,489	69,489	69,489
01-Jan-2028 to 31-Dec-2028	69,489	0	0	69,489	69,489	69,489
01-Jan-2029 to 31-Dec-2029	69,489	0	0	69,489	69,489	69,489
01-Jan-2030 to 31-Dec-2030	69,489	0	0	69,489	69,489	69,489
01-Jan-2031 to 31-Dec-2031	69,489	0	0	69,489	69,489	69,489
01-Jan-2032 to 31-Dec-2032	69,489	0	0	69,489	69,489	69,489
01-Jan-2033 to 31-Dec-2033	69,489	0	0	69,489	69,489	69,489
01-Jan-2034 to 09-Jan-2034	1,523	0	0	1,523	1,523	1,523

Total	694,889	0	0	694,889	694,889	694,889

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$FC_{i,y}$
Data unit	Volume Unit (cubic meter)
Description	Amount of fuel i consumed by relevant power plants in Türkiye in years 2009, 2010, 2011
Source of data	Turkish Electricity Transmission Company (TEIAŞ) Web Site[23]
Value applied	Please see Appendix 4-Figure 5 (Table 1 in the validated PD version 2.01)
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	NCVi,y
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[24]
Value applied	Please see Appendix 4-Figure 6 (Table 5 in the validated PD version 2.01).
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

[23] https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri

[24] https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri

measurement methods and procedures applied	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	As data on the NCV is not published directly on the TEİAŞ website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year.

Data / Parameter	$EFCO_{2,i,y}$
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 Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied	Please see Appendix 4-Figure 7 (Table 2 in the validated PD version 2.01)
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 4[25], 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	EGm,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[26]. Data is extracted from the relevant annexes of the capacity projection reports for the years 2010, 2011, and 2012[27].
Value applied	Please see Appendix-2-Table 8 in the validated PD version 2.01
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 TEİAŞ website is the most up-to-date and reliable data available for the Turkish grid.

[25] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[26] https://www.teias.gov.tr/turkiye-elektrik-uretim-iletim-istatistikleri

[27] https://www.elektrikport.com/uploads/content/TEIAS%20Uretim%20Kapasite%20Projeksiyonu%202011-2020.pdf

measurement methods and procedures applied	
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 4.0, EB87Annex 9)" are used
Value applied	Please see Annex 2 in the validated PD version 2.01.
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 4 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	-

5.2 Data and Parameters Monitored

Data / Parameter	EGPJ,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	EPIAS data as main source (TEIAS meter readings as back-up data)

<table>
<tr><td>Description of measurement methods and procedures to be applied</td><td>Data is measured directly from meters (main and backup) and records on TEİAŞ readings protocol papers. 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.</td></tr>
<tr><td>Frequency of monitoring/recording</td><td>Annually</td></tr>
<tr><td>Value applied</td><td>Will be determined at the monitoring stage of this crediting period</td></tr>
<tr><td>Monitoring equipment</td><td>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. The two electricity metering devices were replaced with new ones on 19-November-2020 as the previous ones reached their end of validity period of 10 years.
<table>
<tr><th>Details</th><th>Old Main Meter (removed on 19-November-2020)</th><th>Old Spare Meter (removed on 19-November-2020)</th></tr>
<tr><td>Brand</td><td>Actaris</td><td>Actaris</td></tr>
<tr><td>Serial Number</td><td>53077779</td><td>53077780</td></tr>
<tr><td>Class</td><td>0.2S</td><td>0.2S</td></tr>
<tr><td>Test Date</td><td>12-July-2013</td><td>12-July-2013</td></tr>
<tr><td>Calibration Date</td><td>12-July-2013</td><td>12-July-2013</td></tr>
<tr><td>Calibration Frequency</td><td>10 years</td><td>10 years</td></tr>
</table>
<table>
<tr><th>Details</th><th>Current Main Meter (placed on 19-November-2020)</th><th>Current Spare Meter (placed on 19-November-2020)</th></tr>
<tr><td>Brand</td><td>EMH</td><td>EMH</td></tr>
<tr><td>Serial Number</td><td>9798713</td><td>9798714</td></tr>
<tr><td>Class</td><td>0.2S</td><td>0.2S</td></tr>
<tr><td>Test Date</td><td>15-November-2020</td><td>15-November-2020</td></tr>
</table></td></tr>
</table>

