Gold Standard®

Gold Standard for the Global Goals
Key Project Information &Project Design Document (PDD)

Version 1.1 – August 2017

Gold Standard

KEY PROJECT INFORMATION

Title of Project:	Boreas-1 Enez Wind Power Plant
Brief description of Project:	"Boreas-1 Enez Wind Power Plant project" (hereinafter referred as the Boreas) is constructed by "Boreas EnerjiÜretimSistemleri Sanayi veTicaret A.Ş." in Edirne province, North West of Turkey. The generation license of the project was issued in 03/05/2007 for 49 years. The project has an installed capacity of 15 MW and annual generation is estimated to be 52,742 MWhThe annual emission reduction estimated by the project is 29,948 tonnes of CO2eq and total emission reduction will be 209,635 tCO2e for the second crediting period.
Implemetation Date: Expected duration of Project:	09/04/2010[1] 49 years[2]
Project Developer:	Boreas Enerji Üretim Sistemleri Sanayi ve Ticaret A.Ş Sekans Danışmanlık
Project Representative:	SILA DURAN
Project Participants and any communities involved:	Boreas Enerji ÜretimSistemleri Sanayi ve TicaretA.Ş
Version of PDD: Date of Version:	v8 17/07/2013 For renewal crediting period: v13 – 30/05/2019
Host Country / Location:	Turkey/Enez, Edirne
Certification Pathway (Project Certification/Impact Statements & Products	Project Certification, Pathway 1 - Regular cycle, Renewable Energy – VER Certification
Activity Requirements applied: (mark GS4GG if none relevant)	GS4GG
Methodologies applied:	AMS-I.D, version 18.0
Product Requirements applied:	1 (Energy industries (renewable - / non-renewable sources)
Regular/Retroactive:	Regular
SDG Impacts:	1 – SDG 7 Affordable and Clean Energy 2 –SGD 8 Decent Work and Economic Growth 3 – SDG 13 Climate Action
Estimated amount of SDG Impact Certified	29,948tCO2e

[1]Acceptance Protocol by Ministry of Energy and Natural Resoruces (MENR)

[2]Generation License by Energy Market Regulatory Authority (EMRA)

SECTION A. Description of project

A.1. Purpose and general description of project

"Boreas-1 Enez Wind Power Plant project" (hereinafter referred as the Boreas) was constructed by "Boreas EnerjiÜretimSistemleri Sanayi veTicaret A.Ş." (hereinafter referred as Boreas Enerji) in Edirne province, North West of Turkey. The generation license of the project was issued in 03/05/2007 for 49 years. The project has an installed capacity of 15 MW and annual generation is estimated to be 52,742 MWh[3].

The project site was an empty area on top of a hill which is surrounded by degraded oak forest. There is radio link station on the West end of the site. The project is located 48.7 ha area which belongs to General Directorate of Forestry.

The purpose of the Project is to produce renewable electricity using wind as the power source and to contribute to Turkey's growing electricity demand through a sustainable and low carbon technology. The project will displace the same amount of electricity generated by the grid dominated with fossil fired power plants. The annual emission reduction estimated by the project is 29,948 tonnes of CO2eq for the second crediting period.

There were six Nordex N90 turbines, each having a capacity of 2.5 MWs. The turbines were purchasedfrom Germany and shipped to Turkey for installation. The electricity is transmitted to substation EnezTM, 154 kV bara via 10 km transmission line.

After the start of the commercial operation, the generation license of the project was revised on 26/06/2013. The installed capacity of the project has been increased to 20 MW with the revision. Two units have been added to the project as of 16/04/2015 and 02/08/2016, respectively. The added units are also from the same turbine supplier-Nordex N100 turbines with an installed capacity of 3.3 MWs. However, the N100 turbines are operated as 2. 5 MWs due to power limitation according to the generation license.

The project will produce positive environmental and economic benefits through the following aspects:

- Displacing the electricity generated by fossil fuel fired power plants by utilising the renewable resources so as to avoid environmental pollution and GHG emissions,
- Contributing the economic development of the region by providing sustainable energy resources,
- Increasing the income and local standard of living by providing job opportunities for the local people,
- Reducing the blackout because of low voltage by lowering required capacity of the transformer.

The project construction started on June 2009 and was operational on 09 April 2010.

A.2. Eligibility of the project under Gold Standard

The project activity meets the eligibility criteria according to section 3.1.1 of GS4GG Principles & Requirements document as below.

- The project applies methodology AMS-I.D. Version 18.0, which is an approved methodology under Gold Standard.
- The project type is wind and an eligible project type as per the 1.1.Eligible Project Types & Scope under Renewable Energy Activity Requirements.

  (a) Project shall generate and deliver energy services (e.g. mechanical work/electricity/heat) from non-fossil and renewable energy sources

(b) Project shall comprise of renewable energy generation units, such as photovoltaic, tidal/wave, wind, hydro, geothermal, waste to energy and renewable biomass.

- The project activity results in displacement of electricity from thermal power stations while contributing to sustainable development of Turkey. Hence, the project contributes to the Gold Standard Vision and Mission.

- Wind is an approved project type.

General Eligibility Criteria

- Type of project: Wind

- Location of project: The project is located in Enez district of Edirne province, Turkey. Therefore, the project is eligible.

- Project Area, Boundary and Scale: The registered project activity is 15 MW as a small scale.

A.3. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

Boreas EnerjiÜretim Sistemleri Sanayi veTicaret A.Ş.

A.4. Location of project

A.4.1. Host Country

Turkey

A.4.2. Region/State/Province etc.

Aegean Region, Edirne Province

A.4.3. City/Town/Community etc.

Enez district of Edirne and the nearest village is Hisarli which is approximatel 1 km away from the plant area.

A.4.4. Physical/Geographical location

[3]Since the certified capacity of the project is considered, 15 MW is indicated rather than the actual value of 20 MW.

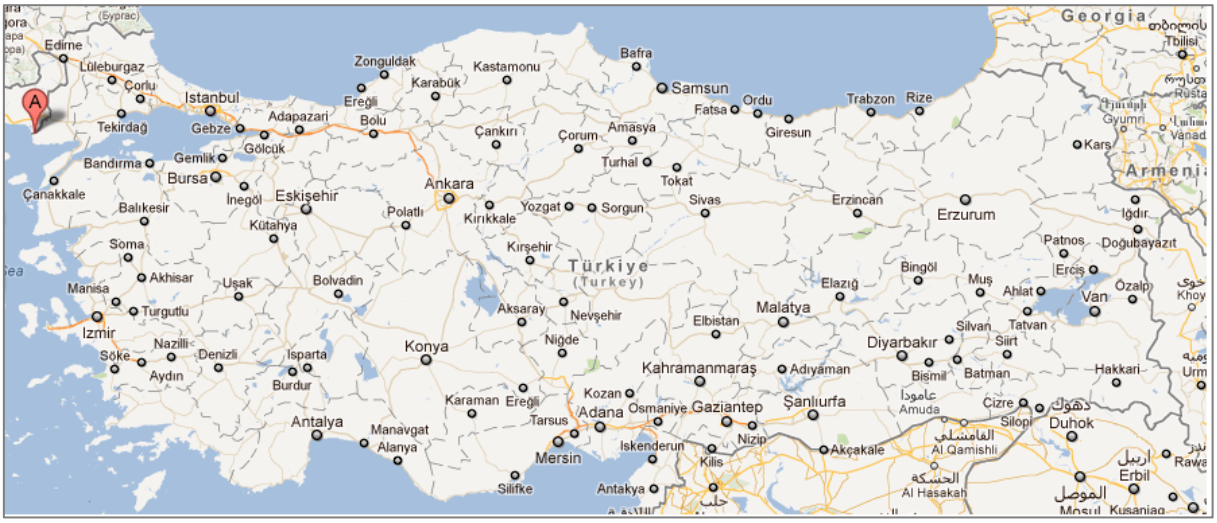

Figure1. The project site marked with A.

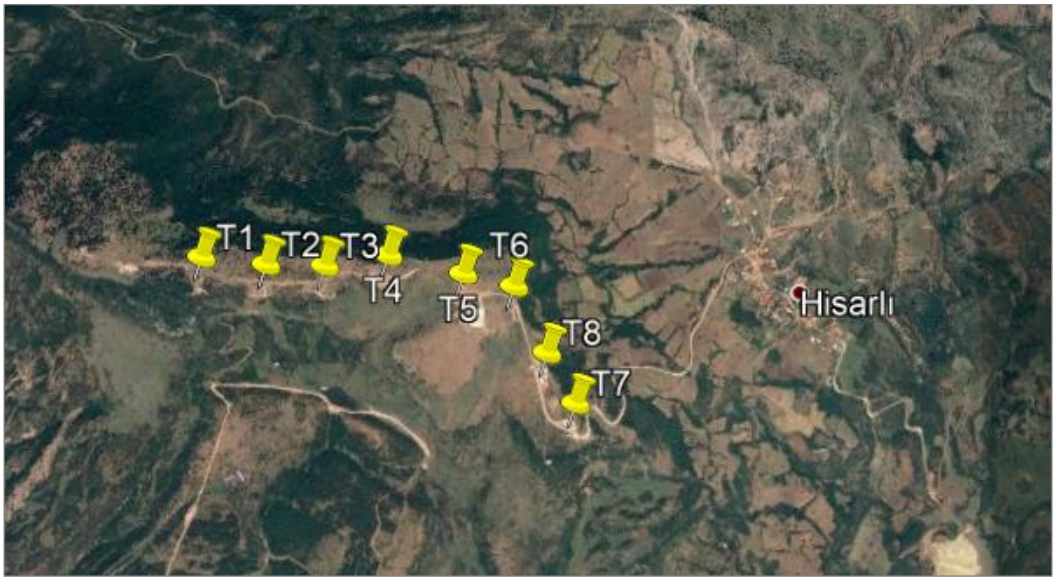

Figure 2. Turbine locations

The coordinates of the project (including the added capacity) may be seen in Table 1:

Table 1- Project Coordinates

Turbine No	Latitude (N)	Longitude (E)
T1	40 º 43’ 19.2’’	26 º 10’ 50.1’’
T2	40 º 43’ 18.3’’	26 º 11’ 2.8’’
T3	40 º 43’ 18.2’’	26 º 11’ 13.7’’
T4	40 º 43’ 19.6’’	26 º 11’ 25.3’’
T5	40 º 43’ 17.1’’	26 º 11’ 39.2’’

T6	40 º 43’ 15.3’’	26 º 11’ 48.5’’
T7	40°42'55.21"	26°11'56.77"
T8	40°43'2.28"	26°11'51.65"

A.5. Technologies and/or measures

The project comprises the installation of six NORDEX N90/2500HS kW wind turbine generators with 80 m hub height. As an all-round turbine in the 2.5 MW product line, the N90/2500 can be deployed at strong-wind sites. With different tower heights, it covers wind class IEC 1. The added units are Nordex N100 turbines with an installed capacity of 3.3 MWs. However, the N100 turbines would be operated as 2. 5 MWs due to power limitation according to the generation license.

Rotor

The rotor consists of three rotor blades made of high-quality glass fibre-reinforced polyester, a hub, slewing rings and drives for adjusting the rotor blades. A pitch system is used to control and optimise output. The variable-speed rotor enhances the aerodynamic effects and reduces the wind load on the system. If necessary, each rotor blade can be locked in any position by means of an innovative locking system to facilitate servicing.

Drive train

The drive train consists of the rotor shaft, the gearbox, an elastic coupling and the generator.

Gearbox

The nacelle is equipped with a two-stage planetary gearbox with a spur gear stage, as an option a differential gearbox is also available. The gearbox is fitted with a cooling circuit with variable cooling output. The gearbox bearing and tooth engagement are kept continuously lubricated with oil.

Generator

The generator is a double-fed asynchronous machine. The main advantage is that only 25 – 30% of the energy produced needs to be fed into the electricity grid via a frequency converter. The deployment of this generator/frequency converter system thus cuts the total cost of the wind power system.

Cooling and filtration

The gearbox, generator and converter of the turbine each have independent active cooling systems. The cooling system for the generator and frequency converter is based on a cooling water circuit, while the gearbox is cooled by an oil-based system. This ensures optimum operating conditions in all types of weather. A separate cooling system room at the rear of the nacelle facilitates access to the cooling units and ensures optimum performance of the individual systems.

Braking system

The three redundant and independently controlled rotor blades can be set at full right angles to the rotation direction for aerodynamic braking. In addition, the hydraulic disc brake provides additional support in the event of an emergency stop.

Nacelle

The nacelle consists of the cast machine frame, a welded generator frame, a steel structure for the crane system and for supporting the nacelle housing and the nacelle housing itself, which is made of glass fibre-reinforced plastic. Ergonomically designed, it is spacious and thus very service-friendly.

Yaw system

The wind direction is continuously monitored by two redundant wind direction sensors on the nacelle. If the permissible deviation is exceeded, the nacelle yaw is actively adjusted by means of up to 4 geared motors.

Tower

The tubular steel tower is designed and certified as a modular tower. The requirements of EN 50308 in particular have been taken into account in the design of the tower interiors (access ladder, platforms, safety equipment). The transformer can be installed either inside or outside the tower.

Control and grid connection

The wind turbine has two anemometers. One anemometer is used for controlling the turbine, the second for monitoring the first. All operational data can be monitored and checked on a control screen located in the switch cabinet or via an external laptop. The data and signals are transmitted via ISDN for remote monitoring. At the click of the mouse, the operator can download all key data for the turbine from the Internet. The necessary communications software and hardware is supplied by Nordex.

Lightning protection

Lightning and overvoltage protection of the entire wind turbine is based on the lightning protection concept and is in accordance with DIN EN 62305.

The electricity generation is mainly done by fossil fuel fired power plants in Turkey.The distribution of installed capacity by fuel types is given in Figure 3.The share of renewable energy sources (including hydraulic) within the installed capacity has been 28,80% in 2017. The contribution to annual electricity generation from wind power plants was only 6.10 %.

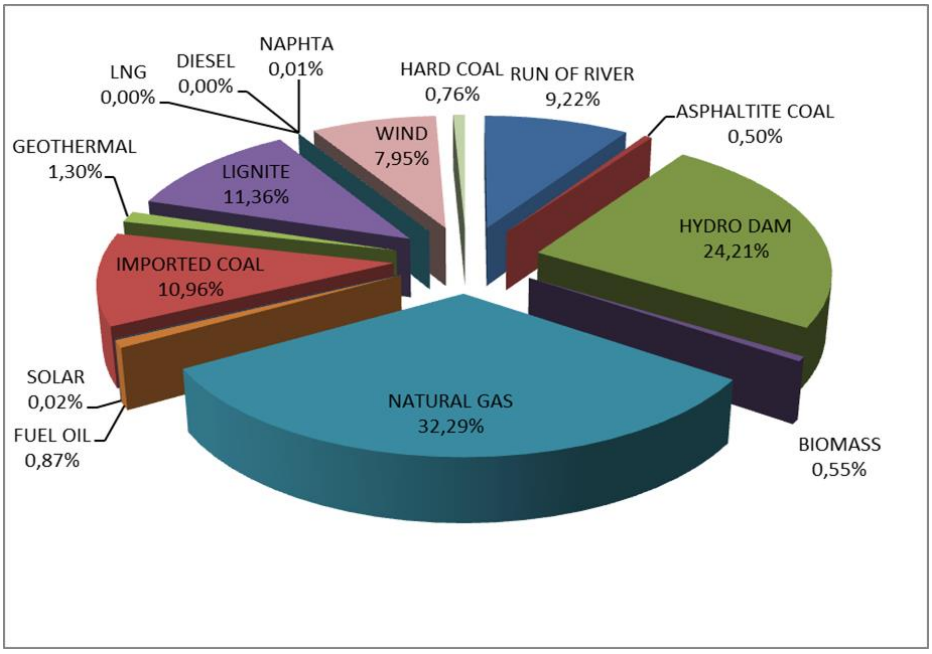

Figure 3. Distribution of Installed Capacity by Sources at the End of 2017 (%)[4]

[4]Electricity Market Development Report, 2017 (EMRA)

The baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.The Baseline Scenario is detailed in section B.4.In the project scenario, the project generates electricity from wind power and result in emission reductions in parallel with its electricity generation values. Since Turkey's grid mainly consists of thermal power plants, this would have resulted in GHG emissions. Briefly, in the absence of the project activity, the electrical energy would have been delivered to the grid through a mix of existing power generation resources, as described in more detail in section B.4.

In addition to displacing the electricity generated by fossil fuel fired power plants by utilising the renewable resources so as to avoid environmental pollution and GHG emissions, the project activity has increased the income and local standard of living by providing job opportunities for the local people and contributed the economic development of the region by providing sustainable energy resources.

A.6. Scale of the project

Small scale

A.7. Funding sources of project

Private funding and funding from bank. The project activity does not have any public funding or Official Development Assistance (ODA) funding.

A.8. Assessment that project complies with 'gender sensitive' requirements

Question 1: Does the project reflect the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy? Explain how.

Response: Gold Standard Gender Policy (https://globalgoals.goldstandard.org/101-1-g-gold-standard-gender-policy/), p. 10 "Foundational gender-sensitive requirement - This strengthens Gold Standard's 'do no harm' approach and addresses safeguards to prevent or mitigate adverse impacts on women or men and girls and boys. Such action is mandatory for all projects seeking Gold Standard certification and includes compliance with the gender 'do no harm' safeguards, gender gap analysis and gender sensitive stakeholder consultations."

The project is a renewable energy project and not gender sensitive project. The project does not impact women or men, negatively.

Question 2: Does the project align with existing country policies, strategies and best practices? Explain how.

Response: The project does not involve and is not complicit in any form of discrimination basedon gender, race, religion, sexual orientationor any other basis. Turkey signed the convention of International Labour Organization. The related articles are 100 and 111. The project owner respectsArticle 5/8425 of Labour Law;

which states no discrimination based on gender, race, religion,sexual orientation or any otherbasis is allowed.

Question 3: Does the project address the questions raised in the Gold StandardSafeguarding Principles & Requirements document? Explain how.

Response: The Project shall complete the following gender assessment questions below:

- Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits?

  No, the project does not reduce access to or control of resources for women.

- Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)?

  No, the project does not involve in any form discrimination in any kind of form.The project respects the employees' freedom of association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights.

- Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)?

  The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.

- Does the Project take into account gender roles and the abilities of women or men to benefit from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)?

  Yes,the project takes into account gender roles and abilities of women or men. Employment is based on the job requirement and the demographics of the local area.

- Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities?

  No, project leads to increased availability of electricity in the regional grid and thus enhancing the living standards.

- Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or access to opportunities and benefits?

  The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.

- Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services?

  The project is not complicit in restrictionsof any freedoms and rights; and does not involve and is notcomplicit in any form of discrimination basedon gender, race, religion, sexual orientationor any other basis.

- Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards?

  No, as being a renewable energy project, the project does not expose women and girls to further risks or hazards.

Question 4: Does the project apply the Gold Standard Stakeholder Consultation & Engagement Procedure Requirements? Explain how.

Response: In order to develop the project as a Gold Standard VER project a Local Stakeholder Consultation Meeting which is in line with Gold Standard Requirements was held on 29/04/2009 in Enez. Another meeting for the stakeholder feedback consultation was held on 09/11/2009.There were no negative comments from the stakeholders during the period of construction and operation phases.

The sitevisit for the renewal crediting periodwith DOE was made on 12/11/2018.The local people were interviewed and the general outcome of the interviews was positive verbally.

Since the GS continuous input mechanism by which any complaint or a request could be communicated with the project owner is available and the contact information of the plant responsible exist at the Mukhtar, the project owner and local community are always in touch. The project owner regularly checks with the Mukhtar if any complaint or a request exist[5].Any complaint or need from the local community could directly be received by the project owner and appropriate contributions or improvements are made to the local community.

SECTION B. Application of selected approved Gold Standard methodology

B.1. Reference of approved methodology

In accordance with the Appendix B of the Simplified Modalities and Procedures for Small Scale CDM project activities,the project activity is classified as the type and category below:

Project type: Type I – Renewable Energy Projects

Category: D – Electricity Generation for a System

Methodology: AMS-I.D.: Grid connected renewable electricity generation --- Version 18.0[6]

Sectoral Scope: 01 Energy industries (renewable - / non-renewable sources)

The AMS-I.D refers to:

- Tool to calculate the emission factor for anelectricity system, Version 07.0.0[7]
- Tool for the demonstration and assessment of additionality, Version 07.0.0[8]
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, Version 03.0[9]

B.2. Applicability of methodology

The methodology AMS-I.D "SmallGrid connected renewable electricity generation" is applicable to grid-connected renewable power generation project activities that a) install a Greenfield power plant; b) involve a

[5]The documentation from the Mukhtar may be seen in Appendix 3

[6]https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK

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

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

[9]https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v3.pdf

capacity addition to (an) existing plant(s); c) involve a retrofit of (an) existing operating plants/units; d) involve a rehabilitation of (an) existing plant(s)/unit(s); or e) involve a replacement of (an) existing plant(s)/unit(s).

The project activity installs a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield), AMS-I.D "Small Grid connected renewable electricity generation is applicable. The applicability criteria are listed and justified below:

Table 2-Applicability of AMS-I.D

Applicability Criteria	**Justification**
This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plants/units; (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s)	The project is installation of a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity.
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 (3), is greater than 4 W/m2; or (c) The project activity results in new single or multiple reservoirs and the powerdensity, calculated using equation (3), is greater than 4 W/m2.	The project is not a hydropower plant.
If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The project has only renewable component with an installed capacity equal to 15 MW.
Combined heat and power (co-generation) systems are not eligible under this category.	The project is not a combined heat and power system.
In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units	The project is not an additional to an existing renewable power generation facility.
In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The project is not a retrofit, rehabilitation or replacement of an existing facility and is a newly built wind power plant.
In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then thebaseline for the electricity component shall be	The project is not a landfill gas, waste gas, wastewater treatment and agro-industries project.

in accordance with procedure prescribedunder this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS-I.C.: Thermal energyproduction with or without electricity” shall be explored.	

