ÇERÇIKAYA WIND POWER PROJECT

Document Prepared By Life İklim ve Enerji Ltd. Şti.

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Prepared By	Life İklim ve Enerji Ltd. Şti.
Contact	Address: Oğuzlar Mah. 1377. Sk. No:19/9 Balgat, Çankaya/Ankara e-mail: info@lifeenerji.com phone:0090 312 481 21 42 fax: 0090 312 480 88 10

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PROJECT DETAILS

1.1 Summary Description of the Project

The project of **ZT Enerji Elektrik Üretim San. Ve Tic. A.Ş.** (hereafter referred to as "**ZT Enerji**"), **Çerçikaya Wind Power Project** (hereafter referred to as the "Project" or "**Çerçikaya WPP**"), involves installation and operation of 53 MWe / 57MWm[1] wind power plant by Energy Market Regulatory Authority (EMRA) and this licence was issued on 1st of March 2012 and it has been revised on 17th of June 2015.

An **estimated electricity generation of 164,221MWh[2] per year** by the efficient utilization of the available wind energy by project activity will replace the grid electricity, which is constituted of different fuel sources, mainly fossil fuels. The electricity produced by project activity will be expected to result in a **total emission reduction of 101,473 tonnes of CO_2e per year**. Moreover, project activity will contribute further dissemination of wind energy and extension of national power generation. It is expected that the generation of electricity fully started on 20th of March 2015 and will have an operational life of 49 years[3].

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

The project will help Turkey to stimulate and commercialise the use of grid connected renewable energy technologies and markets. Furthermore, the project will demonstrate the viability of grid connected wind farms which can support improved energy security, improved air quality, alternative sustainable energy futures, improved local livelihoods and sustainable renewable energy industry development. The specific goals of the project are to:

- reduce greenhouse gas emissions in Turkey compared to the business-as-usual scenario;
- help to stimulate the growth of the wind power industry in Turkey;
- create local employment during the construction and the operation phase of the wind farm;
- reduce other pollutants resulting from power generation industry in Turkey, compared to a business-as-usual scenario;
- help to reduce Turkeys increasing energy deficit;
- and differentiate the electricity generation mix and reduce import dependency.

As the project developer, **ZT Enerji** believes that efficient utilization of all kinds of natural resources with a harmony coupled with responsible environmental considerations is vital for sustainable development of Turkey and the World. This has been a guiding factor for the shareholders towards the concept of designation and installation of a wind power project. Other than the objective of climate change mitigation through significant reduction in greenhouse gas (GHG) emissions, the project has been carried out to provide social and economic contribution to the region in a sustainable way. The benefits that will be gained by the realization of the project compared to the business-as-usual scenario can be summarized under four main indicators:

[1] See; EIA Not Required Decision for 19 turbines
[2] See; Bankable Energy Yield Assessment Report page 9
[3] Çerçikaya Generation License for 19 turbines

Environmental

The project activities will replace the grid electricity, which is constituted of different fuel sources causing greenhouse gas emissions. By replacing in the consumption of these fuels, it contributes to conservation of water, soil, flora and faunas and transfers these natural resources and also the additional supply of these primary energy sources to the future generations. In the absence of the project activity, an equivalent amount of electricity would have been generated from the power plants connected to the grid, majority of which are based on fossil fuels. Thus, the project is replacing the greenhouse gas emissions (CO_2, CH_4) and other pollutants (SO_X, NO_X, particulate matters) occurring from extraction, processing, transportation and burning of fossil-fuels for power generation connected to the national grid.

Economical

Firstly, the project will help to accelerate the growth of the wind power industry and stimulate the designation and production of renewable energy technologies in Turkey. Then, other entrepreneurs irrespective of sector will be encouraged to invest in wind power generations. It will also assist to reduce Turkey's increasing energy deficit and diversify the electricity generation mix while reducing import dependency, especially natural gas. Importantly, rural development will be maintained in the areas around the project site by providing infrastructural investments to these remote villages.

Social

Local employment will be enhanced by all project activities during construction and operation of wind farm. As a result, local poverty and unemployment will be partially eliminated by increased job opportunities and project business activities. Construction materials for the foundations, cables and other auxiliary equipment will preferentially be sourced locally. Moreover as contribution of the project to welfare of the region, the quality of the electricity consumed in the region will be increased by local electricity production, which also contributes decreasing of distribution losses.