	<table><tr><td></td><td>24-December-2024</td><td>24-December-2024</td></tr><tr><td>**Calibration Date**</td><td>19-November-2020</td><td>19-November-2020</td></tr><tr><td>**Calibration Frequency**</td><td>10 years</td><td>10 years</td></tr></table> Both meters are in compliance with the communiqué for Metering Devices to be used in the Electricity Market.
QA/QC procedures to be applied	There are two meters that backup each other. Generated electricity is also monitored via the operator by the help of EPİAŞ trading software for internal monitoring.
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 Aydem Yenilenebilir Enerji AS. During the crediting period and until two years after the last issuance of VERs for the "DERELİ Hydroelectricity Power Plant" project activity for that crediting period.

Data / Parameter	Cap_{PJ}
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site computers with SCADA system and the turbine name plates.
Description of measurement methods and procedures to be applied	Observed via the SCADA system of the project activity.
Frequency of monitoring/recording	Once for each monitoring period
Value applied	49,200,000 W

Monitoring equipment	SCADA System of the Project activity
QA/QC procedures to be applied	Turbine labels checked with SCADA System reading.
Purpose of data	To monitor capacity of the project
Calculation method	N/A
Comments	-

Data / Parameter	A_{PJ}
Data unit	m^2
Description	Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is at its maximum fullness.
Source of data	Indirectly measured based on the reservoir area map provided in Appendix-3.
Description of measurement methods and procedures to be applied	The reservoir area corresponding to maximum operational level has been determined via the topographic satellite images showing the lake area, presented in Appendix-3.
Frequency of monitoring/recording	Once during each monitoring period
Value applied	3,865 m^2
Monitoring equipment	-
QA/QC procedures to be applied	The value checked and compared to satellite imagery available by Google Earth.
Purpose of data	Data to be used for the calculation of Baseline Emissions.
Calculation method	N/A
Comments	-

5.3 Monitoring Plan

Objectives of the monitoring program

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

Data to be monitored

Given that the emission factor is calculated on an ex-ante basis, the first data to be monitored is the net electricity supplied to the grid.

The second data to be monitored is the installed capacity of the Project Activity. Using the SCADA system installed capacity is measured automatically.

The third data to be monitored is the reservoir area of the Project Activity. The reservoir area corresponding to maximum operational level has been determined as a certain value according to the topographical maps. In order to make verification of the reservoir area, the reservoir lake can be compared to the reservoir area map, presented in Annex-4.

The electricity produced is sold to TEİAŞ. Therefore, TEİAŞ measures the electricity produced by meters. Those TEIAŞ meters provide official data which is read and recorded monthly by TEİAŞ officers 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 every ten years. The latest test was conducted on 24-December-2024. If the meters exhibit any error or fault during the test, the electricity meters would be calibrated or replaced with the new ones. 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 for Dereli HEPP is recorded as 19-November-2030.

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 in the registered PDD at validation.

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 10. Positions and responsibilities of the VER monitoring team members

Position	Responsibility
Dereli HEPP Manager	Day to day operation of the Dereli HPP, Compliance of the project activity with the host country rules and regulations Coordination of the data collection and recording for the VCS monitoring report.
Chief Electrical Engineer	Day to day follow up of electrical equipment Recording and monitoring of the electricity generation data
Accounts Manager	Data keeping for power sales Data entry to EPİAŞ system
Chief Mechanical Engineer	Day to day operation of the power plant Keeping records of malfunctions and repairs
Carbon Consultant	Emission reduction calculations Scripting of the periodic monitoring report Follow up of the verification process

The power generation meter readings are performed by using the main metering devices and the auxiliary metering devices for accuracy checks only. Data from metering devices is recorded by TEİAŞ and forms the basis for the electricity production data. In addition to the readings of the main and auxiliary (back-up) metering devices, generation data of the Dereli HPP can be cross checked, via the TEİAŞ – EPİAŞ web site[28] which is accessible by a password available to the electricity generation companies (in the case of project activity the project owner has this capacity). The electricity generation data at the Market Financial Reconciliation Centre (MFRC/EPİAŞ) web page exhibits the net electricity generated less transmission loss, to be able to produce comparable numbers, the figures taken from EPİAŞ web site needs to be multiplied by the transmission loss factor of the grid. This EPİAŞ data is the main source of QA/QC data for the project activity, and the TEİAŞ data will be used for cross-check.