B.3. Project boundary

The project boundary encompasses the physical, geographical site of the renewable generation source. The wind power plant with all installation is the project boundary.

As the electricity generated by the project displaces the electricity generated by national grid, the baselineboundary is defined as the national grid. This includes the project site and all power plants connected physically to the national grid and excludes the off-grid power plants. Please see the diagram below.

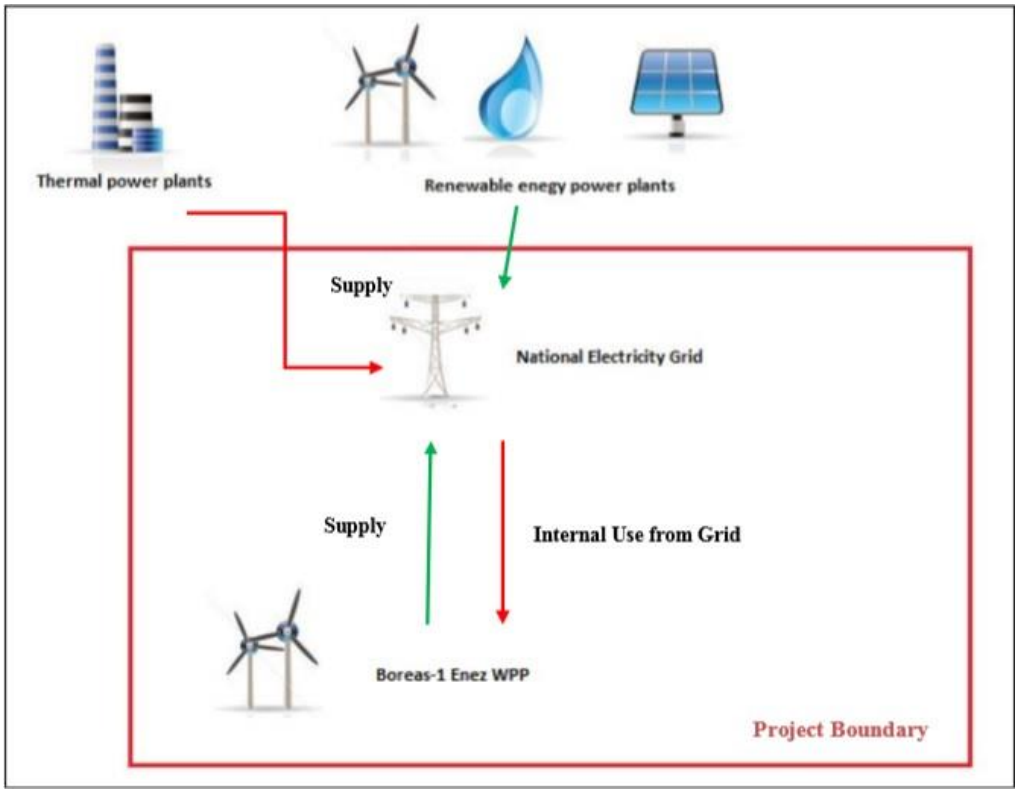

Figure 4. Project Boundary

The greenhouse gases and emission sources included in or excluded from the Project boundary are compiled as below:

Table 3-Emission Sources Included or Excluded From The Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO2	Yes	Main emission source. The dominant emissions from power plants are in the form of CO2, therefore CO2 emissions from fossil fuel fired power plants connected to the grid will be accounted for in baseline calculations.
		CH4	No	Minor emission sources.
		N2O	No	
Project Activity	Emissions as a result of Project Activity	CO2	No	Not Applicable

B.4. Establishment and description of baseline scenario

According to AMS I.D. (Version 18), the baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid .

As it may be seen in Figure 5, the development of Turkey's installed capacity by primary energy resources between the years, 2006-2017 , the electricity generation has mainly been done by fossil fuel fired power plants in Turkey.Total Installed electricity generation capacity in Turkey has reached to 85,200 megawatts (MW) as of 2017. As having a share of %7.65, wind power projects have an installed capacity of 6.516,2MW.

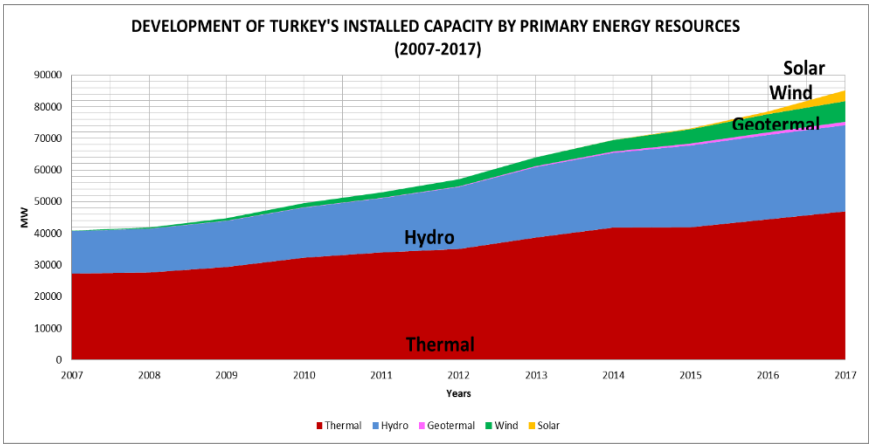

Figure 5. The development of Turkey's installed capacity by primary energy resources, 2006-2017[10]

In reference to 5-year capacity projection, it is clear that fossil fuels will remain the main sources for electricity generation through until 2021.Fossil fuels will continue to dominate the market. Hydro will account for 30% of the mix whereas all non-hydro renewable combined (geothermal/biogas/waste/wind/wind) will only account for 18.7% of all electricity generation capacity. This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector.

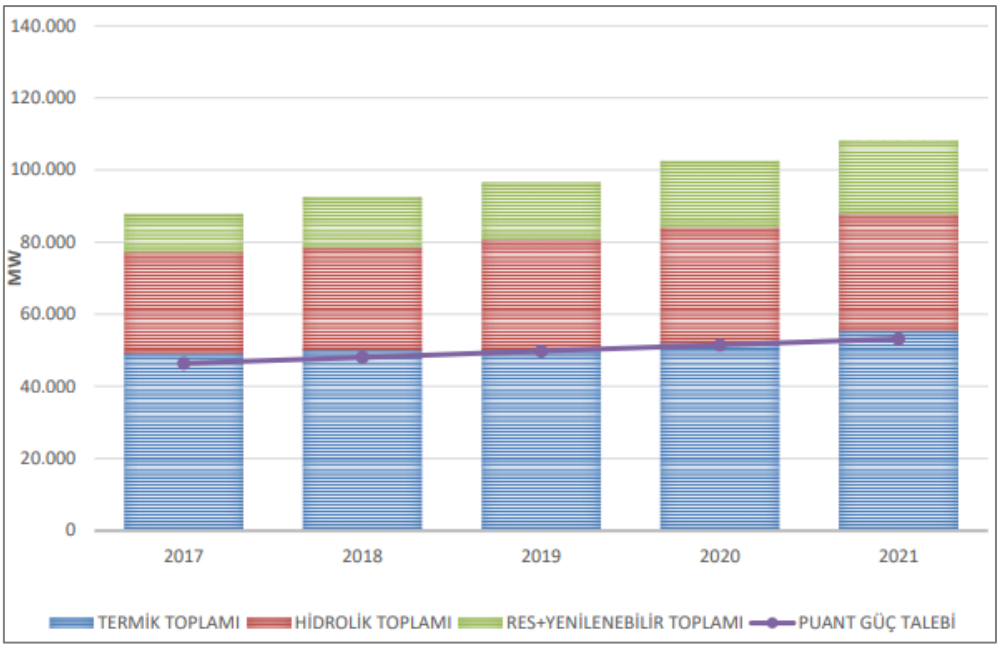

Figure 6. Capacity projection, 2017-2021[11]

[10]https://www.teias.gov.tr/tr/ii-utilization-values-turkeys-installed-capacity

[11]https://www.teias.gov.tr/sites/default/files/2017-12/KapasiteProjeksiyonu2017a%C4%9Fustos.pdf

B.5. Demonstration of additionality

The small scale methodology refers to the guidelines in Attachment A to Appendix B for the assessment of additionality. For the demonstration of additionality, "Tool to for the Demonstration and Assessment of Additionality Version 7.0.0" has been applied to the project.The tool also complies with Attachment A to Appendix B which is referred in the methodology (AMS-I.D).

The steps completed from the tool may be seen below:

Step 1- Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternatives to the project activity:

The project owner is a small company who would like to focus on renewable energy projects and the project is their first investment. The alternatives are defined related to the investor as per footnote 7 of the version 7.0.0 of the additionality tool[12]:

1)The project activity taken without VER: The investment is not financially attractive and comprises potential risks as described below. Therefore, this alternative is not realistic.

2)Building a new power plant utilizing other renewable resource: The Electricity Market License Regulation gives priority to local resources with low environmental impact to generate electricity and therefore other renewable resources are considered as alternatives to the project.

No rivers with continuous flow regime exist in the project site. The nearest river to the project site is Meriç River which is 4.5 kms far away. The river flows through Bulgaria, Greece and Turkey (EIA study, page 18). The project proponent did not consider building a hydropower plant with the same capacity (15MW) as the flow regime is not stable. In addition, wind power plants are considered to be more environmental friendly as no land use activities are affected by their operation. There are 5 dams and a number of lagoons built and operated by government for the purpose of irrigation and regulating flow but no facility exists for electricity generation yet (State Hydraulic Works).

Geothermal resources eligible for electricity generation are located on the West of the country and there are three power plants operational in that region. Using solar power or biomass for electricity generation is still in the infancy state in Turkey. There are no solar or biomass power plants in Turkey due to insufficient incentives.

Therefore, utilizing other renewable resources is not a realistic and credible alternative scenario to the project activity.

3)No activity: In case no project activity is taken, the same amount of electricity will be generated by the existing grid to supply the increasing demand of the country. This alternative is the same as baseline scenario.

Outcome of Step 1a) The only realistic and credible scenario is that the same amount of electricity will be generated by the existing grid, which is the same as baseline scenario.

Sub-step 1b: Consistency with mandatory laws and regulations:

All alternatives to the project activity are in compliance with the existing laws and regulations which are described below in Table -4.

Table 4- Relevant laws and regulations applicable to the project and alternatives

Relevant Laws	**Number/ Enactment Date**	**Aim and Scope**
Environmental Law *Environmental Impact Assessment Regulation	Nr. 2872 / 17/07/2008	The approval is requested for power plants from Ministry of Environment and Forest as Electricity Licence Regulation requests project to be in line with the environmental law.
Electricity Market Law *ElectricityLicence Regulation *Electricity Market Balancing andConciliation Regulation[14]	Nr. 4628 / 03/03/2001	Regulating procedures of electricity generation, transmission, distribution, wholesale, retail for legal entities. Two regulations issued under the law; one for generation licence and the other for market price balancing and conciliation.
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy	Nr. 5346 / 18/05/2005	Aims to extend the utilization of renewable energy for electricity generation and identifies method and principles for power generation from renewable resources in an economical and conservative manner as well as certification of the electricity generated from renewable resources.
Energy Efficiency Law	Nr. 5627 / 02/05/2007	Identifies method and principles for industry, power plants, residential buildings and transport to imply necessary measures for energy efficiency during electricity generation, transmission, distributionand consumption.

[12]As per footnote 7 of the version 7.0.0 of the additionality tool

Outcome of Step1b: The only realistic scenario is the supply of same amount of electricity from the existing grid, which is in compliance with the laws and regulations.

Step 2 - Investment analysis

The investment analysis below aims to show that "the project activity is not (a) the most economically and financially attractive".

Sub-step 2a - Determine appropriate analysis method

(1)There are three options for investment analysis method:

- Simple Cost Analysis
- Investment Comparison Analysis and
- Benchmark Analysis

As the project gains revenue from the sale of generated electricity, Simple Cost Analysis is not applicable. Investment Comparison Analysis is also not applicable as no alternative investment is point at issue. Therefore, Benchmark Analysis will be used for the evaluation of the project investment.

Sub-step 2b - Option III-Apply benchmark analysis

For the purpose of benchmark analysis Project IRR before tax has been chosen as the indicator.

There are no available benchmarks for wind power plant projects in Turkey. The credibility of a particular project is evaluated on the basis of several factors including cost recovery period, risk of postponed commissioning and credibility of the project owner.

World Bank loan reports

World Bank has released 500 M USD fund for private sector renewable energy and energy efficiency projects on May 2009. The loan is given through two local banks, namely, Turkish Industrial development Bank (TSKB) and Turkish Development Bank (TKB). The fund is available for wind power plants. In the project appraisal report it is the threshold IRR for wind power plants are taken as 15% 17. That benchmark reflects the bankers view on the Equity IRR including risks on such investments. The project IRR is the measure that will be compared against the benchmark of weighted average cost of capital (WACC). The project IRR itself is not the benchmark, it is compared against the benchmark of WACC.

Weighted Average Cost of Capital

The benchmark is advised to be WACC for project IRR as stated in the referenced tool. The expected return on capital should be higher than the cost of capital for an investment to be worthwhile. The cost of capital is the rate of return that capital could be expected to earn in an alternative investment of equivalent risk. If a project is of similar risk to a company's average business activities it is reasonable to use the company's average cost of capital as a basis for the evaluation. A company's securities typically include both debt and equity, one must therefore calculate both the cost of debt and the cost of equity to determine a company's cost of capital.

Calculation of Cost of Equity:

In order to calculate the cost of equity, the approach presented in the paper "Estimating equity Risk Premiums" by Prof. Damodaran is taken. He is a Professor of Finance at the Stern School of Business at Newyork

University and well known as author of several widely used academic and practitioner texts on Valuation, Corporate Finance and Investment Management. Most of the parameter used in calculations are taken from the data presented in his web site.

Since the private sector inclusion to the energy market is very early in Turkey, compared to mature markets in other countries, we assume that all companies investing an emerging market would be equally exposed to country risk. The following formula is used for expected cost of equity:

*Expected cost of Equity=Risk free rate + β*Equity Risk Premium*

1) *Choice of Risk free rate:*

   It is stated in the referenced paper that the risk free rate chosen should match up with the duration of the cashflows being discounted and long-term default free government bond rate are generally preferred in corporate finance and valuation. Therefore,the risk free rate is taken from the lowest yielding bonds in the particular market, i.e. government bonds. The rate of Eurobond XS0285127329 with a due date 02.04.2019 has been chosen as the duration of the cash flow is 10 years. The historical yield values are not available on the investment decision date 26/01/2009. The nearest yield rate could be found in Trust Bank (www.trust.ru) and datedas 14/11/2008[13]. The yield was 9.26 % at the time of the report and has been taken as the risk free rate.

2) *Choice of beta:*

   There are four power generating and trading companies under trade in Istanbul Stock Exchange and Electricity Index is caluclated as 0.778 for year 2008 by Bloomberg which is one of the well-known data supplier to the financial market.

3) *Choice of Equity Risk Premium:*

   One of the simplest and most easily accessible measure of the country risk is the rating assigned to a country's debt by a ratings agency. These rating measure default risk but are they are affected by many of the factors that drive equity risk. Total risk premium has been calculated by the following formula:

   Equity Risk Premium= Base Premium for Mature Equity Market+ Country Risk Premium

   The equity risk premium for Turkey has been taken from updated data in 2008 by Prof. Damodoran which has been given as 12.88% for 2008.

   Cost of Equity calculated with above formula is after tax basis. To convert it into before tax basis, the folowing formula has applied:

   Cost of Equity before tax= Cost of Equity after tax / (1- Tc) Where Tc is average business revenue tax.

   The following parameters are used for calculation:

Table 5- Parameters Used for the Calculation of Cost of Equity

Parameter	Value	Source
Risk free rate	9.26%	Long term Eurobond yield, (XS0285127329) on 14/11/2008
Beta	0.778	Beta for electricity market in Turkey in 2008, Bloomberg

[13] http://www.isbank.com.tr/programs/fonlar/Aylik200901817.htm

Country Risk	12.88%	Prof. Damodaran, Risk Premium for Other Markets, 2008, Total Risk Premium for Turkey[14]
Expected Cost of Equity	19.28%	Calculated as after tax
T_c	20%	Average business revenue tax
Expected Cost of Equity	24.10%	Calculated as before tax

Calculation of Cost of Debt:

The loan for the project is taken in EURs and the interest rate is 12%.

Calculation of WACC:

The Weighted Average Cost of Capital (WACC) for the project has been calculated by the following formula:

$$WACC = CE\frac{E}{V} + CD\frac{D}{V}\ (1 - T_c\ )$$

The parameters are defined below:

Table 6-Parameters Used for the Calculation of WACC

Parameter	Value	Source
CE, Cost of Equity	24.10%	Calculated above
E/V, percentage of financing that is equity	15%	Calculated
CD, Cost of Debt	12%	Interest rate
D/V, percentage of financing that is debt	85%	Calculated
V, Total project cost	21,300,000	E+D
T_c, Average business revenue tax	20%	Since the project IRR is calculated on before-tax basis for the project, revenue tax is not included in the calculation.
WACC	13.82%	Calculated

In order to follow a conservative approach, the WACC as **13.82%** is accepted as the benchmark for the project.

Sub-step 2c - Calculation and comparison of financial indicators

The "Guidance for the assessment of investment analysis"[15]implies that:

"**6. Guidance**: Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant. "

[14]http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem08.xls

[15]http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

The following table summarizes the financial figures for the project operation.

Table 7 - Summary of Financial Data

Input Name	Input Value	Reference Document	Page Number	Date of document
Expected electricity generation (P90 value for 20 years)	52.742 MWh	Micrositing report	12	January 2009
Total investment	21,300,000 EUR	Loan agreement -conditional	1	12/06/2008, amended on 24/10/2008
Own capital	3,200,000UR	Calculated	-	-
Debt	18,100,000 EUR	Loan agreement -conditional	1	Payback Schedule 26/01/2009
Interest rate	12%	Loan agreement-amendment	Article 6	24/10/2008
Operation Cost for 20 years	1.2 EUR/MWh	Wind Power Economics, EWEA Report[16]	4	2003
Feed-in tariff	5.5 EURcent	Renewable Energy Law Nr. 5346[17]	Article6 (c)	10/05/2005
Expected VER price	7 EUR/tonne[25]	Stateof Voluntary Carbon Markets 2012[18]	56	May 2012

In the planning and financing stage of a wind farm project a risk assessment is required quantifying all risks related to the wind farm financing (technical due diligence). The result of an energy yield prediction in terms of an AEP (Annual Energy Production) is called the P50. The probability of reaching a higher or lower annual energy production is 50:50. A risk assessment includes the quantification of the project specific uncertainties and whole range of exceedance probabilities of the wind farm's annual energy production.P75 is the annual energy production which is reached with a probability of 75%. The risk that an annual energy production of P90 is not reached is 10%. Both values are widely used by banks and investors as base in their financing decisions.

P75 and P90 value for 20 years for Boreas are 56,209 MWh and 52,742 MWh respectively. The capacity factor estimated for P75 and P90 are 42.8% and 40.1% as stated in the Micro siting Report. P90 values have been taken as the base for the financial calculations as the risk is lower than P75.

The capacity factor for Edirne Province could also be found on webpage of General Directorate of Renewable Energy28. The highest capacity is 40% in the given map.

The Internal Rate of Return (IRR) before taxation for the project is calculated as 8.31 % for P90 value without the VER revenue. It changes to 9.41% if P75 value is used. Both are much lower than expected IRR of 13.82%.

[16] http://www.ewea.org/fileadmin/ewea_documents/documents/press_releases/factsheet_economy2.pdf

[17] http://www.enerji.gov.tr/mevzuat/5346/5346_Sayili_Yenilenebilir_Enerji_Kaynaklarinin_Elektrik_Enerjisi_Uretimi_Amacli_Kullanimina_Iliskin_Kanun.pdf

[18] State of Voluntary Carbon Markets 2012, page 56, (http://www.foresttrends.org/publication_details.php?publicationID=3164)

As a result, the revenue acquired from the operation of the power plant is not financially attractive to do the investment.

Sub-step 2d - Sensitivity Analysis

The sensitivity analysis is applied to variables that constitute of the total investment cost in order to show that investment decision is not the most attractive alternative financially. Investment cost, operational cost, electricity generation and price are taken into account in the sensitivity analysis and the change in electricity revenue is discussed below.

Benchmark hitting percentage is how much the investment cost, electricity revenue or operating cost should change to achieve the benchmark. It is included in the table in order to show required conditions when the project could be financially attractive and discuss those conditions are hard to be realized.

For a range of ±10% fluctuations in parameters above, Table 8 below have been obtained.

Table8.a- Sensitivity analysis for the Project IRR with P90

IRR without carbon	**-10%**	**-5%**	**5%**	**10%**	**Benchmarkhittingpercentage**
Investment Cost	*9.76*	*9.00*	*7.66*	*7.07*	-29%
Operational Cost	*8.68*	*8.49*	*8.12*	*7.93*	-144%
Electricity Price	*6.54*	*7.44*	*9.15*	*9.98*	+32%
Electricity Generation	*6.54*	*7.44*	*9.15*	*9.98*	+32%

Table8.b-SensitivityanalysisfortheProjectIRRwithP75

IRR without carbon	**-10%**	**-5%**	**5%**	**10%**	**Benchmark hitting percentage**
Investment Cost	*10.94*	*10.14*	*8.74*	*8.11*	-22.5%
Operational Cost	*9.77*	*9.59*	*9.23*	*9.05*	-113%
Electricity Price	*7.60*	*8.52*	*10.28*	*11.13*	+23%
Electricity Generation	*7.60*	*8.52*	*10.28*	*11.13*	+23%

The project IRR becomes 9.76% for P90 with a 10% decrease in investment costs. The investment cost should be 29% lower than the actual expenses to hit the benchmark of 13.82% which is not a realistic case.The project IRR is 10.94% for P75 with 10% decrease in investment cost and 11.3% with 10% rise in the electricity price. It should be 22.5% lower to hit the benchmark.