Technological

Implementation of the proposed project will contribute to wider deployment of wind power technology in local and national level. It will demonstrate the viability of larger grid connected wind farms, which will support improved energy security, alternative sustainable energy, and also renewable energy industry development. This will also strengthen pillars of Turkish electricity supply based on ecologically sound technology.

1.2 Sectoral Scope and Project Type

The respective sectoral scope is scope 1: "Energy Industry – Renewable/Non-renewable Sources". Installed capacity of the project is 57 MWe, thus it falls into a large scale project activity.

The project is not a grouped project.

1.3 Project Proponent

ZT Enerji is the developer and owner of the Project.

Organization name	ZT Enerji Elektrik Üretim San. Ve Tic. A.Ş.
Contact person	Erhan Kalender
Title	Energy Engineer
Address	Hatır Sokak No:22 Gaziosmanpaşa / Ankara
Telephone	90 312 447 00 70
Email	ekalender@zaf.com.tr

1.4 Other Entities Involved in the Project

The project documentation at hand was defined by ZT Enerji in cooperation with Life İklim ve Enerji (PD consultancy).

Organization name	Life İklim ve Enerji Ltd. Şti.
Role in the project	Carbon Consultant
Contact person	Elif Özdemir
Title	Assistant Expert
Address	Oğuzlar Mah. 1377. Sk. No:19/9 Balgat, Çankaya/Ankara
Telephone	+90 312 481 21 42
Email	elif.ozdemir@lifeenerji.com

1.5 Project Start Date

The project start date is 20th of March 2015.

1.6 Project Crediting Period

A two times renewable crediting period of 10 years 0 month shall apply. First verifiable emission reductions shall be achieved on 11th of January 2015. Thus, the first crediting period shall last from 20th of March 2015 until 19th of March 2025.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	x

Year	Estimated GHG emission reductions or removals (tCO_2e)
2015*	76,105
2016	101,473
2017	101,473
2018	101,473
2019	101,473
2020	101,473
2021	101,473
2022	101,473
2023	101,473
2024	101,473
2025**	25,368
Total estimated Ers	**1,116,203**
Total number of crediting years	**10**
Average annual ERs	101,473

*Start date; 20/03/2015
**End date; 19/03/2025

1.8 Description of the Project Activity

According to the Generation License, 19 wind turbines with unit capacity of 3000 kW were selected for the project. Acciona is decided as equipment provider due to the outstanding features of its product regarding safety factors, simple durable design for low maintenance and long life operation, high efficiency, and also for fine visual appearance. The key parameters about the technical design of the selected model Acciona AW 125 are listed below in table.

Table 1: Technical specifications of Acciona AW 125 Turbines[4]

Specifications	Acciona AW 125
Rated Power (kW)	3000
Rotor Diameter (m)	125
Num. of Blades	3
Swept Area (m²)	12,272

Technical life time of the Çerçikaya WPP is determined by using the 'Tool to determine the remaining lifetime of equipment''[5]. In the tool it is stated that;

Project participants may use one of the following options to determine the remaining lifetime of the equipment:

[4] See, Bankable Energy Yield Assessment Report, page 9
[5] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

(a) Use manufacturers information on the technical lifetime of equipment and compare to the date of first commissioning;

(b) Obtain an expert evaluation;

(c) Use default values.

For the project option (c) is used. So in the tool it is said that default lifetime for the on-shore wind turbines is 25 years

With figures taken from the Generation License, Plant Load Factor (PLF) is calculated as follows;

PLF= Annual Gen. / Installed Cap. * (working hours)

=184017/57*8760

=0.37

The project activity will achieve emission reductions by avoiding CO_2 emissions from the business-as-usual scenario electricity generation produced by mainly fossil fuel-fired power plants within the Turkish national grid. Total emission reduction over the 10 year crediting period is expected to reach **1,116,203** tCO2e with the assumed total net electricity generation of 184,017 MWh per year.