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 Directive[29]. Calibration of the meters are valid for 10 years based on Regulation on Metering and Metering Devices[30].The generation is zero for the

[28] https://seffaflik.epias.com.tr/transparency/

[29] 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

[30] 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

period where the meters are being replaced. Meter replacements are done on the same day. Testing is done by TEİAŞ.

The two electricity metering devices were replaced with new ones on 19-November-2020 as the previous ones reached their end of validity period of 10 years.

Details	Old Main Meter (removed on 19-November-2020)	Old Spare Meter (removed on 19-November-2020)	Current Main Meter (placed on 19-November-2020)	Current Spare Meter (placed on 19-November-2020)
Brand	Actaris	Actaris	EMH	EMH
Serial Number	53077779	53077780	9798713	9798714
Class	0.2S	0.2S	0.2S	0.2S
Test Date	12-July-2013	12-July-2013	15-November-2020 24-December-2024	15-November-2020 24-December-2024
Calibration Date	12-July-2013	12-July-2013	19-November-2020	19-November-2020
Calibration Frequency	10 years	10 years	10 years	10 years

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

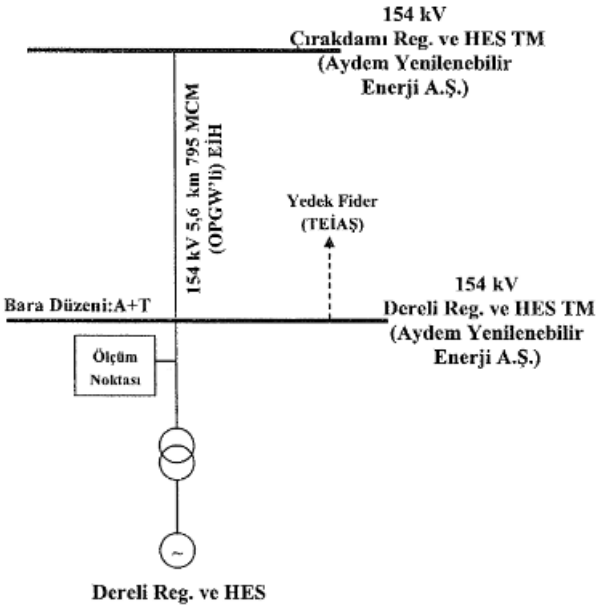


Figure 7. The single line diagram of the project activity

APPENDIX 1: COMMERCIALLY SENSITIVE INFORMATION

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

Section	Information	Justification

APPENDIX 2: THE LEGAL FRAMEWORK OF THE HOST COUNTRY

Turkish Environmental Legislation

The Environmental Law (No. 2872), which was published in Turkish Official Gazette No. 18132 dated August 11, 1983 and revised in Turkish Official Gazette No. 26167 dated May 13, 2006 (Law No. 5491) provides the legislative framework for the regulation of industries and their potential impact on the environment. Industrial projects are subject to varying levels of review that begin while projects are in the development and pre-operation phases. Additional regulations apply to facilities once they are in operation.