Operational cost includes maintenance cost and will not change much during the operational lifetime of the project. The value could be higher as the turbines became worn out. In order to hit the benchmark, the operation cost should be zero (-100%) and en extra income of 44% of operational cost amount should be available for P90 value. The extra income needed is 13% more of the operational cost for P75.

The average electricity generation for 20 years has been estimated as 52,742 MWhs as P90 and 56,209 for P75 in the Micro-siting Report. The annual generation could be higher at high wind speeds at initial years of operation but the average would stay the same as the turbines worn out through its operational life. The IRR becomes 9.98% and 11.13 % with 10% rise in the electricity generation but will still be under the benchmark. The annual generation should be 31% or 23% higher than the actual value, which means 69,092 MWh.

The change in the electricity price was not expected by the time of the project decision taking phase. Renewable Energy Law limits the price of electricity generated by renewable resources from a minimum 5 Eurocents to maximum 5.5 Eurocenst per kWh with a purchase guarantee of maximum 10 years. The law came into force recently in 2005. A revision of this law has been released for the law on January 2010 but the offered electricity price did not change for wind power plants, rather converted to USDcents as 7.3 USDcent/kWh. The electricity price should be between 6.7 USD/cents (23% higher) and 9.6 USDcent/kWh (32% higher) for the whole period of analysis (20 years) to hit the benchmark of 13.82%; which is unlikely under those circumstances.

Outcome of Step 2: The project is unlikely to be financially attractive.

Step 3: Barrier analysis

This step is not implemented for the project.

Step 4: Common practice analysis

***Sub-step 4a. Analyze other activities similar to the proposed project activity*.**

According to the requirements of common practice:
Projects are considered similar if they are in the same country/region and rely on a broadly same technology, are of similar scale and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing.

As per the tool and Guidelines on Common Practice (EB69 Annex8), following steps are applied for common practice analysis:

Step1: Calculate applicable output range as +/-50% of the design output or the capacity of the proposed project activity.

There is one interconnected national grid in Turkey. The power plants with installed capacity between 7.5 MW-22.5 MW have been chosen .

Step2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the project activity and have started commercial operation before the start date of the project. Note their number Nall. Registered CDM project activities and projects activities undergoing validation shall not be included in this step.

The power plants with the installed capacity calculated in Step 1 and were operational before the start date of the project have been listed. As the project start date was January 2009 the power plants operational by the end of 2008 within the power range defined in Step 1 have been chosen. No projects are on the validation process as it has been 4 years since the project started. There are 102 power plants but 7of them are registered at voluntary emission reduction schemes Therefore, Nall is calculated to be 95.

Table 9- The Power Plants Within the Scope of Common Practice

	Project Name	**Type**	**Capacity**	**Project Generation**	**Firm Generation**	**Owner**
1	Seyhan II	Hydropower	7.5	33	7	EUAS
2	Aksu (Çayköy)	Hydropower	16	35	35	BOT
3	Berdan (Alarko)	Hydropower	10	44	44	BOT
4	Fethiye	Hydropower	16.5	88	88	BOT

5	Gaziler (Iğdır)	Hydropower	11.2	51	51	BOT
6	Girvelik-II/Mercan	Hydropower	11	39	39	BOT
7	Gönen	Hydropower	10.6	48	48	BOT
8	Hasanlar (Alarko)	Hydropower	9.6	42	42	BOT
9	Kısık (AyenEnerji)	Hydropower	9.6	34	34	BOT
10	TohmaMedik (Alarko)	Hydropower	12.5	58	58	BOT
11	Bores	Wind	10.2	31	31	BOT
12	Aksen (Gaziantep)	Fuel oil	21.1	168	168	Autoproducer
13	Akdeniz Sefa (Silifke)	Fuel oil	20	_	_	Autoproducer
14	Milda Kağıt (Aksu Seka)	Fuel oil	8	20	20	Autoproducer
15	Ak tekstil-1 (Gaziantep)	Fuel oil	13	87	87	Autoproducer
16	Albayrak Turizm (Balıkesir Seka)	Fuel oil	9.3	56	56	Autoproducer
17	OykaKağ. (Çaycuma Seka)	Fuel oil	10	70	70	Autoproducer
18	GAP İnş. (Çay Seka Afyon)	Fuel oil	8	60	60	Autoproducer
19	Habaş (Bilecik)	Fuel oil	18	144	144	Autoproducer
20	IspartaMensucat	Fuel oil	10.7	85	85	Autoproducer
21	KırkaBoraks (kırka)	Fuel oil	8.2	32	32	Autoproducer
22	Polinas (Manisa)	Fuel oil	10	75	75	Autoproducer
23	EtiAlüminyum (S.Şehir)	Fuel oil	11.9	35	35	Autoproducer
24	Tüpraş (Batman)	Fuel oil	10.3	72	72	Autoproducer
25	Tire-Kutsan (Tire)	Fuel oil	8	37	37	Autoproducer
26	Tüpraş (Batman)	Diesel Oil	10.3	72	72	Autoproducer
27	EtiMaden (BandırmaBoraks)	Lignite	10.7	78	78	Autoproducer
28	EtiBor (Emet)	LPG	10.4	82	82	Autoproducer
29	EgeBirleşikEnerji	LPG	12.8	107	107	Autoproducer
30	Goodyear (Adapazarı)	LPG	9.6	79	79	Autoproducer

31	Orta Anadolu Mensucat	LPG	10	65	65	Autoproducer
32	Menderes Teks. (AkçaEnerji)	Naphta	18.7	140	140	Autoproducer
33	Desa (Işıklar)	Naphta	10.6	70	70	Autoproducer
34	Mensa Mensucat	Naphta	10.4	85	85	Autoproducer
35	Toros (Mersin)	Naphta	12.1	96	96	Autoproducer
36	Akbaşlar	Natural gas	8.7	73	73	Autoproducer
37	AmylumNişasta (Adana)	Natural gas	14.3	80	80	Autoproducer
38	Arenko (Denizli)	Natural gas	12.7	101	101	Autoproducer
39	AydınÖrme	Natural gas	7.5	60	60	Autoproducer
40	Baydemirler (beylikdüzü)	Natural gas	9.3	77	77	Autoproducer
41	DenizliÇimento	Natural gas	14	113	113	Autoproducer
42	Hayat Kağıt San.	Natural gas	7.5	56	56	Autoproducer
43	Hayat temizlik	Natural gas	15	94	94	Autoproducer
44	İgsaş (Yarımca)	Natural gas	11	76	76	Autoproducer
45	İsko (İnegöl)	Natural gas	9.2	63	63	Autoproducer
46	Kaleseramik (Çan. Seramik+Kalebodur)	Natural gas	21.6	157	157	Autoproducer
47	KastamonuEntegre	Natural gas	7.5	48	48	Autoproducer
48	KorumaKlor	Natural gas	9.6	77	77	Autoproducer
49	KüçükçalıkTekstil	Natural gas	8	64	64	Autoproducer
50	MaksiEnerji (Hamoğlu)	Natural gas	7.7	62	62	Autoproducer
51	Marmara Pamuk	Natural gas	8.7	71	71	Autoproducer
52	MB ŞekerNişasta San. (Aksaray)	Natural gas	8.8	60	60	Autoproducer
53	Mercedes Benz	Natural gas	8.3	68	68	Autoproducer
54	Sarkuysan (Tuzla)	Natural gas	7.7	60	60	Autoproducer
55	Yılfert (TügsaşGemlikGüb.)	Natural gas	8	50	50	Autoproducer

56	YalovaElyaf	Natural gas	12.3	_	_	Autoproducer
57	Yongapan (Kastamonu)	Natural gas	9.7	61	61	Autoproducer
58	Yurtbay (Eskişehir)	Natural gas	7.8	62	62	Autoproducer
59	BandırmaAsit	Other	11.5	88	88	Autoproducer
60	BandırmaBağfaş	Other	10	57	57	Autoproducer
61	Ak Enerji (Yalova) İzole	Naphta	21	173	173	Private Owner
62	Ak Enerji (DeblaDenizli)	Naphta	15.6	_	_	Private Owner
63	Ak Enerji (Yalova Akal)	Natural gas	10.4	85	85	Private Owner
64	Ak Enerji (Uşak OSB)	Natural gas	15.2	_	_	Private Owner
65	Berk Enerji (Kurtköy)	Natural gas	14.8	104	104	Private Owner
66	Boz Enerji	Natural gas	8.7	60	60	Private Owner
67	MetemEnerji (Hacışıramat)	Natural gas	7.8	58	58	Private Owner
68	MetemEnerji (Peliklik)	Natural gas	11.7	89	89	Private Owner
69	NorenEnerji	Natural gas	8.7	70	70	Private Owner
70	ZorluEnerji (Yalova)	Natural gas	15.9	122	122	Private Owner
71	ITC-KA Enerji Mamak	Waste	19.8	150	140	Private Owner
72	PS3-A-1	Fuel oil	11.4	80	80	Private Owner
73	Van Engil Gaz (ZorluEnerji)	Diesel Oil	15	75	75	Private Owner
74	Bereket (Feslek)	Hydropower	9.5	41	41	Private Owner
75	Bereket (Gökyar)	Hydropower	11.6	43	43	Private Owner
76	Alp Elektrik (Tınaztepe)	Hydropower	7.7	29	17	Private Owner
77	CansuElektrik (Artvin)	Hydropower	9.2	47	31	Private Owner
78[a]	ÇaldereElektrik (Dalaman)	Hydropower	8.7	35	25	Private Owner
79[b]	Hamzalı HES (Turkon MNG)	Hydropower	16.7	117	66	Private Owner

80	HGM Enerji (Keklicek)	Hydropower	8.7	18	11	Private Owner
81	İç-EnElektrik (Çalkışla)	Hydropower	7.7	18	11	Private Owner
82	Kalen Enerji (Kalen II)	Hydropower	15.7	50	28	Private Owner
83	Sarmaşık I Hes (FetaşFethiye)	Hydropower	21	96	54	Private Owner
84	Sarmaşık II Hes (FetaşFethiye)	Hydropower	21.6	108	61	Private Owner
85	Enerjisa (Aksu-Şahmallar)	Hydropower	14	45	7	Private Owner
86	Enerjisa (Sugözü-Kızıldüz)	Hydropower	15.4	55	8	Private Owner
87	İçtaşYukarıMercan	Hydropower	14.2	44	20	Private Owner
88	ÖzgürElek. K.MaraşTahtaHes	Hydropower	12.5	54	54	Private Owner
89	Tektuğ-KalealtıHes	Hydropower	15	52	11	Private Owner
90	YapısanHacılar	Hydropower	13.3	90	54	Private Owner
91	Beyköy	Hydropower	16.8	87	87	Private Owner
92	Kuzgun	Hydropower	20.9	36	0	Private Owner
93	Tercan	Hydropower	15	51	28	Private Owner
94	Çıldır	Hydropower	15.4	30	20	Private Owner
95	İkizdere	Hydropower	18.6	110	100	Private Owner
96	Mercan	Hydropower	20.4	78	48	Private Owner
97	DoğalEnerji (Burgaz)	Wind	14.9	48	43	Private Owner
98	DenizliElek. (Karakurt-Akhisar)	Wind	10.8	28	24	Private Owner
99	BakiElektrikŞamlıRüzgar	Wind	21	104	92	Private Owner
100	Datça RES	Wind	8.1	24	19	Private Owner
101	Menderes Jeotermal	Geothermal	8	56	56	Private Owner
102	ZorluEnerjiDenizliJeotermal	Geothermal	15	105	105	Private Owner

Step3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number Ndiff.

The power plants with different technology , i.e. utilizing resources other than wind, is calculated to be 95.Four wind power plants in the scope is registered as voluntary carbon projects and eliminated from the list. Only Bores WPP (No.11 in the list) does not benefit from carbon revenue but was realized by Built Operate Transfer program, which was a model of incentive implemented in 1980s and provided financial incentives for the private sector:

- Energy Fund was established by the government in order to subsidise the financial difficulties faced by the companies.
- Guarantee Contract was signed between the Under-secretariat of Treasury and the investment companies on the terms that the electricity will be purchased by Treasury in case the producer could not sell it to any governmental institution.

- Those purchase contracts may be up to 99 years for BOTs and 20 years for BOs30.

Under the new Electricity Market Law came in force in 2001, the investment models were removed and the Energy Fund was ended.

Bores WPP differs with investment climate. The plant was operational on June 2000 and had no chance to apply for any carbon scheme31. Therefore, the wind power plant was also eliminated from the list.

Step4: Calculate factor F=1-Ndiff/Nall representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

F= 1-(95/95)= 1-1=0

The F factor is smaller than 0.2 and Nall-Ndiff =95-95= 0, which is smaller than 3. Outcome of Step 4: Boreas- is not a common practice in the country.

Conclusion:

The project activity satisfies all the criteria of "Tool for the demonstration and assessment of additionality". Therefore, the project is additional.

Milestones of the project activity is listed as below:

Table 10-Time Schedule of the Project Development

	Activity	**Date**
1	Feasibility study completed	2007
2	License	03/05/2007
3	EIA exemption letter	17/07/2007
4	Feasibility study revised	19/03/2008
5	Proposal for loan agreement (active with EM contract)	12/06/2008
6	Board decision for carbon asset development	04/09/2008
7	Contract agreement with EM supplier –conditional (active with down payment)	05/09/2008
8	The reservation payment for EM supplier	15/10/2008
9	Proposal for carbon asset development	17/11/2008
10	Board decision to sign the loan agreement	15/12/2008

11	The down payment done and EM contract activated (investment decision date)	26/01/2009
12	The completion date of the project lengthened to 03/09/2010	28/01/2009
13	Micrositing report completed	January 2009
14	Construction agreement for switchyard	17/02/2009
15	Consultancy agreement for VER development	10/04/2009
16	Construction agreement for the site preparation	27/04/2009
17	Agreement for cabling works	30/04/2009
18	Stakeholder meeting	29/04/2009
19	Construction agreement for turbine foundations	01/06/2009
20	Four turbine locations changed	11/09/2009
21	Site visit with the first DOE	07-09/11/2009
22	Stakeholder Feedback Round Meeting	09/11/2009
23	Commissioning date	09/04/2010
24	Second consultancy agreement with another company	30/11/2011
25	Draft validation report by the first DOE.	19/05/2011
26	Agremeent with another DOE.	19/04/2012
27	Site visit with the second DOE.	09/07/2012
28	License amendment (capacity Increase to 20 MW)	26/06/2013
29	Board decision for carbon asset consideration of capacity increase	09/07/2013
30	Agreement with EM supplier for capacity increase	8/11/2013
31	Construction agreement for capacity increase	11/08/2014
32	Loan Agreement for capacity incerase	19/08/2014

B.6. Sustainable Development Goals (SDG) outcomes

B.6.1. Relevant target for each of the three SDGs

- SDG 7 - Affordable and Clean Energy :55,742 MWh of clean energy expected to be generated annually.

- SDG 8 - Decent Work and Economic Growth : The project provides employment opportunities to 14 people

- SDG 13 - Climate Action :The project would realize emission reduction of is 29,943~~3~~8 tonnes of CO2eq approximately.

SDGs	*Target ("T") and Indicators ("I")*
Goal 7 Affordable and Clean Energy	**T:**7.2.By 2030, increase substantially the share of renewable energy in the global energy mix **I:** 7.2.1.Renewable energy share in the total final energy consumption
Goal 8 Decent Work and Economic Growth	**T:**8.5. By 2030, achieve full and productive employment and decent work for all women and men **I:**8.5.2.Unemployment rate, by sex, age and persons with disabilities **T:**8.8.Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment **I:** 8.8.1Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status
Goal 13 Climate Action	**T:** 13.3.Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning **I:** 13.3.2. Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions

B.6.2. Explanation of methodological choices/approaches for estimating the SDG outcome

- **Goal 7 Affordable and Clean Energy**

The project produces electricity from renewable energy sources using wind as the power source and tocontribute to Turkey's growing electricity demand through a sustainable and low carbon technology. Theproject displaces the same amount of electricity generated by the grid dominated with fossil firedpower plants.

The project is expected to generated 52,742 MWh annually. The project contributes to the followingtarget 7.2. and following indicater 7.2.1.

- **Goal 8 Decent Work and Economic Growth**

During construction and operational period, the project has created employment opportunities for the local community.The project contributes the economic development of the region by providing sustainable energy resources.

Considering the operational phase,14 personnel are working permanently.The target will be monitored by the number of full-time employees with the SGK records during the verification process. Due to job requirements and demographics of the project area, employment of woman and persons with disabilities has not been possible, yet.

The positions at the wind farm require skilled workers, which will be achieved by adequate training. Attendance records or training certificates will be provided during the verification process. The project provides workers with a safe andhealthy work environment and is notcomplicit in exposing workers to unsafe orunhealthy work environments.

The project contributes to the following targets8.5. ; 8.8.and following indicaters 8.5.2.; 8.8.1.

- **Goal 13 Climate Action**

The annual emission reduction estimated by the project is 29,9438 tonnes of CO2eq, approximately. While this amount of emissions are mitigated, technology transfer is also realized as benefitting from wind energy.

The project contributes to improve the environmental situation in the region and in the country as avoiding fossil fuel-based electricity will enhance the air quality and help to reduce the adverse affectson the climate. Through renewable technologies and wind based electricity sustainable and climate friendly development is promoted.

The project contributes to the following target 13.3. and following indicater 13.3.2.

For the calculation of the emission reductions of the project activity, "Tool to calculate the emission factor of an electricity system" version 07.0.0. is taken into consideration.

Emission Reductions

According to the baseline methodology AMS-I.D., the emission reduction ERy by the project activity during a given year y is defined as;

ERy = BEy - Pey - LEy

Where:

ERy: Emission reductions in year y (tCO2e)
BEy: Baseline Emissions in year y (tCO2e)
PEy: Project emissions in year y (tCO2e)
LEy: Leakage emissions in year y (tCO2e)

Project Emissions

As the proposed project activity is a new grid-connected wind power plant. For this reason, PEy is considered as "0" in line with AMS-I.D, Version 18.

PEy=0

Leakage

Leakage emission (LEy) is considered as "0" as suggested in AMS-I.D, Version 18.

Baseline Emissions

The baseline emissions are calculated as follows:

$$BEy = EGPJ,y \times EFgrid,y$$

where:

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

Calculation of $EG_{PJ,y}$

The project falls under the description greenfield power plants;

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

where:

$EG_{PJ,y}$=	Quantity of net electricity generation that is produced and fed into the grid as aresult of the implementation of the CDM project activity in year y (MWh/yr)
$EG_{PJ,facility,y}$ =	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

Calculation of $EF_{grid,y}$

$EF_{grid,y}$is calculated according to the procedures described in the 'Tool to calculate the emission factor for an electricity system, Version 07.0'.

Tool to calculate the emission factor for an electricity system" provides the following steps to calculate combined margin (CM) emission factor:

Step 1: Identify the relevant electricity systems;
Step 2: Choose whether to include off-grid power plants in the project electricity system (optional);
Step 3: Select a method to determine the operating margin (OM);
Step 4: Calculate the operating margin emission factor according to the selected method;
Step 5: Calculate the build margin (BM) emission factor;
Step 6: Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electric systems

According to the "Tool to calculate the emission factor for an electricity system", is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines and that are covered by either single or layered dispatch areas.

The transmission lines in Turkey are operated by TEIAS (Turkish Electricity Transmission Co), which is a state-owned company. The grid is 66,285 km long and constitutes of 727 transformer stations with a total transformer capacity of 163,181 MVA and 11 interconnections to neighboring countries (TEIAS, 2017). The

interconnected grid system is operated incessantly without electricity pricing differences throughout the regions. Therefore, the relevant electric power system is defined as the national grid system of Turkey.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

The applicable tool provides two options whether to include or ignore off-grid power plants in the electricity system:

Option I: Only grid power plants are included in the calculation,
Option II: Both grid power plants and off-grid power plants are included in the calculation,

Since Option II requires data on off-grid power generation and lack of data availability, Option I is chosen and only grid power plants are included in the calculation.

Step 3: Select a method to determine the operating margin (OM)

According to "Tool to calculate the emission factor for an electricity system", the calculation of the operating margin emission factor (EFgrid,OM,y) is based on one of the following methods:

(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or
(d) Average OM

Option (a) Simple OM method has been selected for calculation of the operating margin emission factor. The option is applicable since low-cost/must-run resources constitute less than 50% of total grid generation. The low-cost/must-run resources include power generation from renewable resources. Breakdown by sources of the electricity generation from the grid may be seen in Table-11.