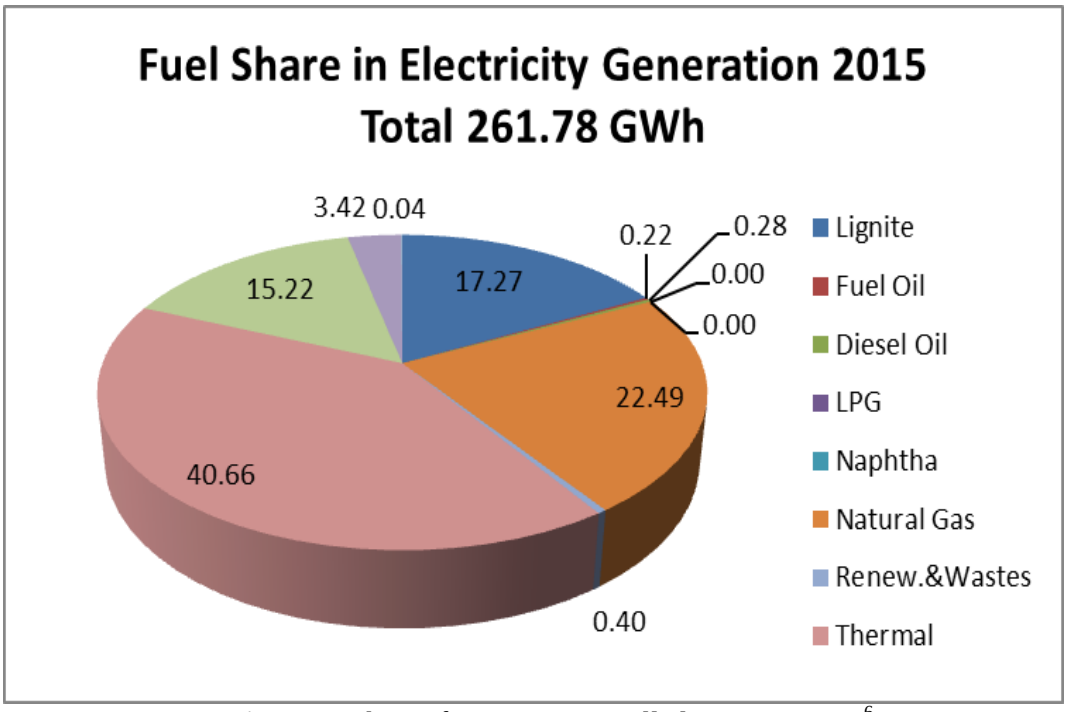

Figure 1: Share of Sources in Installed Capacity 2015[6]

[6] See, Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (2006-2015): http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm

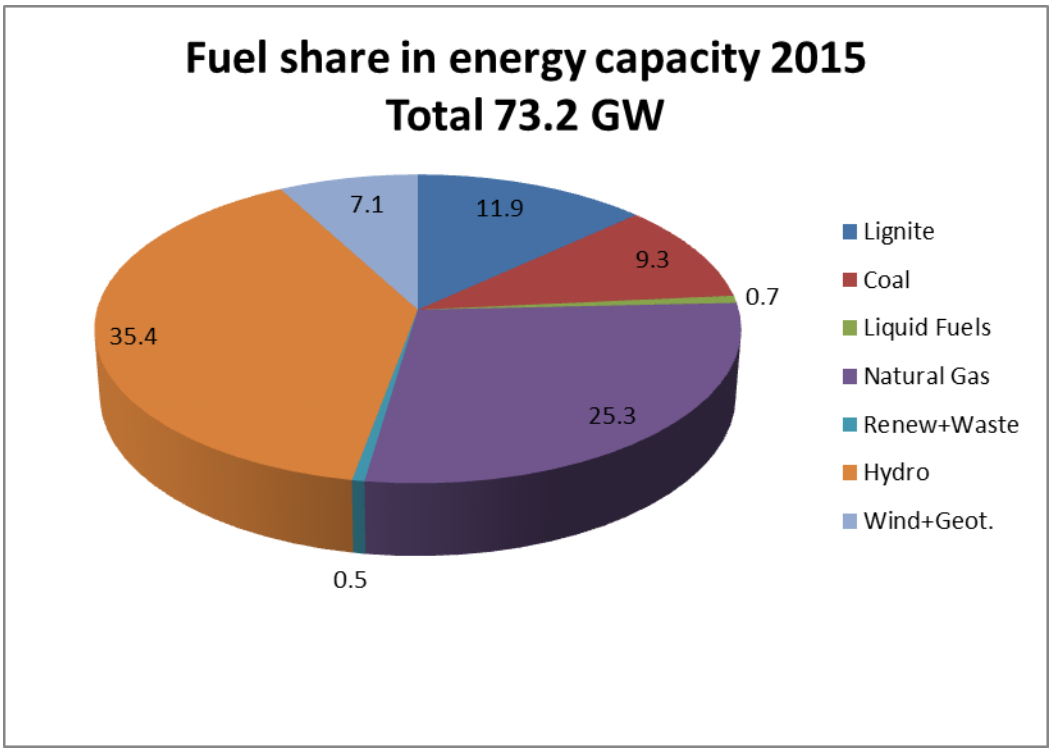

Figure 2: Share of Sources in Electricity Generation 2015[7]

Although Turkey has a very good wind resource, substantial space, a reasonably good electrical infrastructure and an approaching shortage of electricity; it uses negligible capacity (less than 5%) of its onshore potential, which is estimated as 53,000 MW by Ministry of Energy and Natural Resources (MENR).[8] Lack of attractive incentives and tax advantages, limited grid access and restricted turbine supply constitutes the major barriers in front of the wind energy.

Renewable energy law, enacted in 2005, which had amendments in end of 2010 regarding feed-in tariffs, stipulates a purchase obligation by the retail companies for 10 years with a purchase price 7.3 USDc/kWh (~5.5 €c/kWh) for the power plants put in operation by end of 2015[9]. This tariff is much below the average remuneration in the leading wind markets and does not constitute a sufficient incentive for investments in little experienced wind energy sector of Turkey. The revenues calculated according to these regulations are considered in the investment planning of the projects and do not lead to returns that let the project be profitable or attractive for capital investors and lenders.

[7] See, The Distribution of Installed Capacity by Primary Energy Resources and The Electricity Utilities in Turkey (2015): http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm , excel file number 13

[8] See, Presentation of Zeynep Günaydın from MENR, http://www.senternovem.nl/mmfiles/MENR_tcm24-287950.pdf page 9

[9] See : http://www.epdk.org.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_Yek_Kanun.doc (List I in page 10)

These numbers and figures show the contribution of a wind power project like Çerçikaya WPP to the development of environmental friendly electricity generation instead of above described Turkish mix of hydroelectric and fossil fuelled power plants, which are better known and financially more attractive from an investor's point of view. The emission reductions would not occur in the absence of the proposed project activity because of various real and perceived risks that impede the provision of financing.

Çerçikaya WPP, as a large wind power plant project, will serve as a perfect project to demonstrate long-term potential of wind energy as a means to efficiently reducing GHG emissions as well as to diversifying and increasing security of the local energy supply and contributing to a sustainable development. Wind driven turbines will rotate in generators and electricity generated here will be transferred to the grid for consumer without any greenhouse gas emissions. The VCS shall help to realize this seminal technology by providing an adequate compensation for the lacking financial incentives in the Turkish renewable energy market.

Generation of emission reduction and by the way crediting period will start with the first day of documented electricity supply to the national grid. The first 10-year crediting period is going to be from 11th of January 2015 to 10th of January 2025 . Applying the approved methodology to the project annual average amount of 101,473 tCO2e emission reductions is estimated to be achieved by producing 184,017 MWh/year electricity. In each year the amount of VCUs actually generated by the project will vary depending on the metered net electricity supplied to the grid, but totally 1,116,203 tCO2e emission reductions is expected over the period of 10 years.

1.9 Project Location

Project area is in Mediterranean region, Hatay province. The project is located in İskenderun District. Moreover, the site of the project is located at Çerçikaya Village and will be situated on several hills, between Karayol, Bozburun, Kırmızıtepe. The closest settlement is Çakırayan Neighbourhood by 125 m [10].