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

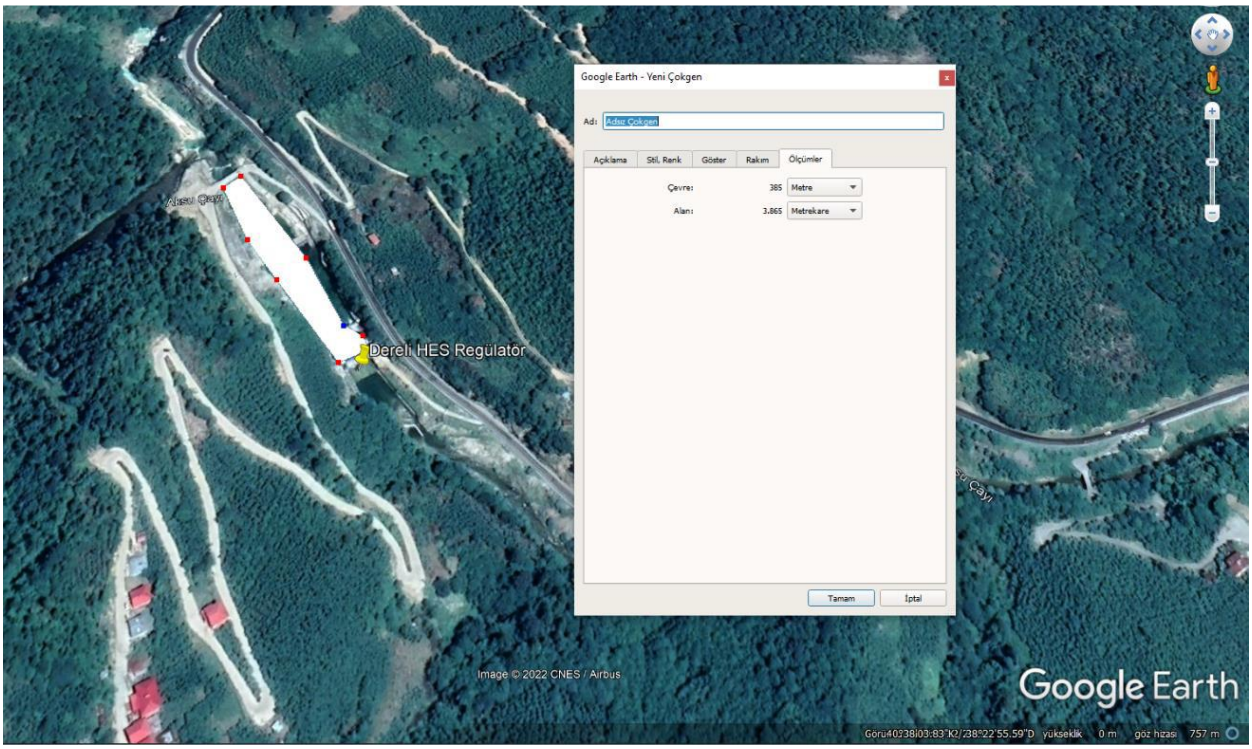
- Environmental Impact Assessment Regulation, Official Gazette No. 26939 dated July 17,2008.
- Water Pollution Control Regulation, Official Gazette No. 25687 dated December 31, 2004and revised in Official Gazette No. 26786 dated February 13, 2008;
- Regulation on Construction of Cesspits where there is no Wastewater Collection System,Official Gazette No. 13783 dated March 13, 1971;
- Hazardous Chemicals Regulation, Official Gazette No.21634 dated July 11, 1993 andrevised in Official Gazette No. 27092 dated December 26, 2008;
- Regulation on General Principles of Waste Management, Official Gazette No. 26927 datedJuly 5, 2008;
- Hazardous Wastes Control Regulation, Official Gazette No. 25755 dated March 14, 2005;
- Waste Oil Control Regulation, Official Gazette No. 26952 dated July 30, 2008 and revisedOfficial Gazette No. 27304 dated July 31, 2009;
- Vegetative Waste Oil Control Regulation, Official Gazette No. 25791 dated April 19, 2005;and revised Official Gazette No. 27305 dated July 31, 2009
- Solid Waste Control Regulation, Official Gazette No. 20814 dated March 14, 1991 andrevised in Official Gazette No. 25777 dated April 5, 2005;
- Medical Waste Control Regulation, Official Gazette No. 25883 dated July 22, 2005;
- Environmental Audit Regulation, Official Gazette No. 27061 dated November 21, 2008;
- Packaging Waste Control Regulation, Official Gazette No. 26562 dated June 24, 2007 andrevised in Official Gazette No. 27046 dated November 6, 2008; and
- Waste Batteries and Accumulators Control Regulation, Official Gazette No. 25569 datedAugust 31, 2004 and revised in Official Gazette No. 25744 dated March 03, 2005;
- The Excavation, Construction and Demolition Waste Control Regulation, Official Gazette No. 25406 dated March 18, 2004;
- Soil Pollution Control Regulation, Official Gazette No. 25831 dated May 31, 2005;
- Regulation Related to Workplace Opening and Operation Permits, Official Gazette No.25902 dated August 10, 2005 and revised in Official Gazette No. 26492 dated April 13,2007;
- Industrial Air Pollution Control Regulation, Official Gazette No.27277 dated July 3, 2009
- Air Quality Assessment and Management Regulation, Official Gazette No. 26898 dated June6, 2008 and revised in Official Gazette No. 27219 and dated May 5, 2009;
- Air Pollution Control Regulation For Heating Sources, Official Gazette No. 25699 datedJanuary 13, 2005 and revised in Official Gazette No. 27134 dated February 07, 2009;
- Exhaust Gases Emission Control Regulation, Official Gazette No. 27190 dated April 04,2009; and