Table 11-Share of primary sources in electricity generation, 2013-2017

YEAR	THERMAL RATIO (%)	HYDRO RATIO (%)	GEOTHERM + WIND + SOLAR RATIO (%)
2013	71.6	24.7	3.7
2014	79.5	16.1	4.3
2015	68.5	25.6	5.8
2016	67.7	24.5	7.8
2017	71.4	19.6	9.1

Regarding the requirements for satisfying simple OM method, Approach 1 has been chosen:

$$Share_{LCMR} = average[\frac{EG_{LCMR\,y-4}}{total_{y-4}}, \ldots\ldots, \frac{EG_{LCMRy}}{total_{y}}] \quad \text{Equation (1)}$$

[19] $Share_{LCMR} = average[\frac{68,342}{240,154}, \frac{51,546}{251,963}, \frac{82,417}{261,783}, \frac{88,610}{274,408}, \frac{85,139}{297,278}]$

$Share_{LCMR} = average[0.285, 0.205, 0.315, 0.323, 0.286]$

[19] http://www.teias.gov.tr/sites/default/files/2018-10/59%282000-2017%29.xls

=%28.3

The share renewable resources in generation for the five most recent years (2013-2017) is below %50 of the total grid generation .The requirements for the use of the Simple OM calculations are satisfied.

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validationstage, thus no monitoring and recalculation of the emissions factor during the crediting period isrequired. For grid power plants, use a 3-year generation-weighted average, based on the mostrecent data available at the time of submission of the CDM PDD to the DOE for validation.
- Ex post option: If the ex post option is chosen, the emission factor is determined for the year in whichthe project activity displaces grid electricity, requiring the emissions factor to be updated annuallyduring monitoring.

The ex ante option has been selected for the proposed project activity. Data from the period 2015-2017 has been obtained for calculating the three year average. This period is standing for the most recent data available at the time of submission of the PDD to DOE.

Step 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.
Since the net electricity generation and a CO2 emission factor of each power unit are not available, Option B is used for simple OM calculation.

Under Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{\text{grid,OMsimple,y}} = \frac{\sum iFC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad \text{Equation (3)}$$

where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (t CO2/MWh)
$FC_{i,y}$=		Amount of fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$=		Net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fuel type i in year y (t CO_2/GJ)
EG_y=		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 (MWh)
i =		All fuel types combusted in power sources in the project electricity system in year y
y	=	The three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (ex-ante option)

Step 5: Calculate the build margin (BM) emission factor

The Build Margin have been calculated for the year 2017.

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 has been chosen in terms of vintage of data for the project activity.

Data from the period 2015-2017 has been obtained from the main information sources for the Turkish electricity system: TEİAŞ (www.teias.com.tr) and Ministry of Energy and Natural Resources (www.etkb.gov.tr). The period, 2015-2017, is the most recent data available at the time of submission of the PDD to DOE.

Step 6: Calculate the combined margin emissions factor

According to the applicable methodological tool, the calculation of the combined margin (CM) emission factor (EFgrid, CM) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

Option (a) has been chosen for weighted average CM.The combined margin emissions factor is calculated as follows:

$$BEy = EF_{grdi,OM,y} \times w_{OM} + EF_{grdi,BM,y} \times w_{BM} \quad \text{Equation (16)}$$

where:

$EF_{grid,BM,y}$=	Build margin CO_2 emission factor in year y (t CO_2/MWh)

$EF_{grid,OM,y}$=		Operating margin CO_2 emission factor in year y (t CO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (per cent)
w_{BM}=		Weighting of build margin emissions factor (per cent)

According to the "Tool to calculate the emission factor for an electricity system" (version 07.0.0), the default weights for the operating margin and build margin emission factors for wind power generation is defined as below for the second crediting period.

w_{OM}= 0.75

w_{BM}= 0.25

B.6.3. Data and parameters fixed ex ante for monitoring contribution to each of the three SDGs

SDG 7 : Affordable and Clean Energy

As the project is expected to generate renewable energy , it contributes to the following target 7.2. : "By 2030, increase substantially the share of renewable energy in the global energy mix" and the indicator 7.2.1.: " Renewable energy share in the total final energy consumption".

SDG 8 : Decent Work and Economic Growth

Considering the operational phase, the project contributes to the target 8.5: "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value."and the indicator 8.5.2.: " Unemployment rate, by sex, age and persons with disabilities".

The project provides workers with a safe and healthy work environment and is notcomplicit in exposing workers to unsafe orunhealthy work environments. And it would contribute to the target 8.8**: "**Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment**"** and the indicator 8.8.1: **"**Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status**".** Employees will be trained for each monitoring period.

SDG 13: Climate Action

The project contributes to the following target 13.3. and following indicater 13.3.2.

Following fixed ex-ante parameters may be seen as below:

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target

Data/parameter	EG_{gross}
Unit	MWh
Description	Gross electricity generated by all power plants connected to the national grid including low-cost must run power plants between years (2014-2016)
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data[20]
Value(s) applied	Please see calculations of emission factor (Section B.6.4.)
Choice of dataorMeasurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$EG_{net,y}$
Unit	MWh
Description	Net electricity generated by all power plants connected to the national grid excluding low-cost must run power plants between years (2014-2016)
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Please see calculations of emission factor (Section B.6.4.)
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	EG_{y}
Unit	MWh
Description	Net electricity generated by all power plants connected to the national grid excluding low-cost must run power plants between years (2015-2017)
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Please see calculations of emission factor (Section B.6.4.)

[20] https://www.teias.gov.tr/

Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$FC_{i,y}$
Unit	tonnes/m3
Description	Fossil fuel consumed by thermal power plants between years 2015-2017
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Please see calculations of emission factor (Section B.6.1.)
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thusthe baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$NCV_{i,y}$
Unit	TJ/mass or volume
Description	Net calorific value of each fossil fuel type between years 2015-2017
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Please see calculations of emission factor (Section B.6.4.)
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$EF_{CO2,i,y}$
Unit	tCO2/TJ
Description	CO2 emission factor of fossil fuel type i between years 2015-2017
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

Relevant SDG Indicator	13.3.2 Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions" and following target
Data/parameter	$\eta_{m,y}$
Unit	-
Description	Average net energy conversion efficiency of thermal power units connected to the grid
Source of data	Default values in Annex.1 in "Tool to calculate the emission factor for an electricity system" version 07.0.0
Value(s) applied	Please see calculations of emission factor (Section B.6.4.)
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

B.6.4. Ex ante estimation of outcomes linked to each of the three SDGs

Calculation of the Operating Margin Emission Factor

For the calculation of the OM the consumption amount and heating values of the fuels for each sources used for the years 2015, 2016 and 2017, is taken from the TEİAŞ annual statistics, which hold data on annual fuel consumption by fuel types as well as electricity generation amounts by sources and electricity imports, all the data needed for the calculation, including the emission factors and net calorific values (NCVs).

The amount of fuel consumption (FCi,y) is taken from website of TEIAS for the calculation of the Simple OM.

Table 12-Fuel consumption of generation sources connected to the grid (2015-2017)[21]

Generation Sources	Units	2015	2016	2017	Total
Natural Gas	1000m3	20,914,868	18,954,093	22,954,854	62,823,815
Hard Coal & Import Coal	tonnes	16,629,492	19,642,410	21,139,104	57,411,006
Lignite	tonnes	49,940,131	60,213,772	64,412,257	174,566,160
Fuel Oil	tonnes	516,912	526,674	317,724	1,361,310
Diesel Oil	tonnes	238,388	306,393	197,219	742,000

Annual heating values for each fuel type are directly related with the fuel consumption and are used to calculate Net Calorific Values (TJ/kt) for each year (Table.13). The annual heating values are converted to TJ and divided by the fossil fuel consumption(kt) for that year.

Turkish specific net calorific values (NCVi,y) values for fossil fuel types have been calculated, using data from the IPCC Guidelines for National Greenhouse Gas Inventory for the emission factor of the fossil fuel types ($EF_{CO2,i,y}$)

Table 13-Net calorific values and emission factor of fossil fuel type[22]

Generation Sources	2015	2016	2017	$EF_{CO2,i}$[23](tonnes/TJ)
Natural Gas	37.84	38.01	36.82	54.3
Hard Coal&Import Coal	24.08	24.07	23.60	89.5
Lignite	7.16	7.20	6.97	90.9
Fuel Oil	44.22	42.42	44.93	75.5
Diesel Oil	43.78	44.20	44.63	72.6

Total CO2 emissions for each year for each fuel source is calculated by the formula:

$$Total\ CO_2 Emissions\ = \sum iFC_{\ i,y} \times NCV_{i,y} \times EF_{CO2,i,y}$$

[21] https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon-0

[22] https://www.teias.gov.tr/tr/iv-turkiye-termik-santrallarinda-kullanilan-yakit-miktarlari-isil-degerleri-ve-kojenerasyon-0

[23] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Total CO_2 emission due to electricity generation in Turkey for the years of 2015, 2016 and 2017 may be seen in Table-14:

Table 14-CO2 emission from electricity production, 2015-2017

Total Emissions (tCO2)	2015	2016	2017	Total
Hard Coal	35,832,091	42,322,566	44,641,881	122,796,538
Lignite	32,508,012	39,388,444	40,816,020	112,712,476
Fuel Oil	1,725,608	1,686,704	1,077,711	4,490,024
Diesel Oil	757,776	983,254	639,039	2,380,070
Natural Gas	42,970,146	39,120,876	45,892,079	127,983,102
Total	**113,793,634**	**123,501,844**	**133,066,731**	**370,362,209**

The electricity delivered to the grid by all power sources serving the system, not including low-cost/must run power plants/units (EGgross,y) is obtained from TEIAS (Turkish Electricity Transmission Company).

Table 15- Gross electricity generation by fossil fuel power sources, 2015-2017 ($EG_{gross,y}$(MWh))

Generation Sources	2015	2016	2017	Total
Hard Coal	44,829,872	53,703,200	56,781,900	155,314,972
Lignite	31,335,735	38,569,900	40,694,400	110,600,035
Fuel Oil	980,378	969,100	520,600	2,470,080
Diesel Oil	1,243,561	957,200	679,300	2,880,060
Natural Gas	99,218,742	89,227,100	110,489,981	298,935,842

To calculate the net electricity fed into the grid by specific fuel sources, relation between overall gross/net electricity generation data is calculated. The electricity consumption of the power plants is included in the gross electricity production. This relation may be seen in Table 16.

Table 16-Relation between net and gross electricity generation, 2015-2017

	2015	2016	2017
Gross Electricity Production (MWh)	261,783,344	274,407,700	297,277,537
Net Electricity Production (MWh)	249,899,500	261,950,900	284,257,519
Net/Gross	0.9546	0.9546	0.9562

The calculated net electricity delivered to the grid by the fossil fuel plants ($EG_{net,y}$) is may be seen in Table 17:

Table 17 - Net electricity generation fossil fuel power plants and electricity imports, 2015- 2017

	2015	2016	2017
Gross electricity Production from Thermal Sources (GWh)	177,608	183,427	209,166
Net Electricity Production from Thermal Sources (GWh)	169,546	175,100	200,005
Electricity imports (GWh)	7,135.5	6,330.3	2,728.3
Electricity supplied to grid EGy (GWh)	176,681	181,430	202,733

The calculation of $EF_{grid,OM,y}$requires the inclusion of electricity imports with an emission factor of 0 tCO2/MWh. Therefore, the imports in the electricity production has been added.

The formula for calculation of operating margin is:

$$EF_{\text{grid,OMsimple,y}} = \frac{\sum iFC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EGy} \quad \text{Equation (9)}$$

The simple operating margin CO2 grid emission factor ($EF_{grid,OMsimple,y}$) calculated through equation is 0.6604 tCO2/MWh as may be seen in Table-18.

Table 18- 2015-2017 Generation Weighted Average$EF_{grid,OMsimple,y}$

	2015	2016	2017
Total Emissions (tCO2)	113,793,634	123,501,844	133,066,731
Net Electricity Generation+ Imports (GWh)	176,681	181,430	202,733
$EF_{grid,OM,simple,y}$ (tCO2/MWh)	0.6441	0.6807	0.6564
2015-2017 Generation Weighted Average $EF_{grid,OMsimple,y}$ (tCO2/MWh)	0.6604		

Calculation of the Build Margin Emission Factor

The Build Margin have been calculated for the year 2017.

Step 5.1 Select the option regarding the vintage:

For the vintage of data, project participants can choose between one of the following two options:

Option 1: For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for whichinformation is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 has been chosen in terms of vintage of data for the proposed project activity:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5 units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

The recent added power units (SET5 Units) list can be obtained from the Ministry of Energy and Natural Resources web site.[24]

Table 19- The 5 most recent power plants, 2017 (excluding VERs)

Plant Name	City	Fuel Type	Installed Capacity (MW)	Temporary Acceptance Date
MELİH JES	Aydın	Geothermal	26	30/12/2017
MAVİBAYRAK-1 BİYOKÜTLE ENERJİ SANTRALİ	Aydın	Biomass	10	28/12/2017
CENAL TERMİK ENERJİ SANTRALİ	Çanakkale	Hard Coal	660	27/12/2017
ZİYARET HES	Erzincan	HPP	3	26/12/2017
KİĞI BARAJI VE HES	Bingöl	HPP	138	21/12/2017

There isn't any data available for annual electricity production of each power plant belonging to years 2015, 2016 and 2017. The latest data available for the annual energy production for specific power station belongs to year 2012. To update the BM, the only data that we can use to estimate the annual production is the power generation capacity. We can make calculations as if every power plant had operated with full capacity all around the year.

The usage of capacity is a CDM Executive Board approved deviation from the methodology AM005 for a similar situation.[25] According to the board-approved deviation, as the annual production datais absent, we will "use of weights estimated using installed capacity in place of annual electricity generation" (cited from the link given in footnote21)

The CDM registered projects are excluded from the five power plants given in Table 19. The sum of power capacities of these plants is 837 MW. AEG_{SET-5} units: 837 MW.

b) Determine the annual electricity generation of the project electricity system, excluding power units registered as VER project activities

Total capacity at the end of the year 2017 is 85,200 (which is AEG_{Total}). The 20 percent of total capacity is 17,040 MW so $AEG_{SET \geq 20 \text{ per cent}} > AEG_{SET\ 5\ units.}$

c) From $SET_{5\text{-units}}$ and $SET_{>20 \text{ per cent}}$ select the set of power units that comprises thelarger annual electricity generation (SET_{sample});

$AEG_{SET \geq 20 \text{ per cent}} > AEG_{SET\ 5\ Units}$ so the set $AEG_{SET \geq 20 \text{ per cent}}$ is selected. None of them has started to produce electricity more than 10 years ago, so the steps (d), (e) and (f) are ignored.

SETsample ($AEG_{SET \geq 20 \text{ per cent}}$). The 20 percent of total power is 17,040 MW.

Table 20- SET-Sample periods

Period	Capacity Addition (MW)	VER Registered (MW)	Addition (Excluding VER Projects) (MW)	Thermal (MW)
2014	5,630.13	462.92	5,167.21	3,857.9
2015	4,287.57	1.252.30	3.035.27	645.8
2016	5,919.10	1.355.92	4,563.18	2,096.1
2017	5,833.83	1,307.84	4,525.99	3,944.2
Total	21,670.63	4378.98,3	17,291.65	10,544

[24] http://www.eigm.gov.tr/File/?path=ROOT%2f4%2fDocuments%2fSayfalar%2f2017+Y%c4%b1l%c4%b1+Enerji+Yat%c4%b1r%c4%b1mlar%c4%b1.xlsx

[25] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

The sum of 2017, 2016 and 2015 projects (excluding VER registered) is 12,150.59 MW. Since it's needed to exceed 17,040 MW**,** more projects from 2014 have been included. As the projects between dates 04/04/2014 and 31/12/2014 are included, 17,291.65 MW is reached. This value is the gross capacity, to reach the net capacity, Net/Gross ratio in Table 16 is used and , $SET_{Sample.}$is formed as 16,491.85.

SET_{Sample} List

The list of SET_{Sample}in Table 21, colored rows indicate that the project is VER registered and excluded from the SET.

Table 21- $SET_{-Sample}$ list

POWER PLANT	FUEL TYPE	ADDED CAPACITY MW_e	COMMISSIONING DATE
MELİH JES	JEOTERMAL	26	30.12.2017
MAVİBAYRAK-1 BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE	10	28.12.2017
CENAL TERMİK ENERJİ SANTRALİ	İTHAL KÖMÜR	660	27.12.2017
ZİYARET HES	HES	3	26.12.2017
ÇAMLICA HES	HES	23	23.12.2017
ASLANCIK BARAJI VE HES	HES	5	22.12.2017
SARPINCIK RES	RES	3	22.12.2017
KİĞI BARAJI VE HES	HES	138	21.12.2017
DATÇA RES	RES	6	21.12.2017
MERSİN RES	RES	0	20.12.2017
SANKO JES	JEOTERMAL	10	20.12.2017
HAMİTABAT DGKÇS	DG	64	20.12.2017
DEREBAŞI HES	HES	5	15.12.2017
DURUCASU HES	HES	0	15.12.2017
KÜREKDAĞI RES	RES	7	8.12.2017
MERSİN RES	RES	17	8.12.2017
RENOE ACIPAYAM GES	GES	4	8.12.2017
KUYUCAK JES	JEOTERMAL	8	7.12.2017
HATAY GÖKÇEGÖZ ÇÖP SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3	2.12.2017
KOZBEYLİ RES	RES	2	1.12.2017
DARICA II HES	HES	37	1.12.2017
KARTALDAĞI RES	RES	20	24.11.2017
ÇUMRA ŞEKER FABRİKASI KOJENERASYON SANTRALİ	LİNYİT/DG/FO/BİYOGAZ	2	24.11.2017
GÖKDAĞ RES	RES	7	24.11.2017
MANASTIR-ESENKÖY RES	RES	7	24.11.2017
KÜREKDAĞI RES	RES	10	24.11.2017
TÜPRAŞ KIRIKKALE RAFİNERİ TESİSİ	DG	22	23.11.2017
KANGAL RES	RES	2	23.11.2017
DATÇA RES	RES	6	17.11.2017
SOĞUKSU RES	HES	1	10.11.2017
DARICA II HES	HES	37	9.11.2017
ELMALI RES	RES	3	9.11.2017
CENAL TERMİK ENERJİ SANTRALİ	İTHAL KÖMÜR	660	4.11.2017
KÜREKDAĞI RES	RES	10	4.11.2017
MANASTIR-ESENKÖY RES	RES	10	3.11.2017

SİNCAN ÇADIRTEPE BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	8	3.11.2017
KAROVA RES	RES	20	2.11.2017
İÇ ANADOLU DGKÇS	DG	13	2.11.2017
GEBZE KOJENERASYON TESİSİ	DG	1	1.11.2017
VESMEC KIRK-KAB 1 ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1	31.10.2017
TİRE BİYOGAZ ELEKTRİK SANTRALİ	BİYOKÜTLE (TAR./HAYV. ATIK)	1	31.10.2017
KALECİK HES	HES	26	31.10.2017
GÖKDAĞ RES	RES	2	31.10.2017
MALATYA ÇÖP GAZLAŞTIRMA-YAKMA TESİSİ	BİYOKÜTLE	4	31.10.2017
DOĞAL ENERJİ BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (TAR./HAYV. ATIK)	1	31.10.2017
KARATAŞ 1 HES	HES	10	31.10.2017
PİR ENERJİ ÜRETİM TESİSİ	BİYOKÜTLE (PİROLİTİK GAZ VE YAĞ)	4	31.10.2017
DELİCE-1 HES	HES	7	29.10.2017
KARTEPE BİYOKÜTLE-PİROLİZ SIVISI VE GAZI ENERJİ SANTRALİ	BİYOKÜTLE (PİROLİTİK YAĞ)	1	29.10.2017
YAPILCANLAR-2 BİYOGAZ ENERJİ SANTRALİ	BİYOKÜTLE (HAYV./BİTKİSEL ATIK)	1	28.10.2017
HAMZABEYLİ RES	RES	2	28.10.2017
AFYON-I BİYOGAZ SANTRALİ	BİYOKÜTLE (HAYVANSAL ATIK)	7	28.10.2017
SANKO JES	JEOTERMAL	5	27.10.2017
ŞAVŞAT HES	HES	7	27.10.2017
GERİŞ RES	RES	11	27.10.2017
KANGAL RES	RES	11	27.10.2017
KUYUCAK JES	JEOTERMAL	10	27.10.2017
EGE II-III-IV HES	HES	3	26.10.2017
MAS 1 YENİLENEBİLİR ENERJİ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2	25.10.2017
KAYADİBİ HES	HES	19	23.10.2017
MAVİBAYRAK-1 BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE	3	21.10.2017
DEREKÖY HES	HES	6	20.10.2017
KAZAN DOĞAL GAZ KOJENERASYON SANTRALİ	DG	108	19.10.2017
KİPAŞ KAĞIT BİYOKÜTLE ENERJİ ÜRETİM TESİSİ	BİYOKÜTLE	1	19.10.2017
ÇORUM-MECİTÖZÜ BES	BİYOKÜTLE (TAR./ORMAN ATIK)	5	17.10.2017
KÜREKDAĞI RES	RES	7	14.10.2017
MANASTIR-ESENKÖY RES	RES	14	13.10.2017
KORUMA KLOR ALKALİ KOJENERASYON SANTRALİ	DG	4	13.10.2017
KAROVA RES	RES	10	13.10.2017
KARTALDAĞI RES	RES	7	3.10.2017
GREENECO JES-3	JEOTERMAL	13	13.10.2017
RENOE ACIPAYAM GES	GES	1	13.10.2017