[10] See, According to the distance between T10 and Yarış Village

Map 1: Location of Çerçikaya Wind Power Plant Project[11]

[11] See; Çerçikaya Ornithology Report, page 4

Table 2: Geographical coordinates of the wind turbines of the project activity[12]

Wind Turbine No.	Latitude (N)	Longitude (E)
1	36º 26' 23,5860''	48º 07' 28,1688''
2	36º 26' 18,9024''	48º 07' 23,0410''
3	36º 26' 07,9332''	48º 07' 16,0202''
4	36º 26' 07,7604''	48º 07' 08,9985''
5	36º 26' 02,2020''	48º 07' 01,9771''
6	36º 25' 55,6032''	48º 06' 58,6883''
7	36º 25' 49,4184''	48º 06' 57,8734''
8	36º 25' 43,3560''	48º 06' 56,6927''
9	36º 25' 37,3440''	48º 06' 54,9882''
10	36º 25' 31,2888''	48º 06' 52,6833''
11	36º 25' 25,8816''	48º 06' 49,1100''
12	36º 25' 20,5680''	48º 06' 45,4530''
13	36º 25' 10,7220''	48º 06' 42,1247''
14	36º 24' 58,4784''	48º 06' 44,2644''
15	36º 24' 47,5308''	48º 06' 44,9109''
16	36º 24' 35,9424''	48º 06' 58,1839''
17	36º 24' 26,8920''	48º 07' 02,2513''
18	36º 24' 19,2276''	48º 07' 04,5014''
19	36º 24' 10,9404''	48º 07' 07,9381''

1.10 Conditions Prior to Project Initiation

As the project activity is a greenfield project, the conditions prior to the project initiation is the continuation of the current situation, i.e. the equivalent amount of energy would have been produced by other grid-connected units, which is explained under the Section 0 (Baseline Scenario).

[12] See, EIA Not Required Decision for 19 turbines (Convert UTM to Lat/Lon Coordinates), for unit convertion see; http://www.rcn.montana.edu/resources/tools/coordinates.aspx?nav=11&c=UTM&md=83&mdt=NAD83/WGS84&z=35&e=591938&n=4469295&h=N

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is in line with all defined laws and regulations of Turkey. This is proven by the authorizations and operation permits obtained.

Laws as relevant to the project are (Law No. and Enactment Date):

(1) Electricity Market Law[13]

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[14]

(3) Environment Law[15]

The renewable Energy generation license for Çerçikaya WPP has been issued considering Electricity Law and Law in utilization of Renewable Energy Resources for the purpose of generating electricity energy. Environment Law is also satisfied in terms of sustainable development principles.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

Çerçikaya WPP is a project by ZT Enerji. Respective documentation regarding the ownerships is given in Annex-2.

1.12.2 Emissions Trading Programs and Other Binding Limits

N/A.

1.12.3 Other Forms of Environmental Credit

The project does not participate/has not participated under any other GHG program.

[13] See: http://www.epdk.org.tr/TR/DokumanDetay/Elektrik/Mevzuat/Kanunlar/6446 (Enactment Date:2013)

[14] See: http://www.epdk.org.tr/TR/DokumanDetay/Elektrik/Mevzuat/Kanunlar/5346 (Enactment Date: 2005)

[15] See: http://www.mevzuat.gov.tr/Metin1.Aspx?MevzuatKod=1.5.2872&MevzuatIliski=0&sourceXmlSearch=&Tur=1&Tertip=5&No=2872 (Enactment Date: 1983)

1.12.4 Participation under Other GHG Programs

The project was seeking registration under Gold Standard. Due to the carbon market conditions, project owner would like to opt from GS and applied for VCS. Since the processes of Gold Standard are very long and costly, VCS has been chosen for the project registration. On the other hand, Gold Standard Local Stakeholder Consultancy meeting had been conducted and feedbacks from meeting will be used in this project.

1.12.5 Projects Rejected by Other GHG Programs

Project has not been rejected from any other program.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

Project is not classified as grouped project.

Leakage Management

Not applicable. Leakage is not considered since project activity consists of installation of a new power plant.

Commercially Sensitive Information

Any commercially sensitive information that has been excluded from the public version of the VCS PD that will be displayed on the VCS Project Database shall be listed by the project proponent.

Sustainable Development

Çerçikaya WPP, as a large wind power plant project, will serve as a perfect project to demonstrate long-term potential of wind energy as a means to efficiently reducing GHG emissions as well as to diversifying and increasing security of the local energy supply and contributing to a sustainable development. Wind driven turbines will rotate in generators and electricity generated here will be transferred to the grid for consumer without any greenhouse gas emissions. The VCS shall help to realize this seminal technology by providing an adequate compensation for the lacking financial incentives in the Turkish renewable energy market.