- Regulation on Protection of Wetlands, Official Gazette No. 25818 dated May 17, 2005.
- In addition to the Environmental Law and its associated regulations, there are several otherlaws that directly or indirectly include environmental review, and thus, are applicable to the proposed project. The project will comply with the 4857 numbered Labour Law and its regulations stated below:
- Occupational Health and Safety Statute, Official Gazette No. 14765 dated April 11, 1974;
- Health and Safety Regulation for Construction Works, Official Gazette No. 25325 dated December 23, 2003;
- Regulation on Health and Safety Regarding Temporary Works, Official Gazette No. 25463 dated May 15, 2004.

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

- 5346 numbered Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy;
- Regulation on Protection and Usage of Agricultural Lands, Official Gazette No. 25766 dated March 25, 2005;
- 2863 numbered Law on Protection of Cultural and Natural Heritage (revised by 5226 numbered Law)
- 4342 numbered Pasture Law;
- 6831 numbered Forestry Law (amended by 5192 numbered Revision in Forestry Law)
- Regulation on Buildings located on the Disaster Areas, Official Gazette No. 26582 dated July 14, 2007;
- Law No. 4628: Electricity Market Law Ratification Date: 20.02.2001 Enactment Date: 03.03.2001
- Law No. 5627: Energy Efficiency Law Enactment Date: 18/4/2007.

APPENDIX 3: PROJECT'S RESERVOIR AREA



APPENDIX 4: BASELINE INFORMATION

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKIT MİKTARLARININ ÜRETİCİ KURULUŞLARA DAĞILIMININ YILLAR İTİBARİYLE GELİŞİMİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
ANNUAL DEVELOPMENT OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)

Birim(Unit):Ton/Gaz(gas) 10^3 m^3

			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	1,664,859	1,563,792	1,700,458
	Linyit	*Lignite*	57,850,129	50,123,941	54,558,282
	TOPLAM	*TOTAL*	**59,514,988**	**51,687,733**	56,258,740
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	239,410	16,864	27,098
		Yrd. Yakıt *Auxiliary Fuel*	134,007	105,073	118,439
		TOPLAM *TOTAL*	**373,417**	**121,937**	145,537
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	45,364	4	0
		Yrd. Yakıt *Auxiliary Fuel*	72,956	18,901	13,984
		TOPLAM *TOTAL*	**118,320**	**18,905**	13,984
	TOPLAM	*TOTAL*	**491,737**	**140,842**	159,521
	Doğal Gaz	*Natural Gas*	5,091,011	4,493,275	4,173,420
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	Fuel-Oil	*Fuel Oil*	0	0	0
	Motorin	*Diesel Oil*	0	0	0
	TOPLAM	*TOTAL*	**0**	**0**	0
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	4,956,318	5,855,911	8,873,976
	Linyit	*Lignite*	5,770,389	6,565,451	6,949,028
	TOPLAM	*TOTAL*	**10,726,707**	**12,421,362**	15,823,004
	Fuel-Oil	*Fuel Oil*	1,220,904	769,845	386,071
	Motorin	*Diesel Oil*	62,537	1,449	1,063
	LPG	*LPG*	111	0	0
	Nafta	*Naphta*	8,077	13,140	0
	TOPLAM	*TOTAL*	**1,291,629**	**784,434**	387,134
	Doğal Gaz	*Natural Gas*	15,887,029	17,290,139	18,631,167
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	6,621,177	7,419,703	10,574,434
	Linyit	*Lignite*	63,620,518	56,689,392	61,507,310
	TOPLAM	*TOTAL*	**70,241,695**	**64,109,095**	**72,081,744**
	Fuel-Oil	*Fuel Oil*	1,594,321	891,782	531,608
	Motorin	*Diesel Oil*	180,857	20,354	15,047
	LPG	*LPG*	111	0	0
	Nafta	*Naphta*	8,077	13,140	0
	TOPLAM	*TOTAL*	**1,783,366**	**925,276**	**546,655**
	Doğal Gaz	*Natural Gas*	**20,978,040**	**21,783,414**	**22,804,587**