PINARBAŞI KOJENERASYON SANTRALİ	DG	6	13.10.2017
ITC ANTALYA BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	3	13.10.2017
NİSA BİYOKÜTLE ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ORMAN ATIĞI)	5	9.10.2017
ÇAY REGÜLATÖRÜ VE HES	HES	2	6.10.2017
KANGAL RES	RES	15	6.10.2017
KUMRULAR BİYOGAZ TESİSİ	BİYOKÜTLE (TAR./HAYV. ATIK)	4	5.10.2017
HAMİTABAT DGKÇS	DG	203	28.09.2017
KONAKPINAR RES	RES	0	28.09.2017
KARAÇAYIR RES	RES	0	27.09.2017
KANGAL RES	RES	23	22.09.2017
KAYADÜZÜ RES	RES	5	21.09.2017
SOĞUKSU HES	HES	7	17.09.2017
KARTALDAĞI RES	RES	13	15.09.2017
KOS ENERJİ SANTRALİ	DG	6	15.09.2017
ITC ANTALYA BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	11	11.09.2017
MARATON HES	HES	4	9.09.2017
KAYADÜZÜ RES	RES	20	9.09.2017
KİLLİK RES	RES	12	8.09.2017
YAKINCA REGÜLATÖRÜ VE HES	HES	7	8.09.2017
KUYUCAK RES	RES	5	25.08.2017
ARSLANBEY-OSB İZMİT	DG	-1	25.08.2017
DEVECİKONAĞI BARAJI VE HES	HES	5	24.08.2017
ACWA POWER KIRIKKALE DGKÇS	DG	336	24.08.2017
EFE-6 JES	JEOTERMAL	23	20.08.2017
KARAMENDERES HES	HES	2	18.08.2017
KIZILDERE-3 JES	JEOTERMAL	99	18.08.2017
KAZAN DOĞAL GAZ KOJENERASYON SANTRALİ	DG	271	18.08.2017
AFJES	JEOTERMAL	3	17.08.2017
HAMİTABAT DGKÇS	DG	375	16.08.2017
ABATEKS TEKSTİL DOĞALGAZ KOJENERASYON TESİSİ	DG	4	14.08.2017
SULTANHİSAR JES	JEOTERMAL	6	11.08.2017
EBRU REG. VE HES	HES	15	11.08.2017
BİNATOM GEDİZ ELEKTRİK ÜRETİM TESİSİ	DG	3	4.08.2017
KİLLİK RES	RES	12	4.08.2017
PETKİM RES	RES	4	27.07.2017
KUYUCAK RES	RES	5	27.07.2017
TRABZON RİZE ÇÖP GAZI SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1	26.07.2017
KİLLİK RES	RES	21	21.07.2017
ALBE-I BİYOGAZ SANTRALİ	BİYOKÜTLE (TAR./HAYV. ATIK)	1	17.07.2017
İSKENDERUN DEMİR VE ÇELİK TERMİK KUVVET SANTRALİ	FO/KG/YFG	24	15.07.2017
FATMA RES	RES	14	14.07.2017
DİLOVASI ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1	13.07.2017

ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	10	7.07.2017
BARBAROS RES	RES	9	30.06.2017
SARPINCIK RES	RES	2	22.06.2017
HAMİTABAT DGKÇS	DG	203	16.06.2017
KARGI BARAJI VE HES	HES	47	15.06.2017
ÇARDAKLI REGÜLATÖRÜ VE HES	HES	15	15.06.2017
GENERJİ HES	HES	4	6.06.2017
MASPO JEOTERMAL ENERJİ TESİSİ IV	JEOTERMAL	10	3.06.2017
ÇALIKOBASI HES	HES	9	2.06.2017
DİZAYN TEKNİK ÇORLU TRİJENERASYON SANTRALİ	DG	2	1.06.2017
SUSURLUK RES	RES	13	30.05.2017
BERGRES RES	RES	41	26.05.2017
KARGI BARAJI VE HES	HES	4	18.05.2017
AİRRES-4 RES	RES	1	18.05.2017
ACWA POWER KIRIKKALE DGKÇS	DG	296	17.05.2017
YALOVA RES	RES	18	12.05.2017
TİRE RES	RES	26	12.05.2017
SEYDİOĞLU REGÜLATÖRÜ VE HES	HES	2	9.05.2017
HAMİTABAT DGKÇS	DG	375	5.05.2017
AİRRES-4 RES	RES	13	5.05.2017
ÖDEMİŞ RES	RES	9	4.05.2017
ÇAYIRHAN SODYUM SÜLFAT TESİSLERİ KOJENERASYON PROJESİ	LİNYİT	3	28.04.2017
ACWA POWER KIRIKKALE DGKÇS	DG	296	28.04.2017
BERGRES RES	RES	29	20.04.2017
KARGI BARAJI VE HES	HES	47	20.04.2017
ÇAYHAN 2 HES	HES	6	14.04.2017
AREL ENERJİ MANAVGAT BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1	14.04.2017
ÖDEMİŞ RES	RES	12	13.04.2017
MUŞ-DOĞAN REGÜLATÖRÜ VE HES	HES	8	31.03.2017
UMURLAR RES	RES	10	31.03.2017
FATMA RES	RES	11	31.03.2017
DEMİR REGÜLATÖRÜ VE HES	HES	1	31.03.2017
ALAPLI KOJENERASYON TESİSİ	DG	10	31.03.2017
SAMURLU RES	RES	9	31.03.2017
DOĞANÇAY REGÜLATÖRÜ VE HES	HES	62	31.03.2017
ETİ KROM PROSES ISISI KOJENERASYON SANTRALİ	ATIK ISI	2	31.03.2017
GÜNDOĞDU RES	RES	2	29.03.2017
SULTANHİSAR JES	JEOTERMAL	6	29.03.2017
PETKİM RES	RES	21	25.03.2017
KARTALDAĞI RES	RES	10	24.03.2017
GEMCİLER KOJENERASYON TESİSİ	DG	2	24.03.2017
GÜLLE ENTEGRE TEKSTİL İŞLETMELERİ EMLAK DAN. SAN. VE TİC. A.Ş. ÜRETİM TESİSİ	DG	5	24.03.2017
ÖZMEN-1 JES	JEOTERMAL	9	24.03.2017
AYBİGE REGÜLATÖRÜ VE HES	HES	6	23.03.2017

ABS ALÇI YENİCE OTOPRODÜKTÖR SANTRALİ	DG	2	17.03.2017
KARACABEY RES	RES	3	16.03.2017
TOPÇAM HES	HES	41	15.03.2017
DEREBAŞI HES	HES	5	10.03.2017
UMURLAR RES	RES	17	5.03.2017
KARTALDAĞI RES	RES	7	3.03.2017
FATMA RES	RES	11	3.03.2017
ÇAYALTI REGÜLATÖRÜ VE HES (1. SANTRAL)	HES	2	3.03.2017
İSKENDERUN ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1	24.02.2017
ÖZMEN-1 JES	JEOTERMAL	15	24.02.2017
KIRKAĞAÇ RES	RES	11	24.02.2017
DELTA TERMİK KOMBİNE ÇEVRİM SANTRALİ	DG	1	24.02.2017
YAHYALI RES	RES	3	23.02.2017
KARACABEY-2 BİYOGAZ TESİSİ	BİYOKÜTLE	2	23.02.2017
GÜNEŞ HES	HES	5	21.02.2017
KARGI REGÜLATÖRÜ VE HES	HES	5	20.02.2017
TEPE RES	RES	5	17.02.2017
AİRRES-4 RES	RES	42	17.02.2017
DİNAR RES	RES	9	16.02.2017
KMK PAPER KÜTAHYA KAĞIT FABRİKASI KOJENERASYON SANTRALİ	DG	8	11.02.2017
KASIMLAR BARAJI VE HES (KASIMLAR II HES)	HES	74	11.02.2017
BALABANLI RES	RES	10	10.02.2017
MARAŞ BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	4	3.02.2017
BARBAROS RES	RES	3	3.02.2017
ÇEŞME RES	RES	9	3.02.2017
ANKAMALL AVM TRİJENERASYON TESİSİ	DG	6	2.02.2017
ALES DOĞAL GAZ KOMBİNE ÇEVRİM SANTRALİ	DG	1	27.01.2017
AYYILDIZ RES	RES	13	27.01.2017
DİNAR RES	RES	9	27.01.2017
KIRKAĞAÇ RES	RES	11	27.01.2017
ÇAYALTI REGÜLATÖRÜ VE HES (1. SANTRAL)	HES	3	20.01.2017
BUPİLİÇ SANTRALİ	DG	2	20.01.2017
UZUNDERE II REGÜLATÖRÜ VE HES (ÇATALDERE III HES)	HES	6	13.01.2017
KARDEMİR TERMİK-KOJENERASYON SANTRALİ	KÖMÜR+DİĞER	50	6.01.2017
YUMRUTEPE REGÜLATÖRÜ VE HES	HES	5	6.01.2017
KARADERE RES	RES	3	6.01.2017
SARPINCIK RES	RES	6,90	31.12.2016
KUBİLAY JES	JEOTERMAL	23,00	31.12.2016
DİNAR RES	RES	7,432	30.12.2016
ALİAĞA RES	RES	9,60	30.12.2016
ÇATALCA RES	RES	16,50	29.12.2016

GÖKTAŞ HES (GÖKTAŞ-1 HES)	HES	122,20	29.12.2016
ÇİĞDEM REG. VE HES (ÇİĞDEM 3 HES)	HES	4,80	29.12.2016
OVARES RES	RES	0,00	28.12.2016
SAMATLAR REGÜLATÖRÜ VE HES	HES	5,783	27.12.2016
YAHYALI RES	RES	23,10	24.12.2016
KIRKAĞAÇ RES	RES	17,100	23.12.2016
FATMA RES	RES	11,200	23.12.2016
MELİKOM REGÜLATÖRÜ VE HES	HES	6,750	23.12.2016
MEHMETHAN JES	JEOTERMAL	22,80	22.12.2016
TOPÇAM HES	HES	20,450	21.12.2016
KEBAN DERESİ HES	HES	0,325	18.12.2016
KELTEPE RES	RES	9,20	18.12.2016
AKNİŞASTA TERMİK KOJENERASYON SANTRALİ	DG	2,30	17.12.2016
KURTEKS ÜRETİM TESİSİ	DG	2,00	16.12.2016
SOMA RES	RES	9,00	16.12.2016
OMMER OTEL TRİJENERASYON TESİSİ	DG	1,286	16.12.2016
ÇATALCA RES	RES	16,50	16.12.2016
YALOVA RES	RES	10,50	15.12.2016
SAYALAR RES	RES	3,00	15.12.2016
ERAK GİYİM KOJENERASYON SANTRALİ	DG	-0,165	15.12.2016
SARPINCIK RES	RES	11,50	9.12.2016
BANDIRMA-3 RES	RES	7,20	9.12.2016
KOCAELİ ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,415	9.12.2016
SEYİTALİ RES	RES	4,00	8.12.2016
URLA RES	RES	7,50	8.12.2016
FATMA RES	RES	16,80	8.12.2016
BALIKLI I-II-III HES	HES	3,237	7.12.2016
YAHYALI RES	RES	23,10	7.12.2016
KARACABEY RES	RES	10,00	7.12.2016
KARADAĞ RES	RES	13,542	7.12.2016
SENKRON EFELER BİYOGAZ SANTRALİ	BİYOKÜTLE	1,20	7.12.2016
ZELİHA RES	RES	9,00	7.12.2016
SUSURLUK RES	RES	0,000	6.12.2016
DİNAR RES	RES	31,586	6.12.2016
İNCESU RES	RES	14,00	6.12.2016
SEFERİHİSAR RES	RES	9,00	6.12.2016
KINIK RES	RES	48,00	5.12.2016
MAZI I RES	RES	17,00	5.12.2016
MEŞELİ HES	HES	3,10	8.11.2016
EDİNCİK RES	RES	21,00	6.11.2016
FUATRES RES	RES	10,20	5.11.2016
SOMA RES	RES	21,00	5.11.2016
KOZBÜKÜ HES	HES	60,810	5.11.2016
ELMALI RES	RES	18,00	5.11.2016
KONAKPINAR RES	RES	5,70	4.11.2016
YAHYALI RES	RES	19,80	4.11.2016
ERİK REGÜLATÖRÜ VE HES	HES	9,012	4.11.2016
URLA RES	RES	5,00	4.11.2016

KUBİLAY JES	JEOTERMAL	1,00	31.10.2016
MEHMETHAN JES	JEOTERMAL	2,00	31.10.2016
AHMETLİ HES	HES	11,640	31.10.2016
ATLAS İNŞAAT OSMANİYE ÇÖP GAZI ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	3,120	31.10.2016
KEN 3 JES	JEOTERMAL	9,8	31.10.2016
SULTANHİSAR JES	JEOTERMAL	1,10	31.10.2016
YUMRUTEPE REGÜLATÖRÜ VE HES	HES	9,958	31.10.2016
DEREİÇİ HES	HES	6,770	30.10.2016
SARPINCIK RES	RES	4,60	30.10.2016
HALK ENERJİ ERZURUM GES	GES	4,90	30.10.2016
MELİKOM REGÜLATÖRÜ VE HES	HES	0,85	29.10.2016
UMURLU-2 JES	JEOTERMAL	12,00	28.10.2016
KARGI REGÜLATÖRÜ VE HES	HES	0,97	28.10.2016
KIRKAĞAÇ RES	RES	5,70	28.10.2016
KASIMLAR BARAJI VE HES	HES	25,00	28.10.2016
MUTLULAR BES	BİYOKÜTLE (ORMAN ATIĞI)	30,00	28.10.2016
MALATYA-1 ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,20	28.10.2016
HATAY GÖKÇEGÖZ ÇÖP SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	4,239	28.10.2016
MEŞELİ HES	HES	3,10	25.10.2016
KILCAN HES	HES	2,39	22.10.2016
MAS 1 YENİLENEBİLİR ENERJİ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	0,835	22.10.2016
ZEUS BİYOKÜTLE ENERJİSİNE DAYALI ELK. ÜRT. TESİSİ	BİYOKÜTLE	12,00	22.10.2016
SEFERİHİSAR RES	RES	3,00	22.10.2016
MARAŞ BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,20	21.10.2016
FATMA RES	RES	5,60	21.10.2016
GÜVERCİN REG. VE HES	HES	16,372	21.10.2016
AFYONKARAHİSAR SANDIKLI BİYOKÜTLE ÜRETİM TESİSİ	BİYOKÜTLE	1,40	21.10.2016
ERİK REGÜLATÖRÜ VE HES	HES	6,010	21.10.2016
KARACABEY RES	RES	15,00	21.10.2016
URLA RES	RES	2,50	20.10.2016
NAZAR ÜRETİM TESİSİ	DG	4,50	15.10.2016
BURSA ÇİMENTO KOJENERASYON TESİSİ	ATIK ISI	9,00	14.10.2016
TİRE BİYOGAZ TESİSİ	BİYOKÜTLE	4,268	14.10.2016
SOLENTEGRE GES	GES	8,00	14.10.2016
OKKAYASI REG. VE ŞEHİTLİK HES	HES	22,708	13.10.2016
İZMİT RAFİNERİ TERMİK-KOJENERASYON	DG/FO	35,00	8.10.2016
NAMNAM HES	HES	3,720	7.10.2016
BANDIRMA-3 RES	RES	9,60	7.10.2016
KARABEL RES	RES	3,00	6.10.2016
KUZEY I-II REG. VE HES	HES	5,55	6.10.2016
TÜFEKÇİKONAĞI HES	HES	5,18	4.10.2016
AKYURT RES	RES	4,40	2.10.2016

AREL YENİLENEBİLİR ENERJİ ISPARTA BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2,826	1.10.2016
BOZYAKA RES	RES	2,40	1.10.2016
KARAÇAYIR RES	RES	1,60	1.10.2016
ALAŞEHİR JES 2	JEOTERMAL	24,000	1.10.2016
GREENECO JES	JEOTERMAL	12,800	30.09.2016
OVARES RES	RES	3,00	29.09.2016
KONAKPINAR RES	RES	6,30	29.09.2016
YAHYALI RES	RES	13,20	24.09.2016
KANDİL REG. VE HES	HES	6,192	23.09.2016
ELMALI RES	RES	9,00	23.09.2016
SİVAS ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,41	22.09.2016
BALKODU II HES	HES	6,492	10.09.2016
DEMİRCİLİ RES	RES	10,00	9.09.2016
AKYURT RES	RES	8,40	9.09.2016
GÜNDOĞDU RES	RES	6,750	8.09.2016
OVARES RES	RES	8,00	8.09.2016
ITC-KA ÇARŞAMBA ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,415	8.09.2016
ATİLLA REGÜLATÖRÜ VE HES	HES	10,43	8.09.2016
KARAÇAYIR RES	RES	8,40	8.09.2016
BALIKLI I-II-III HES	HES	6,55	2.09.2016
KOZBÜKÜ HES	HES	20,27	2.09.2016
ALİAĞA RES	RES	6,00	2.09.2016
ÇARIKLI HES	HES	8,96	2.09.2016
DEMİRCİLİ RES	RES	10,00	26.08.2016
DEMİRCİLER RES	RES	14,75	26.08.2016
OVARES RES	RES	4,00	26.08.2016
SARITEPE RES	RES	5,000	25.08.2016
TERMİK-KOJENERASYON SANTRALİ	DG	2,022	19.08.2016
ALİAĞA RES	RES	18,00	12.08.2016
YALOVA RES	RES	12,00	12.08.2016
ZONGULDAK EREN ENERJİ ELEKTRİK ÜR. A.Ş. ÜRETİM TESİSİ (ZETES III)	YERLİ/İTHAL TAŞKÖMÜRÜ VEYA LİNYİT	700,00	11.08.2016
GEYCEK RES	RES	18,00	5.08.2016
BOREAS I ENEZ RES	RES	2,50	31.07.2016
KARADAĞ RES	RES	2,70833	30.07.2016
BEREKETLİ RES	RES	30,00	29.07.2016
DEMİR REGÜLATÖRÜ VE HES	HES	0,705	29.07.2016
DEMİRCİLİ RES	RES	10,00	29.07.2016
AFYON-I BİYOGAZ SANTRALİ	BİYOKÜTLE (HAYVANSAL ATIK)	1,20	29.07.2016
ZİNCİRLİ RES	RES	2,40	24.07.2016
DEMİRCİLER RES	RES	8,55	22.07.2016
ULUBORLU RES	RES	19,992	22.07.2016
SARITEPE RES	RES	10,00	22.07.2016
EBRU REG. VE HES	HES	15,310	22.07.2016
İNTEPE RES	RES	2,30	21.07.2016
İÇ ANADOLU DGKÇS	DG	280,000	21.07.2016
AMASYA RES	RES	15,000	15.07.2016

GEP KARAMAN OSB KOJENERASYON SANTRALİ	DG	4,200	15.07.2016
ZELİHA RES	RES	6,00	4.07.2016
ALİAĞA RES	RES	6,00	1.07.2016
DEMİRCİLİ RES	RES	10,00	1.07.2016
DORA-4 JES	JEOTERMAL	17,00	30.06.2016
GEBZE KOJENERASYON TESİSİ	DG	11,85	30.06.2016
ZONGULDAK EREN ENERJİ ELEKTRİK ÜR. A.Ş. ÜRETİM TESİSİ (ZETES III)	YERLİ/İTHAL TAŞKÖMÜRÜ VEYA LİNYİT	700,00	30.06.2016
YANIKKÖPRÜ HES	HES	9,20	30.06.2016
İÇ ANADOLU DGKÇS	DG	280,00	29.06.2016
ÇERÇİKAYA RES	RES	4,00	24.06.2016
ABALIOĞLU KOJENERASYON TESİSİ	DG	6,066	24.06.2016
ZİNCİRLİ RES	RES	9,60	24.06.2016
SEFERİHİSAR RES	RES	2,00	24.06.2016
ÇAYALTI REGÜLATÖRÜ VE HES (2. SANTRAL)	HES	2,16	24.06.2016
POYRAZ RES	RES	21,00	24.06.2016
MORDOĞAN RES	RES	13,80	24.06.2016
İÇ ANADOLU DGKÇS	DG	280,00	23.06.2016
DEMİR REGÜLATÖRÜ VE HES	HES	1,895	18.06.2016
AMASYA RES	RES	12,00	17.06.2016
BOZYAKA RES	RES	0,50	17.06.2016
POYRAZ RES	RES	12,00	17.06.2016
ODAYERİ BİYOGAZ	BİYOKÜTLE (ÇÖP GAZI)	5,660	17.06.2016
SARITEPE RES	RES	35,00	17.06.2016
TAHA DGKÇS	DG	68,00	10.06.2016
ULUBORLU RES	RES	16,67	10.06.2016
ÇATALTEPE RES	RES	2,50	10.06.2016
TERMİK (KOJENERASYON) SANTRALİ	İTHAL KÖMÜR	9,70	9.06.2016
BOZYAKA RES	RES	4,80	9.06.2016
GARZAN BARAJI VE HES	HES	1,34	3.06.2016
ALAÇATI RES	RES	16,00	3.06.2016
SEFERİHİSAR RES	RES	12,00	3.06.2016
YALOVA RES	RES	13,50	3.06.2016
AMASYA RES	RES	15,00	30.05.2016
POYRAZ RES	RES	9,00	27.05.2016
İNTEPE RES	RES	13,80	27.05.2016
TEKAS ELEKTRİK ÜRETİM SANTRALİ	DG	0,80	27.05.2016
URLA RES	RES	13,00	27.05.2016
GERES RES	RES	2,500	27.05.2016
PAMUKÖREN JES 3	JEOTERMAL	22,51	20.05.2016
ENERJEO KEMALİYE SANTRALİ	JEOTERMAL	24,90	20.05.2016
ÇATALTEPE RES	RES	7,50	20.05.2016
TAHA DGKÇS	DG	68,00	20.05.2016
AKPINAR HES	HES	9,010	19.05.2016
MARTEKS ÜRETİM TESİSİ	DG	4,300	14.05.2016
KURTKAYASI RES	RES	9,000	13.05.2016
KANİJE RES	RES	0,000	13.05.2016

İNEGÖL-CERRAH HES	HES	1,181	13.05.2016
İKİLER HES	HES	6,120	13.05.2016
DOĞANŞAR REG. VE HES	HES	6,770	13.05.2016
BANDIRMA II DGKÇS	DG	205,600	13.05.2016
İNTEPE RES	RES	9,200	6.05.2016
GERMİYAN RES	RES	10,800	6.05.2016
ULUBORLU RES	RES	15,003	6.05.2016
VANAZİT HES	HES	3,089	6.05.2016
ŞENBÜK RES	RES	9,160	6.05.2016
HAYMEANA I-II HES (HAYMEANA I HES)	HES	3,200	5.05.2016
ÇAYALTI REGÜLATÖRÜ VE HES (2. SANTRAL)	HES	3,120	29.04.2016
UMUTLU HES	HES	6,780	29.04.2016
KANİJE RES	RES	12,800	22.04.2016
PAŞALI REGÜLATÖRÜ VE HES	HES	3,500	22.04.2016
TAV EGE ADNAN MENDERES HAVALİMANI OTOPRODÜKTÖR TESİSİ	DG	9,780	18.04.2016
ÇAY REGÜLATÖRÜ VE HES	HES	4,143	15.04.2016
KARACABEY-2 BİYOGAZ TESİSİ	BİYOKÜTLE	1,067	15.04.2016
KURTKAYASI RES	RES	14,400	15.04.2016
KOJENERASYON TESİSİ	DG	4,300	14.04.2016
ARISU REGÜLATÖRÜ VE HES	HES	0,863	14.04.2016
BANDIRMA II DGKÇS	DG	401,600	14.04.2016
UMUTLU HES	HES	13,560	8.04.2016
ÇANDIR-1 REG. VE HES	HES	1,710	8.04.2016
TOROS TARIM SAMSUN SANTRALİ	ATIK ISI	30,600	8.04.2016
YAMANLI II HES (1. KADEME ÜNİTE 3)	HES	11,781	7.04.2016
KANİJE RES	RES	19,200	1.04.2016
ULUBORLU RES	RES	8,335	1.04.2016
ARIKAN ÜRETİM TESİSİ	DG	9,000	1.04.2016
GREENECO JES	JEOTERMAL	12,800	31.03.2016
YAYLAKÖY RES	RES	15,000	25.03.2016
BAYRA HES	HES	9,046	25.03.2016
GÖKBÖĞET HES	HES	3,176	25.03.2016
TUFANBEYLİ ÜRETİM TESİSİ	LİNYİT	150,000	25.03.2016
AKSARAY OSB BİYOGAZ SANTRALİ	BİYOKÜTLE	3,201	18.03.2016
ANI BİSKÜVİ KOJENERASYON SANTRALİ	DG	1,200	11.03.2016
KURTKAYASI RES	RES	12,000	11.03.2016
KANİJE RES	RES	12,800	4.03.2016
SUSUZ REGÜLATÖRÜ VE HES	HES	7,100	3.03.2016
ITC-KA BİYOKÜTLE GAZLAŞTIRMA TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	5,425	3.03.2016
YUNUS EMRE TERMİK SANTRALİ	LİNYİT	145,000	25.02.2016
ÇİLEHANE HES	HES	5,664	19.02.2016
AKBÜK II RES	RES	20,000	12.02.2016
YAMANLI II HES (1. KADEME ÜNİTE 1 VE 2)	HES	47,628	11.02.2016
TERMİK-KOJENERASYON SANTRALİ	DG	4,300	6.02.2016
ARTVİN BARAJI VE HES	HES	166,090	3.02.2016
KURTKAYASI RES	RES	9,600	29.01.2016

BOLU-GÖYNÜK ENERJİ SANTRALİ	LİNYİT	135,000	29.01.2016
YAHYALI RES	RES	16,800	29.01.2016
KÖROĞLU BARAJI VE KOTANLI HES	HES	50,000	29.01.2016
İÇDAŞ BİGA RES	RES	8,800	22.01.2016
BEYPİ A.Ş. BOLU YEM FABRİKASI KOJEN. SAN.	DG	4,300	22.01.2016
ALAŞEHİR JES	JEOTERMAL	11,270	15.01.2016
TARABYA OTELİ KOJENERASYON	DG	1,200	01.01.2016
İÇDAŞ BİGA RES	RES	12,800	31.12.2015
UMURLU JES	JEOTERMAL	9,720	30.12.2015
ITC-KA ELAZIĞ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2,830	30.12.2015
HANAK HES	HES	5,139	29.12.2015
ALPERTEKS SANTRALİ	DG	4,290	25.12.2015
KALEKÖY HES	HES	2,740	25.12.2015
BANDIRMA RES	RES	15,000	25.12.2015
FUATRES RES	RES	16,500	25.12.2015
TUĞRA REG. VE HES	HES	2,120	25.12.2015
YAHYALI RES	RES	18,900	25.12.2015
SİLOPİ TERMİK SANTRALİ	YERLİ ASFALTİT	135,000	22.12.2015
BAĞBAŞI REG. VE HES	HES	13,600	19.12.2015
İSKENDERUN ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2,830	18.12.2015
ATAKÖY HES	HES	5,000	17.12.2015
ŞANLIURFA BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3,120	17.12.2015
SÖKE RES	RES	45,000	14.12.2015
TÜPRAŞ İZMİT RAFİNERİSİ TERMİK KOJENERASYON SANTRALİ	DG	41,280	11.12.2015
ARTVİN BARAJI VE HES	HES	166,090	10.12.2015
HASANLAR HES	HES	0,000	9.12.2015
SARES RES	RES	2,750	4.12.2015
TUFANBEYLİ ÜRETİM TESİSİ	LİNYİT	300,000	2.12.2015
İÇDAŞ BİGA RES	RES	22,400	2.12.2015
FLORANCE NIGHTINGALE HASTANESİ KOJENERASYON SANTRALİ	DG	0,800	2.12.2015
İNCESU RES	RES	3,200	26.11.2015
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	4,240	26.11.2015
KANGAL RES	RES	14,000	26.11.2015
YAHYALI RES	RES	7,200	20.11.2015
ŞANLIURFA OSB ENERJİ SANTRALİ	DG	18,310	18.11.2015
KOÇAK REG. VE HES	HES	1,344	17.11.2015
KANDİL REG. VE HES	HES	6,192	16.11.2015
OSB ÜRETİM SANTRALİ	DG	21,750	13.11.2015
SÜLOĞLU RES	RES	24,000	13.11.2015
KANİJE RES	RES	3,200	13.11.2015
AKBÜK RES	RES	4,800	12.11.2015
KIYIKÖY RES	RES	11,000	12.11.2015
ASLAN ÇİMENTO ATIK ISIDAN ENERJİ ÜRETİM TESİSİ	ATIK ISI	7,500	6.11.2015
DÜZOVA RES	RES	1,500	6.11.2015

TEPEKIŞLA BARAJI VE HES	HES	32,993	5.11.2015
ÇİLEHANE HES	HES	1,536	2.11.2015
ŞANLIURFA BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3,120	31.10.2015
UMURLU JES	JEOTERMAL	2,280	31.10.2015
KANGAL RES	RES	20,000	30.10.2015
PAMUKÖREN JES 2	JEOTERMAL	22,510	29.10.2015
HIZIR REGÜLATÖRÜ VE HES	HES	1,955	29.10.2015
KANDİL REG. VE HES	HES	2,616	29.10.2015
BAĞARASI RES	RES	24,400	29.10.2015
HAYMEANA I-II HES (HAYMEANA I HES)	HES	3,200	29.10.2015
KARAMAN BİYOGAZ TESİSİ	BİYOKÜTLE	1,414	29.10.2015
ÇAY REGÜLATÖRÜ VE HES	HES	4,143	28.10.2015
OVACIK BİYOGAZ ENERJİ SANTRALİ	BİYOKÜTLE	4,800	28.10.2015
FUATRES RES	RES	3,300	28.10.2015
KANİJE RES	RES	3,200	28.10.2015
PAKMİL BİYOKÜTLE SANTRALİ	BİYOKÜTLE	1,763	27.10.2015
AKBÜK RES	RES	2,400	27.10.2015
KARAKAYA REG. VE HES	HES	9,010	26.10.2015
KARADUVAR ATIKSU ARITMA TESİSİ BİYOGAZ SANTRALİ	BİYOKÜTLE	1,900	26.10.2015
TRABZON RİZE ÇÖP GAZI SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	2,826	25.10.2015
PAŞALI REGÜLATÖRÜ VE HES	HES	3,500	25.10.2015
BABADERE JES	JEOTERMAL	8,000	24.10.2015
DİLOVASI ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,063	24.10.2015
SERHAT REGÜLATÖRÜ VE HES	HES	8,840	24.10.2015
SİVAS BİYOKÜTLEDEN (ÇÖP GAZI) ELEKTRİK ENERJİSİ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,410	24.10.2015
SEBİL REG. VE HES	HES	22,636	24.10.2015
POYRAZGÖLÜ RES	RES	14,000	24.10.2015
HİLAL-2 RES	RES	7,000	23.10.2015
KIYIKÖY RES	RES	12,000	23.10.2015
YAHYALI RES	RES	9,600	23.10.2015
ATAKÖY HES	HES	2,500	22.10.2015
ADA 2 RES	RES	3,200	21.10.2015
GÜNAYŞE REG. VE HES	HES	0,800	19.10.2015
ANGUTLU HES	HES	14,400	19.10.2015
DEMİRCİ REG. VE HES	HES	12,600	17.10.2015
AKBÜK RES	RES	2,400	16.10.2015
İÇDAŞ BİGA RES	RES	16,000	16.10.2015
EGE RES	RES	7,000	16.10.2015
ARPACIK REGÜLATÖRÜ VE HES	HES	3,770	15.10.2015
ÇİLEKLİTEPE HES	HES	23,625	15.10.2015
SÜLOĞLU RES	RES	18,000	11.10.2015
TERMİK-KOJENERASYON SANTRALİ	DG	4,000	10.10.2015
ADARES RES	RES	10,000	10.10.2015
GERES RES	RES	0,000	3.10.2015
KÖPRÜBAŞI HES	HES	7,949	2.10.2015
GÖKTAŞ HES (GÖKTAŞ-2 HES)	HES	153,400	2.10.2015

BAĞARASI RES	RES	21,600	29.09.2015
POYRAZGÖLÜ RES	RES	16,000	18.09.2015
KARACABEY-2 BİYOGAZ TESİSİ	BİYOKÜTLE	1,067	18.09.2015
SÜLOĞLU RES	RES	18,000	18.09.2015
HANAK HES	HES	3,690	17.09.2015
KEN KİPAŞ JES	JEOTERMAL	24,000	17.09.2015
KIYIKÖY RES	RES	9,000	17.09.2015
İZNİK DEREKÖY HES	HES	0,715	15.09.2015
DİLEK RES	RES	9,600	15.09.2015
KUYUCAK RES	RES	15,100	12.09.2015
ALAŞEHİR JES	JEOTERMAL	33,730	12.09.2015
ORİON ÜRETİM SANTRALİ	DG	1,200	11.09.2015
TERMİK-KOJENERASYON SANTRALİ	DG	2,000	10.09.2015
TERMİK-KOJENERASYON SANTRALİ	DG	1,200	9.09.2015
TEPEKIŞLA BARAJI VE HES	HES	32,993	4.09.2015
EĞERCİ REGÜLATÖRÜ VE HES	HES	1,3436	3.09.2015
AYVALI (ÇORUH) BARAJI VE HES	HES	121,654	3.09.2015
TERMİK-KOJENERASYON SANTRALİ	DG	4,044	2.09.2015
KOCADAĞ 2 RES	RES	2,500	2.09.2015
DİLEK RES	RES	7,200	27.08.2015
SEKİYAKA II HES	HES	1,090	27.08.2015
EFELER JES	JEOTERMAL	47,400	26.08.2015
SUÇATI-I HES	HES	8,316	20.08.2015
TEPEKIŞLA BARAJI VE HES	HES	3,641	13.08.2015
KIYIKÖY RES	RES	12,000	13.08.2015
PAMUKÖREN JES	JEOTERMAL	16,006	7.08.2015
AKÇAKOYUN HES	HES	6,790	6.08.2015
ZİYARET RES	RES	1,000	4.08.2015
MUT RES	RES	0,500	31.07.2015
AKINCI (KAYABEYİ) HES	HES	10,175	30.07.2015
GÖKSU HES	HES	17,177	25.07.2015
DİLEK RES	RES	7,200	24.07.2015
PAMUKÖREN JES	JEOTERMAL	6,504	21.07.2015
BOLU-GÖYNÜK ENERJİ SANTRALİ	LİNYİT	135,000	15.07.2015
DOĞU HES	HES	5,985	8.07.2015
KARAKUZ BARAJI VE HES	HES	76,000	8.07.2015
MANAHOZ HES	HES	1,120	5.07.2015
TELLİ 1-2 HES	HES	0,000	3.07.2015
EFELER JES	JEOTERMAL	22,500	3.07.2015
AVANOS REGÜLATÖRÜ VE CEMEL HES	HES	6,000	3.07.2015
ALÇE HES	HES	5,140	2.07.2015
SOMA RES	RES	8,000	26.06.2015
SÖĞÜTLÜ HES	HES	9,160	26.06.2015
MANAHOZ HES	HES	5,960	25.06.2015
ÖDEMİŞ RES	RES	8,000	25.06.2015
ÇEŞME RES	RES	7,000	20.06.2015
MUT RES	RES	13,200	19.06.2015
TOSUNLAR-1 JES	JEOTERMAL	3,807	12.06.2015
ÇAYKARA HES	HES	10,560	11.06.2015

BOLU ÇİMENTO ATIK ISIDAN ENERJİ ÜRETME TESİSİ	ATIK ISI	6,000	5.06.2015
MUT RES	RES	16,500	5.06.2015
HAVVA HES	HES	4,780	4.06.2015
ÖDEMİŞ RES	RES	12,000	29.05.2015
EKOTEN TEKSTİL SAN. VE TİC. A.Ş. KOJEN. SANTRALİ	DG	0,008	29.05.2015
SEBENOBA RES	RES	9,000	28.05.2015
BEYHAN I BARAJI VE HES	HES	31,600	26.05.2015
ANGUTLU 2 HES	HES	8,898	25.05.2015
EDİNCİK RES	RES	26,400	23.05.2015
KORU RES	RES	10,400	22.05.2015
MUT RES	RES	19,800	22.05.2015
POLATLI BES	BİYOKÜTLE	0,637	22.05.2015
ÇEŞME RES	RES	9,000	22.05.2015
GÜNEYYAKA HES	HES	6,630	21.05.2015
SEMA REGÜLATÖRÜ VE HES	HES	17,000	21.05.2015
KARGI (KIZILIRMAK) HES	HES	101,720	20.05.2015
AKSARAY OSB BİYOGAZ SANTRALİ	BİYOKÜTLE	1,067	15.05.2015
YALNIZARDIÇ HES	HES	0,530	8.05.2015
KORU RES	RES	19,800	8.05.2015
ORTAMANDIRA RES	RES	10,000	8.05.2015
SİLOPİ TERMİK SANTRALİ	YERLİ ASFALTİT	135,000	8.05.2015
ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	3,978	7.05.2015
HARMANLIK RES	RES	10,400	6.05.2015
KIZILÇAM REGÜLATÖRÜ VE HES	HES	1,320	5.05.2015
AKINCI (KAYABEYİ) HES	HES	74,506	3.05.2015
KİPAŞ KAĞIT SANAYİ İŞLETMELERİ A.Ş. TERMİK-KOJENERASYON SANTRALİ	KÖMÜR	7,600	1.05.2015
YANBOLU HES	HES	6,21	30.04.2015
DURKAR 1 TERMİK-KOJENERASYON SANTRALİ	DG	2,433	30.04.2015
STS-1 HES	HES	11,243	30.04.2015
YUNUSLAR HES	HES	7,960	28.04.2015
HARMANLIK RES	RES	13,200	24.04.2015
KORU RES	RES	19,800	22.04.2015
BARAN REGÜLATÖRÜ VE HES (BARAN-I)	HES	8,865	17.04.2015
BOREAS I ENEZ RES	RES	2,500	17.04.2015
BEYHAN I BARAJI VE HES	HES	183,500	17.04.2015
YANBOLU HES	HES	2,870	16.04.2015
GARZAN BARAJI VE HES	HES	3,210	15.04.2015
HARMANLIK RES	RES	26,400	11.04.2015
İNCEBEL HES	HES	6,930	9.04.2015
SOMA RES	RES	12,00	9.04.2015
YALNIZARDIÇ HES	HES	15,930	8.04.2015
SEYİTALİ RES	RES	2,000	7.04.2015
BAĞIŞTAŞ I BARAJI VE HES	HES	89,540	3.04.2015
ÇAKMAK REGÜLATÖRÜ VE HES	HES	8,630	3.04.2015
ONUR REGÜLATÖRÜ VE HES	HES	19,568	2.04.2015
BEYHAN I BARAJI VE HES	HES	183,500	29.03.2015
ÇERÇİKAYA RES	RES	11,15795	20.03.2015
SOMA RES	RES	18,000	20.03.2015

SÜTLÜCE HES VE REGÜLATÖRÜ	HES	5,640	19.03.2015
YALNIZARDIÇ HES	HES	15,930	19.03.2015
ALAKÖPRÜ BARAJI VE HES	HES	28,890	18.03.2015
PEMBELİK BARAJI VE HES	HES	63,670	13.03.2015
KIYIKÖY RES	RES	3,000	13.03.2015
MODERN ENERJİ TERMİK SANTRALİ	DG+ORMAN ÜRÜN.	27,600	12.03.2015
BEYHAN I BARAJI VE HES	HES	183,500	12.03.2015
SÖĞÜTLÜ HES	HES	9,160	12.03.2015
ÇAKMAK REGÜLATÖRÜ VE HES	HES	18,750	10.03.2015
EFELER JES	JEOTERMAL	22,500	6.03.2015
BÜYÜKBAHÇE REGÜLATÖRÜ VE HES	HES	11,700	6.03.2015
BANDIRMA RES	RES	0,600	27.02.2015
TÜPRAŞ İZMİT RAFİNERİSİ TERMİK KOJENERASYON SANTRALI	DG	79,080	27.02.2015
BAĞIŞTAŞ I BARAJI VE HES	HES	51,090	27.02.2015
ÇERÇİKAYA RES	RES	13,94735	19.02.2015
YAMANLI II HES	HES	11,222	19.02.2015
PEMBELİK BARAJI VE HES	HES	63,670	18.02.2015
SEBENOBA RES	RES	8,000	13.02.2015
SİNCAN ÇADIRTEPE BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	5,664	13.02.2015
MEREK REGÜLATÖRÜ VE HES	HES	9,180	12.02.2015
DEMİRER KOJENERASYON TESİSİ	DG	2,476	11.02.2015
PİTANE RES	RES	4,800	9.02.2015
KADAHOR REGÜLATÖRÜ VE HES	HES	9,362	07.02.2015
SOMA RES	RES	6,000	07.02.2015
KOCADAĞ 2 RES	RES	7,500	06.02.2015
KÖPRÜYANI REGÜLATÖRÜ VE HES	HES	11,900	04.02.2015
YAMANLI II HES	HES	11,222	31.01.2015
ADIGÜZEL II HES	HES	30,09	24.01.2015
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	1,125	23.01.2015
MMK METALURJİ SAN. TİC. VE LİMAN İŞLETMECİLİĞİ A.Ş KOJENERASYON TESİSİ	DG	15,000	17.01.2015
HAYAT BİYOKÜTLE PROJESİ	BİYOKÜTLE	0,955	16.01.2015
ÇAYKARA HES	HES	15,360	16.01.2015
KARDEMİR KARABÜK DEMİR ÇELİK SAN. VE TİC. A.Ş. TERMİK-KOJENERASYON SANTRALI	KÖMÜR+DİĞER	15,000	10.01.2015
ÇERÇİKAYA RES	RES	27,8947	10.01.2015
BUCAKKIŞLA HES	HES	41,000	08.01.2015
PET CİPS RESİN VE KOJ. TESİSİ	DG	8,600	31.12.2014
M.KEMALPAŞA-SUUÇTU HES	HES	2,304	31.12.2014
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	13,075	31.12.2014
HAMZABEY HES	HES	8,820	31.12.2014
TERMİK KOJENERASYON SANTRALİ	LİNYİT	1,640	31.12.2014
TEKSMAK TERMİK KOJENERASYON SANTRALİ	DG	2,677	30.12.2014
YEŞİLKÖY REG. VE HES	HES	3,720	30.12.2014
GÜNAYDIN RES	RES	2,500	26.12.2014