Figure 8. Consumption of fuel in thermal power plants in Türkiye

NET CALORIFIC VALUES OF FUELS CONSUMED IN THE THERMAL POWER PLANTS

Unit: TJ/KT

			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	13.71	13.36	13.57
	Linyit	*Lignite*	6.03	6.76	7.01
	TOPLAM	*TOTAL*	**6.25**	**6.96**	7.21
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	40.24	40.30	40.27
		Yrd. Yakıt *Auxiliary Fuel*	40.19	40.19	40.19
		TOPLAM *TOTAL*	**40.22**	**40.21**	40.21
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	0.00	1.00	0.00
		Yrd. Yakıt *Auxiliary Fuel*	43.12	43.12	43.17
		TOPLAM *TOTAL*	**43.12**	**43.12**	43.17
	TOPLAM	*TOTAL*	**40.92**	**40.60**	40.47
	Doğal Gaz	*Natural Gas*	34.82	34.81	34.73
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	Fuel-Oil	*Fuel Oil*	0.00	0.00	0.00
	Motorin	*Diesel Oil*	0.00	0.00	0.00
	TOPLAM	*TOTAL*	**0.00**	**0.00**	**0.00**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	25.07	24.71	24.56
	Linyit	*Lignite*	10.37	9.94	9.55
	TOPLAM	*TOTAL*	**17.16**	**16.90**	**17.97**
	Fuel-Oil	*Fuel Oil*	39.69	40.23	42.10
	Motorin	*Diesel Oil*	40.94	42.66	42.85
	LPG	*LPG*	0.00	1.00	0.00
	Nafta	*Naphta*	43.65	33.50	0.00
	TOPLAM	*TOTAL*	**39.77**	**40.13**	42.10
	Doğal Gaz	*Natural Gas*	37.93	38.05	37.63
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	22.21	22.32	22.79
	Linyit	*Lignite*	6.43	7.13	7.30
	TOPLAM	*TOTAL*	**7.91**	**8.89**	**9.57**
	Fuel-Oil	*Fuel Oil*	39.81	40.23	41.58
	Motorin	*Diesel Oil*	42.37	43.09	43.15
	LPG	*LPG*	46.47	0.00	0.00
	Nafta	*Naphta*	43.65	33.50	0.00
	TOPLAM	*TOTAL*	**40.09**	**40.20**	**41.63**
	Doğal Gaz	*Natural Gas*	37.17	37.38	37.10

Figure 9. Net calorific values of fuels consumed in the thermal power plants

Fuel Type:	EF (tCO2/TJ)
Coal	92.80
Lignite	90.90
Fuel Oil	75.50
Diesel	72.60
LPG	61.60
Naphtha	69.30
Natural Gas	54.30
Bitumen	73.00

Figure 10. IPCC Default CO_2 emission factors

http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/statistik2011/yakit6-49/49.xls

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TÜRKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)

Birim(Unit): Tcal

			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	5,452	4,990	5,511
	Linyit	*Lignite*	83,356	80,967	91,352
	TOPLAM	*Total*	88,809	85,957	96,863
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	2,301	162	261
		Yrd. Yakıt *Auxiliary Fuel*	1,286	1,009	1,137
		TOPLAM *TOTAL*	3,587	1,171	1,398
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	467	0	0
		Yrd. Yakıt *Auxiliary Fuel*	751	195	144
		TOPLAM *TOTAL*	1,219	195	144
	TOPLAM	*TOTAL*	4,806	1,366	1,542
	Doğal Gaz	*Natural Gas*	42,335	37,354	34,621
	TOPLAM	*TOTAL*	135,949	124,676	133,026
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	Fuel-Oil	*Fuel Oil*	0	0	0
	Motorin	*Diesel Oil*			
	TOPLAM	*TOTAL*	0	0	0
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	29,677	34,556	52,056
	Linyit	*Lignite*	14,295	15,584	15,857
	TOPLAM	*Total*	43,973	50,141	67,914
	Fuel-Oil	*Fuel Oil*	11,573	7,398	3,882
	Motorin	*Diesel Oil*	612	15	11
	Lpg	*Lpg*	1	0	0
	Nafta	*Naphta*	84	105	0
	TOPLAM	*TOTAL*	12,270	7,518	3,893
	Doğal Gaz	*Natural Gas*	143,931	157,134	167,443
	TOPLAM	*TOTAL*	187,904	207,275	235,357
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	35,130	39,546	57,567
	Linyit	*Lignite*	97,652	96,551	107,210
	TOPLAM	*Total*	132,781	136,097	164,777
	Fuel-Oil	*Fuel Oil*	15,160	8,569	5,280
	Motorin	*Diesel Oil*	1,830	209	155
	Lpg	*Lpg*	1	0	0
	Nafta	*Naphta*	84	105	0
	TOPLAM	*TOTAL*	17,076	8,884	5,435
	Doğal Gaz	*Natural Gas*	186,266	194,487	202,064
	TOPLAM	*TOTAL*	336,123	339,468	372,276