YAZILI I-II-III HES	HES	6,620	25.12.2014
SOMA RES	RES	24,000	25.12.2014
SEBENOBA RES	RES	13,000	20.12.2014
GÜNAYDIN RES	RES	5,000	20.12.2014
ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	7,956	19.12.2014
ATLAS TERMİK SANTRALİ	İTHAL KÖMÜR	600,000	19.12.2014
BANDIRMA RES	RES	26,400	14.12.2014
ARAKLI 3 HES	HES	0,631	12.12.2014
ŞADILLI RES	RES	11,000	06.12.2014
CENGİZ 240MW DGKÇS	DG	208,670	05.12.2014
EREN HES	HES	35,186	04.12.2014
MURAT HES	HES	11,089	01.12.2014
BİLECİK DOĞALGAZ ÇEVRİM SANTRALİ	DG	13,050	28.11.2014
MENTAŞ HES	HES	9,600	28.11.2014
SOMA RES	RES	32,000	26.11.2014
KELTEPE RES	RES	0,000	21.11.2014
EKİNCİK HES	HES	7,520	20.11.2014
YAKINCA REGÜLATÖRÜ VE HES	HES	11,700	14.11.2014
YÜCE HES	HES	5,283	14.11.2014
PİRİNÇLİK HES	HES	21,315	14.11.2014
GÖNEN BİYOGAZ TESİSİ PROJESİ	BİYOKÜTLE	1,487	14.11.2014
ŞADILLI RES	RES	13,750	14.11.2014
ÜÇGEN HES	HES	3,388	07.11.2014
MERNİOS HALI KOJENERASYON SANTRALİ	DG	9,730	01.11.2014
BEYPAZARI BİYOGAZ TESİSİ BİYOKÜTLE PROJESİ	BİYOKÜTLE	0,7936	31.10.2014
CANAN TEKSTİL KOJENERASYON SANTRALI	DG	2,000	31.10.2014
GÖKBOYUN REGÜLATÖRÜ VE HES	HES	5,000	29.10.2014
AMASYA ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,200	29.10.2014
TUĞRA REGÜLATÖRÜ VE HES	HES	11,480	28.10.2014
ŞADILLI RES	RES	8,250	26.10.2014
TERMİK-KOJENERASYON SANTRALI	DG	15,000	25.10.2014
KOCABEY-2 BİYOGAZ SANTRALİ	BİYOKÜTLE	2,134	25.10.2014
AFYON BİYOGAZ ENERJİ SANTRALİ BİYOKÜTLE PROJESİ	BİYOKÜTLE	4,017	24.10.2014
TURKOL OTEL SANTRALİ (TERMİK KOJENERASYON)	DG	1,000	24.10.2014
ADANA DOĞU ATIKSU SANTRALİ	BİYOKÜTLE	0,800	24.10.2014
TUANA HES	HES	3,695	24.10.2014
ALBE-I BİYOGAZ SANTRALİ	BİYOKÜTLE	1,813	24.10.2014
POLATLI BES	BİYOKÜTLE	0,834	24.10.2014
CENGİZ 240MW DGKÇS	DG	401,330	22.10.2014
İNCESU RES	RES	10,000	22.10.2014
SİGMA SULUOVA BİYOGAZ TESİSİ	BİYOKÜTLE	1,000	20.10.2014
ZEKERE HES	HES	3,978	17.10.2014
BURDUR ŞEKER FABRİKASI ÜRETİM TESİSİ (TERMİK KOJENERASYON)	DG/FO/LİNYİT	4,750	17.10.2014
KEREM JES	JEOTERMAL	24,000	16.10.2014

GÜRGEN REGÜLATÖRÜ VE HES	HES	2,360	15.10.2014
ALİAĞA RES	RES	2,400	10.10.2014
EFELER JES	JEOTERMAL	22,500	01.10.2014
PİRO REGÜLATÖRÜ VE HES	HES	4,060	01.10.2014
MODERN BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE	6,000	30.09.2014
UMURLAR RES	RES	10,000	30.09.2014
SAMSUN AVDAN BİYOGAZ TESİSİ BİYOKÜTLE PROJESİ	BİYOKÜTLE (ÇÖP GAZI)	2,400	27.09.2014
KOJEN	DG	1,189	26.09.2014
ALAŞEHİR JES	JEOTERMAL	24,000	25.09.2014
KAVAKLI RES	RES	13,700	25.09.2014
ASLANCIK HES	HES	46,500	19.09.2014
GARZAN HES	HES	5,420	19.09.2014
SİLİVRİ RES	RES	7,500	19.09.2014
DORUK HES	HES	28,278	19.09.2014
AYVASIL REGÜLATÖRÜ VE HES	HES	2,976	19.09.2014
KANGAL RES	RES	2,000	19.09.2014
SERAP HES	HES	28,960	19.09.2014
ALİAĞA RES	RES	7,200	12.09.2014
DOĞANÇAY HES	HES	20,160	12.09.2014
HAYAT KİMYA KOJENERASYON SANTRALİ	DG	15,040	12.09.2014
KAYSERİ KATI ATIK DEPONİ SAHASI ELEKTRİK ÜRETİM SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,560	11.09.2014
ATİK RES	RES	2,000	09.09.2014
KANGAL RES	RES	42,000	05.09.2014
KORKMAZ RES	RES	14,000	04.09.2014
SİLİVRİ RES	RES	12,500	03.09.2014
DOĞANÇAY HES	HES	10,080	29.08.2014
KÖRFEZ ENERJİ SAN. VE TİC. A.Ş. TERMİK KOJENERASYON SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	2,830	29.08.2014
AK NİŞASTA SAN. VE TİC. A.Ş. KOJENERASYON SANTRALİ	DG	2,000	22.08.2014
DİNAR RES	RES	36,800	22.08.2014
KAVAKLI RES	RES	36,300	21.08.2014
SİLİVRİ RES	RES	25,000	20.08.2014
ALADEREÇAM HES	HES	7,350	19.08.2014
SAMURLU RES	RES	4,500	16.08.2014
KORKMAZ RES	RES	10,000	15.08.2014
GÖKRES-2 RES	RES	24,000	15.08.2014
TERMİK-AKIŞKAN YATAKLI KOJENERASYON SANTRALİ	LİNYİT	5,500	15.08.2014
KIYIKÖY RES	RES	24,000	15.08.2014
ŞENKÖY RES	RES	9,000	15.08.2014
GENERAL REGÜLATÖRÜ VE HES	HES	5,950	08.08.2014
ATLAS TERMİK SANTRALİ	İTHAL KÖMÜR	600,000	08.08.2014
ÇANTA RES	RES	12,500	24.07.2014
ÜÇGEN 2 REGÜLATÖRÜ VE HES	HES	10,319	17.07.2014
SARAY REGÜLATÖRÜ VE HES	HES	13,500	16.07.2014
PANER KOJENERASYON SANTRALİ	DG	2,800	16.07.2014
AKDERE HES	HES	7,480	12.07.2014

HASANBEYLİ RES	RES	7,500	11.07.2014
BALABANLI RES	RES	16,100	11.07.2014
AŞKALE ÇİMENTO TERMİK KOJENERASYON SANTRALİ	ATIK ISI	5,500	10.07.2014
KOÇLU HES	HES	36,260	10.07.2014
BEKİRLİ TERMİK SANTRALİ	İTHAL KÖMÜR	600,000	10.07.2014
KARADERE RES	RES	4,800	04.07.2014
UŞAK RES	RES	28,500	04.07.2014
ÇANTA RES	RES	20,000	28.06.2014
SUSURLUK RES	RES	15,000	28.06.2014
ALTINSU TEKSTİL KOJENERASYON TESİSİ	DG	1,189	27.06.2014
GÜNAYDIN RES	RES	2,500	27.06.2014
HASANBEYLİ RES	RES	7,500	26.06.2014
KARADERE RES	RES	11,200	21.06.2014
GÖKRES 2 RES	RES	11,000	20.06.2014
KÖROĞLU HES	HES	9,060	20.06.2014
BERKE REGÜLATÖRÜ VE HES	HES	3,127	20.06.2014
ITC AKSARAY ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,415	17.06.2014
KAVŞAK BENDİ HES	HES	5,430	17.06.2014
BÜKOR II HES	HES	12,597	13.06.2014
SENTETİK-2 KOJENERASYON TESİSİ	DG	3,349	13.06.2014
GÖKBEL I-II HES	HES	4,282	13.06.2014
EDİNCİK BES	BİYOGAZ	2,126	12.06.2014
ARKUN BARAJI VE HES	HES	88,819	12.06.2014
TOKMADİN HES	HES	3,430	12.06.2014
SALMAN RES	RES	2,000	06.06.2014
ÇİNE HES	HES	46,600	06.06.2014
ERZİN DGKÇS	DG	319,820	05.06.2014
DORA 3 JES	JEOTERMAL	17,000	03.06.2014
ZİYARET RES	RES	10,000	31.05.2014
DERHAN TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	1,189	31.05.2014
ÇANTA RES	RES	15,000	31.05.2014
ARKUN BARAJI VE HES	HES	156,010	30.05.2014
SALMAN RES	RES	6,000	30.05.2014
HASANBEYLİ RES	RES	7,500	29.05.2014
GÜLLE TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	4,300	27.05.2014
ŞENBÜK RES	RES	13,940	25.05.2014
BALABANLI RES	RES	23,000	17.05.2014
UŞAK RES	RES	25,500	17.05.2014
ZALA REGÜLATÖRÜ VE HES	HES	5,422	16.05.2014
KİRAZLIK REGÜLATÖRÜ VE HES	HES	2,500	16.05.2014
SALMAN RES	RES	12,000	14.05.2014
TUANA HES	HES	3,695	13.05.2014
PROKOM PİROLİTİK YAĞ VE GAZ TAKITLI ELEKTRİK ÜRETİM TESİSİ	PİROLİTİK YAĞ	7,040	11.05.2014
GÜVEN GIDA TETMİK KOJENERASYON SANTRALİ	DG	2,006	10.05.2014
TONYA I-II HES	HES	2,500	09.05.2014
ASLANCIK HES	HES	12,800	09.05.2014

HASANBEYLİ RES	RES	10,000	09.05.2014
KAYAKÖPRÜ HES	HES	14,200	08.05.2014
GERES RES	RES	27,500	08.05.2014
EROĞLU GİYİM TERMİK KOJENERASYON SANTRALİ	DG	1,165	08.05.2014
ÇAMLICA II HES	HES	17,580	02.05.2014
AYVASIL REGÜLATÖRÜ VE HES	HES	1,466	30.04.2014
ERZİN DGKÇS	DG	292,090	28.04.2014
CANAN TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	2,000	27.04.2014
KALEALTI II HES	HES	9,977	26.04.2014
BOYAR KİMYA TERMİK KOJENERASYON SANTRALİ	DG	2,000	26.04.2014
DÜZCE-AKSU HES	HES	46,200	25.04.2014
SÖLPEREN REGÜLÂTÖRÜ VE HES	HES	9,762	25.04.2014
HAVVA HES	HES	2,390	22.04.2014
YEŞİLYURT ENERJİ SAMSUN DGKÇ SANTRALİ	DG	18,321	18.04.2014
GEYCEK RES	RES	14,000	18.04.2014
GÖKBEL 2 HES	HES	14,504	18.04.2014
MELİKE İPLİK TERMİK KOJENERASYON SANTRALİ	DG	9,730	18.04.2014
UZUNDERE II REGÜLATÖRÜ VE HES	HES	7,020	18.04.2014
SİNCİK RES	RES	2,500	17.04.2014
ERZİN DGKÇS	DG	292,090	12.04.2014
ARSAN DOKUMA TERMİK KOJENERASYON SANTRALİ	DG	4,300	12.04.2014
KAMER REGÜLATÖRÜ VE HES	HES	3,750	11.04.2014
DAĞBAŞI HES	HES	10,433	11.04.2014
MANYAS BARAJI VE HES	HES	20,250	08.04.2014
POLAT ENERJİ KÜTAHYA TERMİK SANTRALİ	LİNYİT	51,000	05.04.2014
İZDEMİR ENERJİ ELEKTRİK ÜRETİM TESİSİ	İTHAL KÖMÜR	350,000	04.04.2014

The build margin emissions factor is the generation-weighted average emission factor(t CO2/MWh) of all power units m during the most recent year y for which electricitygeneration data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EGm,y \times EF_{EL,m,y}}{\sum_m EGm,y} \quad \text{Equation (15)}$$

where:

$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (t CO2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$	=	CO2 emission factor of power unit m in year y (t CO2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which electricity generation data isavailable

According to, "Tool to calculate the emission factor for an electricity system", version 07.0.0, the CO2emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance from the tool in step 4 for simple OM, using options A1, A2 or A3, using for y the most recent historicalyear for which power generation data is available, where m is the power units included in the build margin.

Since plant specific fuel consumption data is not available for Turkey, option A2 has been selected for the calculation (since only fuel type and electricity generation are known) of the CO2 emission factor of each power unit m ($EF_{EL,m,y}$) as follow:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad \text{Equation (5)}$$

where:

$EF_{EL,m,y}$=		CO2 emission factor of power unit m in year y (t CO2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO2 emission factor of fuel type i used in power unit m in year y (t CO2/GJ)
$\eta_{m,y}$=		Average net energy conversion efficiency of power unit m in year y (ratio)
m	=	All power units serving the grid in year y except low-cost/must-run power units
y	=	The relevant year as per the data vintage chosen in Step 3

Where several fuel types are used in the power unit, the lowest CO2 emission factor for $EF_{CO2,m,i,y}$ has been used.

a) Identification of Average CO2 Emission Factor of Fuel Type i in Power Unit m in year y

The $EF_{CO2,m,i,y}$ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per theguidance in Step 4 for the simple OM usingfor y the most recent historical year for which electricity generation data is available, andusing for m the power units included in the build margin:

Table 22- EF-CO2 values of fuels used in set sample[26]

Fuels Used in SET Sample	EFCO2 Values (t CO2/GJ)
Natural Gas	0.0543
Import Coal	0.0895

[26] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Lignite	0.0909

b) Average net energy conversion efficiency of power unit m in year y ($\eta_{m,y}$)

Since there is no available data for the plant and year specific efficiency data the efficiency level of best technology available complying the board approved deviation given in footnote 2 is considered. Quotation from the board-approved deviation is given below:

"(ii) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM). For the estimation of the operating margin (OM) the average emission factor for the grid for each fuel type can be used."

Table 23- Efficiency η values for fuels in set sample[27]

Fuels Used in SET Sample	η Values (Ratio)
Natural Gas	0.62
Import Coal	0.50
Lignite	0.50

Efficiency values are taken from the TOOL09 'Determining the baseline efficiency of thermal or electric energy generation systems' version 02.0.

c) Calculation of CO2 emission factor of power unit m in year y (t CO2/MWh)

Using the values in Table 23, the $EF_{EL,m,y}$values for the fuel types are reached.

Table 24-$EF_{EL,m,y}$values for fuel types

Fuels Used in SET Sample	$EF_{EL,m,y}$(t CO2 MWh)
Natural Gas	0.3153
Import Coal	0.6444
Lignite	0.6545

d) Calculation of Build margin CO2 Emission Factor (t CO2/MWh)

Table 25-Total capacities and emission contributions by fuel type

Year	Total NG Capacity Addition (MWe)	Emission Addition of NG (tCO2)	Total Import Coal Capacity Addition (MWe)	Emission Addition of Coal (tCO2)	Total Lignite Capacity Addition (MWe)	Emission Addition of Lignite tCO2)	Total Emissions (tCO2)
2017	2,621.5	826.5	1,320	850.6	2.7	1.7	1,678.9
2016	1,656.4	522.3	9.7	6.3	430	281.4	809.9
2015	203.2	64.1	7.6	4.9	435	284.7	353.7
2014	1,649.7	520.1	2,150	1,385.5	58.1	38.1	1,943.6
Total	6,130.9	1,933	3,487.3	2,247.2	925.8	605.9	4,786.2

[27] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-09-v2.0.pdf

By using the values reached as considering that power plantsworked at full capacity, the calculated Build Margin, $EF_{grid,BM,y}$,is: **0.2902 tCO2/MWh**.

Calculating of the Combined Margin Emission Factor

Using the formula;

$$BEy = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \text{Equation (16)}$$

In accordance with Tool 07, W_{OM} = 0.75 and W_{BM} = 0.25 are considered.

The combined margin emission factor,$EF_{grid,CM,y}$,is calculated through equation as: **0.5678 tCO2/MWh.**

Baseline Emissions

In accordance with AMS-I.D, the baseline emissions are calculated as the net electricity generated by the project activity, multiplied with the baseline emission factor of the project grid.

$$BEy = EG_{PJ,y} \times EF_{grid,y} \quad \text{Equation (1)}$$

where:

BE_y = Baseline Emissions in year y (tCO2e)

$EG_{PJ,y}$ = 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)

$EF_{grid,y}$ = Combined margin CO2 emission factor for grid connected powergeneration in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"(t CO2/MWh)

BE_y= 52,742x 0.5678

=29,948 tCO2/MWh

Project Emissions

Since the project activity is a small scale wind project, PE_y=0

Leakage

In accordance with the AMS-I.D. (version 18), leakage is taken as zero since the project is a new power plant is taken as zero, LE_y= 0

Emission Reductions

$ER_y = BE_y - PE_y - LE_y$ Equation (9)

ER_y = 29,948 tCO2/MWh

B.6.5. Summary of ex ante estimates of each SDG outcome

SDG 7 : Affordable and Clean Energy

Table 26-Net Benefit to SDG 7[28]

Year	Baseline estimate	Project estimate	Net benefit (MWh)
18.03.2019-31.12.2019	41,760	0	41,760
2020	52,742	0	52,742
2021	52,742	0	52,742
2022	52,742	0	52,742
2023	52,742	0	52,742
2024	52,742	0	52,742
2025	52,742	0	52,742
01.01.2026-17.03.2026	10,982	0	10,982
Total	369,194	0	369,194
Total number of crediting years	7		
Annual average over the crediting period	52,742	0	52,742

[28] Micrositing Report, dated January 2009

SDG 8 : Decent Work and Economic Growth

The project has provided employment opportunities which would not exist at the local area in the baseline scenario. 14 personnel are expected to work permanently and thus the project and this contributes to the target 8.5: "By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value." and the indicator 8.5.2.: " Unemployment rate, by sex, age and persons with disabilities". The employees will be paid above minimum wage and better than local average.

The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments. Attendance records or training certificates will be provided for each monitoring period. The project would contribute to the target 8.8: "Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment" and the indicator 8.8.1: "Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status".

SDG13 :Climate Action

Table 27-Net Benefit to SDG 13

Year	Baseline estimate	Project estimate	Net benefit (tCO_2)
18.03.2019-31.12.2019	23,712	0	23,712
2020	29,948	0	29,948
2021	29,948	0	29,948
2022	29,948	0	29,948
2023	29,948	0	29,948
2024	29,948	0	29,948
2025	29,948	0	29,948
01.01.2026-17.03.2026	6,235	0	6,235
Total	209,635	0	209,635
Total number of crediting years	7		
Annual average over the crediting period	29,948	0	29,948

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Relevant SDG Indicator	7.2.1 Renewable energy share in the total final energy consumption
Data / Parameter	$EG_{PJ,\ y,\ facility}$

Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	EPIAS records (Meter Reading Forms of the main power meter is with a serial number of 5316624 or OSF forms issued by governmental officers will be used for the crosscheck)
Value(s) applied	The annual electricity fed to the grid is estimated as 52,742 MWh.
Measurement methods and procedures	The net electricity is measured continuously by a power meter at the grid interface and recorded monthly.EPIAS records are the source of the exact electricity generation of the project and the imports from the grid. The quantity of net electricity delivered to the grid is cross checked with the meter reading records (OSF forms-OSOS) which are provided to the company by TEIAS. For the aim of reaching the actual values derived from the registered capacityof the power plant (15 MW), the ratio between the feasibility studies of the registered and added capacities will be considered. Thus, baseline emissions will be based on the adjusted net electricity supplied to the grid. Net electricity generation supplied by the project plant to the grid [MWh] = Electricity supplied to the grid [MWh] - Electricity consumption from the grid [MWh]
Monitoring frequency	Continuous monitoring, hourly measurement and at least monthly recording Meters information:

	Main Power Meter	Back-up Power Meter
Manufacturer	EMH	EMH
Serial Number	5316624	5316625
Date of Installation	26/11/2015	26/11/2015
The Test Date of the Meters	02/12/2017	02/12/2017
Accuracy of meters	0.2S class	0.2S class

QA/QC procedures	• A back-up meter is used for crosschecking the accuracy and both meters are periodically tested. • The metering devices are in line with the technical requirements which are set out by the Communiqué for Metering Devices to be used in the Electricity Market, which describes the minimum accuracy requirement the metering devices have to fulfil, which are categorized according to the installed capacity. The periodical test or maintenance is under the responsibility of TEIAS.Since TEİAŞ meters are sealed by TEİAŞ, the project proponent cannot intervene with the devices. • The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import. EPIAS recordsare crosschecked with the meter reading protocols (OSOS-OSF forms) • In addition to metering devices every single wind turbine generation is monitored and the data will be stored through a SCADA system.
Purpose of data	Calculation of emission reductions SDG 7.2. By 2030, increase substantially the share of renewable energy in the global energy mix
Additional comment	

Relevant SDG Indicator	8.5.2Unemployment rate, by sex, age and persons with disabilities
Data / Parameter	Number of employment
Unit	Number
Description	Number of people permanentlyworking for the operation of the project
Source of data	Social Security System (SGK)
Value(s) applied	14
Measurement methods and procedures	Social Security System (SGK) records
Monitoring frequency	Once for each monitoring period
QA/QC procedures	SGK records of employees are provided during each monitoring period.
Purpose of data	SDG 8.5.By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value
Additional comment	

Relevant SDG Indicator	8.8.1 Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status
Data / Parameter	Number of trainings
Unit	Number
Description	Number of training sessions held
Source of data	Attendance records or training certificates
Value(s) applied	-

Measurement methods and procedures	Attendance records or training certificates
Monitoring frequency	Once for each year of operation
QA/QC procedures	Attendance records or training certificates are provided during each monitoring period.
Purpose of data	Monitoring the trainings to justify contribution to SDG 8.8.Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
Additional comment	

Relevant SDG Indicator	13.3.2Number of countries that have communicated the strengthening of institutional, systemic and individual capacity-building to implement adaptation, mitigation and technology transfer, and development actions
Data / Parameter	ER_y
Unit	tCO_2/y
Description	Emission reductions by the project activity in year y (t CO2/yr) In accordance with AMS-I.D, baseline emissions include $CO_2$from electricity generation in powerplants that are displaced due to the project activity. And baseline emissions correspond to emission reductions and are calculated as the net electricity generated by the project activity, multiplied with combined margin CO2 emission factor for grid connected powergeneration in year y.
Source of data	Both measured and calculated Emission reductions will be calculated as considering the EPIAS records for the net electricity generated and the emission factor for the grid, 0.56786 tCO2/MWh, calculated using the TEIAS annual data
Value(s) applied	29,948 tCO2 [29]
Measurement methods and procedures	Please check sections B.6.2-B.6.4 and B.7.3 for more detailed description of the monitoring plan.
Monitoring frequency	Once for each year of operation
QA/QC procedures	Please check sectionB.7.3 for the monitoring plan.
Purpose of data	Calculation of combined margin CO2 emission factor and thus the baseline emissions-to demonstrate contribution to SDG Target 13.3.: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
Additional comment	

B.7.2. Sampling plan

[29]This value could change depending on the electricity generated.

N/A

B.7.3. Other elements of monitoring plan

The Project Owner will be responsible for the overall management of the monitoring proceduresincluding recording, data collection and store. The consultant will calculate emission reductions based onthese monitored data and prepare monitoring report.

Please see the operational structure of the Boreas-1 Enez Wind Power Plant as below:

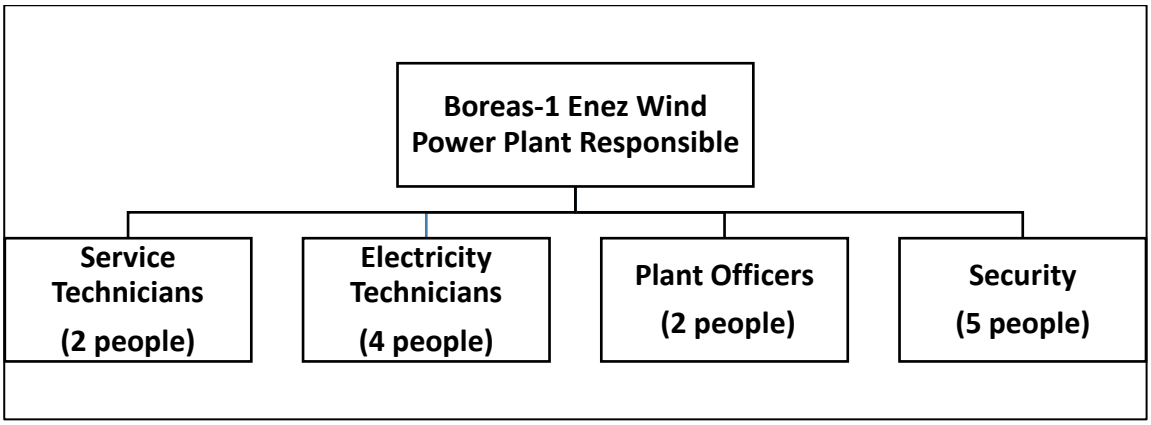

Figure 7. Operational Structure of the Project Activity

According to the methodology applied, the electricity supplied to the national grid by the project and the electricity consumed by the project activity shall be monitored. The net electricity is the difference of the electricity supplied and consumed by the project and shall be taken into account for emission reduction calculations.

Two power meters are installed at the grid interface of the project. One is the main meter and the other is back-up meter of the main meter for cross-checking. Both meters are jointly inspected and sealed in order to be protected from interference by any of the parties.

The capacity of the transmission line connected is 154 kVA, the accuracy class for main power meter has been defined in the Communiqué for Power Meters as 0.2S class. The back-up meter has the same accuracy class of 0.2S. The calibration will be implemented in accordance with the related standard procedures (IEC-EN 60687) by either Turkish Electricity Transmission Corporation (TEIAS) or the provider company in the name of TEIAS. The meters are calibrated on yearly basis. The latest calibration was made on 02/12/2017 .

The data is hourly recorded by the personnel electronically and also Trakya Load Dispatching Center of TEIAS executes remote reading during 24 hour period. At the end of each month, the readings are sent via e-mail to Babaeski TEIAS office and Trakya Load Center to be compared and approved. The data can also be remotely accessed byTrakya Load Dispatching Center Additionally, the Project Owner enters the expected electricity generation on daily basis to the website of EPIAS which is the financial settlement centre of TEIAS. The website of EPİAŞ is accessible to project owner with their unique user ID and password. The difference

between the expected and generated electricity (imbalance) is costed the project owner at the end of each month. The electricity generation data is reported monthly.

EPIAS records will used as the source of net generated electricity value andmeter reading forms or OSF forms issued by TEIAS will be used for the crosscheck.

All data collected as part of monitoring will be archived electronically by the project owner and be kept at least for 2 years after the end of the last crediting period.

Since the installed capacity of the project activity has been increased by adding two units, the net electricity generation of the registered capacity will be monitored as comparing these units'expected generation to the registered capacity's expected generation. By using the proportion, the actual generation of the added units will be tried to determined. Then, this value will be subtracted from the actual generation of the project activity.

Considering the Sustainable Development Matrix Indicators stated in the first crediting period has been simplified in section B.7.1. The indicators not stated to be monitoredseparately during the second crediting period may bee seen below.

No	Indicator	Explanation
1	Air Quality	The indicator is stated to be monitored during the construction phase.
2	Water quality and quantity	Domestic wastewater is collected by the designated entites by the municipality. From the start date of the project activity, the process is handled according to the regulations of Ministry of Environment and Urbanization.
3	Soil Condition	The indicator is stated to be monitored during the construction phase.
4	Other pollutants (Noise level)	There has not been any complaint on noise, since the project started operation. Additionally, the nearest village is approximately 1km far from the Project field.
5	Other pollutants(Solid waste)	The indicator is stated to be monitored during the construction phase.
6	Biodiversity	The indicator is stated to be monitored during at the end of the first and second year of operation.
8	Livelihood of the poor	Various contributions and donations to local community have done by the project owner and the related proofs were submitted to the DOE regarding the first crediting period. The project owner use its best efforts to help in case of any need from the villagers.
9	Livelihood of the poor	
11	Human and institutional capacity	

SECTION C. Duration and crediting period

C.1. Duration of project

C.1.1. Start date of project

26/01/2009 (Date of the validation of EM contract with the second down payment and bank letter)

C.1.2. Expected operational lifetime of project

49 years

C.2. Crediting period of project

C.2.1. Start date of crediting period

Start date of the first crediting period: 25/04/2011

End date of the first crediting period: 24/04/2018

Even though the commissioning date of the power plant is 09/04/2010 , the crediting period starts two years before the registration date as per the GS guidelines.

Start date of the second crediting period: 18/03/2019

End date of the second ~~first~~ crediting period: 17/03/2026

C.2.2. Total length of crediting period

7 years, renewed twice

SECTION D. Safeguarding principles assessment

D.1. Analysis of social, economic and environmental impacts

Safeguarding principles	Assessment questions	Assessment of relevance to the project (Yes/potentially/no)	Justification	Mitigation measure (if required)
SOCIAL & ECONOMIC SAFEGUARDING PRINCIPLES AND REQUIREMENTS				
1Human Rights	1.The Project Developer and the Project shall respect internationally proclaimed human rights and shall not be complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights.	No	1. Turkey is a party to European Convention on Human Rights since 18.May. 1954.[30] 2. The project owner respects internationally proclaimed human rights including dignity, cultural	Not required

[30]Please See Official Website of Ministry of Foreign Affairs of Turkey: http://www.mfa.gov.tr/the-european-convention-on-human-rights.en.mfa

	2.The Project shall not discriminate with regards to participation and inclusion.		property and uniqueness of indigenous people. The project is not complicit in Human Rights abuses.	
2– Gender Equality and Women's Rights	1.Gender assessment questions a. Is there a possibility that the Project might reduce or put at risk women's access to or control of resources, entitlements and benefits? b.Is there a possibility that the Project can adversely affect men and women in marginalised or vulnerable communities (e.g., potential increased burden on women or social isolation of men)? c.Is there a possibility that the Project might not take into account gender roles and the abilities of women or men to participate in the decisions/designs of the project's activities (such as lack of time, child care duties, low literacy or educational levels, or societal discrimination)? d.Does the Project take into account gender roles and the abilities of women or men to benefit from the Project's activities (e.g., Does the project criteria ensure that it includes minority groups or landless peoples)? e.Does the Project design contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities? f.Would the Project potentially reproduce or further deepen discrimination against women based on gender, for instance, regarding their full participation in design and implementation or	No	1. a.No, the project does not reduce access to or control of resources for women. b.No, the project does not involve in any form discrimination in any kind of form.The project respects the employees' freedom of association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights. c.The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis. d.No, the project does notdiscriminate on basis of gender. e. No, the project design does not contribute to an increase in women's workload that adds to their care responsibilities or that prevents them from engaging in other activities. f.No,the project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis. g.No, the project is not complicit in restrictions of any freedoms and rights; and does not involve and	Not required

	access to opportunities and benefits? g.Would the Project potentially limit women's ability to use, develop and protect natural resources, taking into account different roles and priorities of women and men in accessing and managing environmental goods and services? h.Is there a likelihood that the proposed Project would expose women and girls to further risks or hazards? 2.The Project shall not directly or indirectly lead to/contribute to adverse impacts on gender equality and/or the situation of women. a.Sexual harassment and/or any forms of violence against women – address the multiple risks of gender-based violence, including sexual exploitation or human trafficking. b.Slavery, imprisonment, physical and mental drudgery, punishment or coercion of women and girls. c.Restriction of women's rights or access to resources (natural or economic). d.Recognise women's ownership rights regardless of marital status – adopt project measures where possible to support to women's access to inherit and own land, homes, and other assets or natural resources. 3. Projects shall apply the principles of nondiscrimination, equal treatment, and equal pay for equal work, specifically. a.Where appropriate for the implementation of a Project, paid, volunteer work or community contributions will be organised to		is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis. h.No, the project does not expose women and girls to further risks or hazards. 2. a.The project does not lead or contribute sexual harassment and/or any forms of violence against women. b. There is no such risk for the project. Participation in the project is voluntary. c. The project does not restrict women's rights or access to resources (natural or economic). d.The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis. 3.a. The Project provide equal opportunity for women and men to contribute both in volunteer and working positions. b. The project owner takes into account participation by both men and women. 3. The access of women or men, as the case may be, to Project participation and benefits is not limited. 4. The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.	

	provide the conditions for equitable participation of men and women in the identified tasks/activities. b.Introduce conditions that ensure the participation of women or men in Project activities and benefits based on pregnancy, maternity/paternity leave, or marital status. c.Ensure that these conditions do not limit the access of women or men, as the case may be, to Project participation and benefits. 4. The Project shall refer to the country's national gender strategy or equivalent national commitment to aid in assessing gender risks.		Turkey signed the convention of International Labour Organization. The related articles are 100 and 111. The project owner respects Article 5/8425 of Labour Law; which states no discrimination based on gender, race, religion, sexual orientation or any other basis is allowed.	
3-Community Health, Safety and Working Conditions	The Project shall avoid community exposure to increased health risks and shall not adversely affect the health of the workers and the community.	Potentially	The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments. Turkey signed the convention of International Labour Organization. The related article is 155. The project owner respects Article 77 of Labour Law No.4857 and will take necessary measures.	For risk associated with construction, health and safety trainings are given to the workers. All personelare trained on general health and safety trainings, including working at height.
4-Cultural Heritage, Indigenous Peoples, Displacement and Resettlement	1.Does the Project Area include sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, or practices)?	No	1.The project does not involve and is not complicit in the alteration, damage or removal of any critical cultural heritage (EIA report). 2.a. The project does not involve and is not	Not required

	2.a. Does the Project require or cause the physical or economic relocation of peoples (temporary or permanent, full or partial)? 2.b.For Projects involving land-use tenure, are there any uncertainties with regards land tenure, access rights, usage rights or land ownership? 3.Are indigenous peoples present in or within the area of influence of the Project and/or is the Project located on land/territory claimed by indigenous peoples?		complicit in involuntary resettlement.No residents are required to be re-located. 2.b.The project does not involve land-use tenure, and there are no uncertainties with regards land tenure, access rights, usage rights or land ownership.The project land have been approved by the local Authorities. 3.No,indigenous peopledo not present within the area of influence of the Project.	
5-Corruption	The Project shall not involve, be complicit in or inadvertently contribute to or reinforce corruption or corrupt Projects.		The project does not involve and is not complicit in corruption. Turkey is a party to OECD and is party to Anti-Bribery Convention.[31] The project owner respects Declaration of property and Anti- Corruption Law No.3628[32]	Not required
6-Economic Impacts	1. The Project Developer shall ensure that there is no forced labour and that all employment is in compliance with national labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organization (ILO) fundamental conventions.		1.The project does not involve and is not complicit in any form of forced or compulsory labour.Turkey signed the convention of International Labour Organization.[33] 2.The project respects the employees' freedomof association and their right to collective	Not required

[31] http://www.oecd.org/turkey/turkey-oecdanti-briberyconvention.htm

[32] http://www.mevzuat.gov.tr/MevzuatMetin/1.5.3628.pdf

[33] https://www.ilo.org/dyn/normlex/en/f?p=1000:11200:0::NO::P11200_COUNTRY_ID:102893

	2. Workers shall be able to establish and join labour organisations. 3.Child labour, as defined by the ILO Minimum Age Convention is not allowed. 4.The Project Developer shall ensure the use of appropriate equipment, training of workers, documentation and reporting of accidents and incidents, and emergency preparedness and response measures.		bargaining and is not complicit in restrictions of these freedoms and rights.Turkey signed the convention ofInternational Labour Organization. The related articles are 87 and 98[34]. The project owner respects Labour Law 4857[35] and Trade Union ActNo.2821[36]. 3.The project does not employ and is not complicit in any form of child labour.Turkey signed the convention of International Labour Organization regarding the prevention of child labour with the articles 182 and 138[37]. 4.The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments. Health and safety trainings are given to the workers.	
ENVIRONMENTAL & ECOLOGICAL SAFEGUARDING PRINCIPLES AND REQUIREMENTS				
1 – Climate and Energy	1.Will the Project increase greenhouse gas emissions over the Baseline Scenario? 2.Will the Project use energy from a local grid or power supply (i.e., not connected to a national or regional grid) or fuel resource (such	No Yes	1. The project reduces greenhouse gas emissions compared to the baseline scenario. The project generates renewable energy and	Not required

[34] https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm

[35] https://www.tbmm.gov.tr/kanunlar/k4857.html

[36] http://www.mevzuat.gov.tr/MevzuatMetin/1.5.2821.pdf

[37] https://www.ilo.org/ankara/conventions-ratified-by-turkey/lang--en/index.htm

	as wood, biomass) that provides for other local users?		supplies to the national grid. 2. The auxiliary consumption of the Project is met from the national grid.	
2-Water	1-Will the Project affect the natural or pre-existing pattern of watercourses, ground-water and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	No	The project does not have any impact on the surface and ground water quality. No rivers with continuous flow regime exist in the project site.The nearest river to the project site is Meriç River which is 4.5 kms far away. And the project owner complys with all relevant national laws. Regarding daily water consumption of the employees, it's for derived from a well which is close to the Project site. For drinking purpose, water is purchased from the supermarket. Thus, no significant changes with regard to both ground and surface waters have been realized.	
3- **E**nvironment, ecology and land use	1.Does the Project involve the use of land and soil for production of crops or other products? 2.Will the Project be susceptible to or lead to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme climatic conditions? 3.Could the Project be negatively impacted by the use of genetically modified organisms or GMOs (e.g.,	No	1-The project land have been approved by the local Authorities. 2.The project is not susceptible to increased vulnerability to wind, earthquakes, subsidence, landslides, erosion, flooding, drought or other extreme conditions. 3.N/A	Not required

	contamination, collection and/or harvesting, commercial development)? 4.Could the Project potentially result in the release of pollutants to the environment? 5.Will the Project involve the manufacture, trade, release, and/ or use of hazardous and non-hazardous chemicals and/or materials? 6.Will the Project involve the application of pesticides and/or fertilisers? 7.Will the Project involve the harvesting of forests? 8.Does the Project modify the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives? 9.Will the Project involve animal husbandry? 10.Does the Project physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified? 11.a. Are there any endangered species identified as potentially being present within the Project boundary (including those that may route through the area)? b. Does the Project potentially impact other areas where endangered species may be present through transboundary affects?		4. The project complys withthe related regulations ofMinistry of Environment and Urbanization.The project owner acted in compliance with the Regulation on Control of Excavation Soil, Construction and Debris Waste and the Regulation on Prevention and Control of Industrial Air Pollution to minimize the emissions caused by construction works.[38] 5.During operation of the wind farm there are no positive nor negative impacts expected. During excavation and construction no hazardous, toxic or flammable materials will be used. 6. N/A 7.N/A 8.The project does not exist within the agricultural land, therefore the Projectdoes not modify the quantity or nutritional quality of food available. 9. No 10.The Project does not physically affect or alter largely intact or High Conservation Value (HCV) ecosystems, critical habitats, landscapes, key biodiversity areas or sites identified.Turkey has its own legislations regarding	

[38]Project Introduction File, pages 10,11

			the protected areas and is a party of many International agreements regarding the protected areas like BERN and RAMSAR.The project is in line witlh the legislations. No endemic flora species exist in the field. 11.There are not endangered species identified as potentially being present within the project land (including those that may route through the area).	

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from stakeholders

In order to develop the project as a Gold Standard VER project a Local Stakeholder Consultation Meeting which is in line with Gold Standard Requirements was held on 29/04/2009 in Enez. Another meeting for the stakeholder feedback consultation was held on 09/11/2009. Two stakeholder meetings were carried out by ENÇEV Energy Environmental Investments Consultancy L.C.

Regarding the renewable crediting period, a site visit with DOE was made on 12/11/2018.The local people were interviewed and the general outcome of the interviews was positive verbally.

E.2. Summary of comments received

According to the Gold Standard requirements, local stakeholders were identified including local people, local and national NGOs, project developers and entities involved in implementation and operation of the project activity. At the stakeholder meeting held on 29/04/2009 in Hisarli village, besides project developers and local citizens, there were two representatives of Enez Municipality and two headmen of neighbouring villages.In brief, the support of the participants for the project was easily observed.

After the Stakeholder Feedback Round (two month period), the second meeting was organized as a second stakeholder meeting on 09/11/2009 with the local stakeholders in Hisarlı village.All issues rose in the first local stakeholder consultation meeting were evaluated during the meeting. Generally, the stakeholders were pleasant about the project. Since they have informed regardingthe project at the first stakeholder consultation process they have no negative comments on the project.

From the date of the poject activity started, there haven't been any negative comments from the stakeholders during the period of construction and operation phases.

Regarding the renewable crediting period, a site visit with DOE was made on 12/11/2018.The local people were interviewed and the general outcome of the interviews was positive verbally. Since the GS continuous input mechanism by which any complaint or a request could be communicated with the project owner is always

available and the contact information of the plant responsible is available at the Mukhtar, the project owner and local community are always in touch. The project owner regularly checks with the Mukhtar if any complaint or a request exist.Any complaint or need from the local community could directly be received by the project owner and appropriate contributions are made to the local community[39].

E.3. Report on consideration of comments received

Although no negative comments have been received during the stakeholders' process, Boreas Enerji is aware of the importance of the project for the region and wants to further contribute to the social and sustainable development of the region. As an outcome of the close communication and relation with local community the project owner implemented several measures and provided beneficial contributions to the region[40].

[39]The related proofs are available to the DOE.

[40]The related documents are available to the DOE.

Appendix 1. Contact information of project participants

Organization name	Boreas EnerjiÜretimSistemleri Sanayi veTicaret A.Ş.
Registration number with relevant authority	
Street/P.O. Box	Ahmet Adnan Saygun Cad. Kultur Mah. Venus Sok.
Building	1/15 Beskitas
City	Istanbul
State/Region	
Postcode	
Country	Turkey
Telephone	+90 212 265 78 01
Fax	+90 212 265 78 21
E-mail	
Website	http://www.boreas.com.tr/
Contact person	
Title	Vice Chairman
Salutation	Mr.
Last name	Orsan
Middle name	Ozan
First name	Sabri
Department	
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	ozanorsan@boreas.com.tr
Organization name	SekansDanismanlik
Street/P.O. Box	CubukluMah. Vatan Cad. KorfezSitesi
Building	35/5
City	Istanbul
State/Region	
Postcode	
Country	Turkey
E -mail	sila@sekansdanismanlik.com

Appendix 2. Summary of post registration design change

The date of the registered PDD is 17/07/2013 with a version number of 8 and the first crediting period start date is01/05/2011 even though the commissioning date of the power plant is 09/04/2010.As per the GS guidelines the crediting period starts two years before the registration date.

The generation license of the project was revised on 26/06/2013. The installed capacity of the project has been raised to 20 MW with the revision. Two turbines were added to the project on 16/04/2015 and 02/08/2016, respectively.

As compared to the initial design, the wind farm is extended by further 2 turbines with a rated capacity of 3.3 MW each, summing up to total installed capacity of 20 MW from 15 MW. The added turbines would be operated as 2. 5 MWs due to power limitation according to the generation license. It's crucial to state that the new turbines were installed witin the current project site which has been devoted by EMRA. Since the approved capacity of the project activity is 15 MW by GS, the PDD has been revised accordingly for the second crediting period.

Appendix 3. Documentary from the Mukhtar

8.11.2018

Halkımızın Boreas 1 Enez RES hakkındaki herhangi bir şikayetinde ulaşabileceği santral sorumlusu Mehmet Ersun Şılak'ın iletişim bilgileri bizde mevcuttur ve halkımız ile paylaşılacaktır.

Boreas 1 Enez RES santral sorumlusu Mehmet Ersun Şılak -
ersunsilak@boreas.com.tr
0530 879 02 45

Hisarlı Muhtarı : Emin SAYGIN

İmza :

Revision History

Version	Date	Remarks
1.1	24 August 2017	Updated to include section A.8 on ‘gender sensitive’ requirements
1	10 July 2017	Initial adoption