Figure 11. Heat values of fuels consumed in thermal power plants in Türkiye according to their establishments (Tcal)

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)
1cal = 4,1868 Joule

Birim(Unit): Gjoule

			2009	2010	2011
EÜAŞ VE BAĞLI ORTAKLIKLARI / *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	22,828,163	20,892,383	23,074,208
	Linyit	*Lignite*	348,995,433	338,990,622	382,472,805
	TOPLAM	*Total*	**371,823,595**	**359,883,005**	405,547,013
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	9,632,696	679,656	1,091,289
		Yrd. Yakıt *Auxiliary Fuel*	5,386,180	4,223,229	4,760,433
		TOPLAM *TOTAL*	**15,018,876**	**4,902,885**	5,851,723
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	1,956,278	159	0
		Yrd. Yakıt *Auxiliary Fuel*	3,146,162	815,082	603,737
		TOPLAM *TOTAL*	**5,102,441**	**815,241**	603,737
	TOPLAM	*TOTAL*	**20,121,317**	**5,718,126**	6,455,459
	Doğal Gaz	*Natural Gas*	**177,247,713**	**156,392,061**	144,950,365
	TOPLAM	*TOTAL*	**569,192,626**	**521,993,192**	556,952,838
MOBİL SANTRALLAR / *MOBIL POWER PLANTS*	Fuel-Oil	***Fuel Oil***	0	0	0
	Motorin	***Diesel Oil***	0	0	0
	TOPLAM	***TOTAL***	**0**	**0**	0
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ / *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	124,253,075	144,680,890	217,948,438
	Linyit	*Lignite*	59,852,102	65,249,084	66,392,055
	TOPLAM	*Total*	**184,105,177**	**209,929,975**	284,340,493
	Fuel-Oil	*Fuel Oil*	48,452,601	30,974,336	16,254,037
	Motorin	*Diesel Oil*	2,560,350	61,818	45,552
	Lpg	*Lpg*	5,158	0	0
	Nafta	*Naphta*	352,524	440,154	0
	TOPLAM	*TOTAL*	**51,370,633**	**31,476,308**	16,299,589
	Doğal Gaz	*Natural Gas*	**602,609,967**	**657,887,178**	701,051,608
	TOPLAM	*TOTAL*	**786,715,144**	**867,817,153**	985,392,101
TÜRKİYE / *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	147,081,237	165,573,274	241,022,646
	Linyit	*Lignite*	408,847,535	404,239,706	448,864,860
	TOPLAM	*Total*	**555,928,772**	**569,812,980**	**689,887,506**
	Fuel-Oil	*Fuel Oil*	63,471,478	35,877,221	22,105,760
	Motorin	*Diesel Oil*	7,662,790	877,059	649,289
	Lpg	*Lpg*	5,158	0	0
	Nafta	*Naphta*	352,524	440,154	0
	TOPLAM	*TOTAL*	**71,491,950**	**37,194,434**	**22,755,049**
	Doğal Gaz	*Natural Gas*	**779,857,681**	**814,279,239**	**846,001,974**
	TOPLAM	*TOTAL*	**1,407,278,403**	**1,421,286,653**	**1,558,644,529**

Figure 12. Heat values of fuels consumed in thermal power plants in Türkiye according to their establishments (Gjoule)