Further Information

N/A.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

For the determination of the baseline, the official methodology ACM0002 version 17.0.0, "Large-scale Grid-connected electricity generation from renewable sources" [16], is applied, using conservative options and data as presented in the following section. This methodology refers to five Tools, which are:

1. Tool to calculate the emission factor for an electricity system (Version 05.0.0)[17];

2. Tool for the demonstration and assessment of additionality (Version 07.0.0)[18];

3. Combined tool to identify the baseline scenario and demonstrate additionality (Version 06.0.0)[19];

4. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (Version 02.0.0)[20].

5. Tool to determine the remaining lifetime of the equipment[21]

For baseline calculation the first tool, for additionality assessment the second tool is used. As third tool is the combination of the first and second tool, it is not used. Since no project emission or leakage calculation is required for wind power project fourth tool is not used, and finally to determine the remaining lifetime of the equipment fifth tool is used.

2.2 Applicability of Methodology

"Grid-connected renewable power generation project The choice of methodology ACM0002 version 17 is justified as the proposed project activity meets its applicability criteria:

Applicability Conditions in the ACM0002/Version17.0	Applicability to this project activity
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);	The project activity consists of installation of Greenfield power plant at a site where no renewable power plant was operated prior to the implementation of the project activity. Thus, it meets the said applicability condition.

[16] ACM0002 Version 17: (https://cdm.unfccc.int/filestorage/D/5/Y/D5YFS9I3VKBT18MQNGX0LPZ6U7AWCO/ACM0002_%28v17%200%29_clean.pdf?t=cEt8bzhodnhmfDB9LEc_AfNqpHkBqVvBVoqp)

[17] See; https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v5.0.pdf

[18] See; http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[19] See; https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-02-v6.0.pdf

[20] See; http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

[21] See; http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

(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 may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project activity is the installation of 19 numbers of wind turbine generators (WTGs). Hence, meets this criterion.
In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The project activity does not involve capacity additions, retrofits, rehabilitations or replacements. Hence this criterion is not applicable to 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/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower	The project activity is not a hydro power plant. Hence this applicability criterion is not relevant to the project activity.

unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project activity is not a hydro power plant. Hence this applicability criterion is not relevant to the project activity.
The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units	Project activity does not involve: • Switching from fossil fuels to renewable energy sources at the site of the project activity. • Biomass fired plants. Hence this criterion is not applicable.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is “the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance”.	The project is not a retrofit, rehabilitations, replacements or capacity addition; hence this applicability criterion is not relevant.
In addition, the applicability conditions included in the tools referred to above apply.	Applicability conditions of the applied tool are Justified

From the above it is concluded that the project activity meets all the applicability conditions of the methodology ACM0002 version 17.0 “Grid connected electricity generation from renewable sources”.

The project activity also meets the following applicability conditions of “Tool to calculate the emission factor for an electricity system”.

SI No	Applicability condition	Applicability to this project activity
1	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The project activity substitutes grid electricity by supplying renewable power to grid. Hence this criterion is applicable.
2	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	Project is not a CDM project.

The project activity also meets the applicability conditionsgiven in “Tool for the demonstration and assessment of additionality”.

Other tools mentioned in the methodology are not applicable for this project activity. In addition to this, all approved Standardized baselines are not applicable for the project activity.

2.3 Project Boundary

As per the Approved Large Scale Consolidated Methodology ACM0002, the project boundary is “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.” Correspondingly, in this project activity the project boundaries include the project site and all power plants attached to the Turkish National Grid.

The project uses wind energy to produce electricity. Kinetic power of the wind is converted to electrical energy, which then will be transferred to the grid. Back-up power generators in the wind farm will only be used when the wind farm is out of service and power cannot be supplied from grid. Hence, emissions due to usage of back-up power generation are expected to be very low and are taken to be zero complying with the Tool. The baseline and project activity related greenhouse gases which are considered in baseline calculation is given below.

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	*Main emission source*: Fossil fuels fired for electricity generation cause CO_2 emissions. It is included to baseline calculation to find the displaced amount by the project activity.
		CH_4	No	*Minor emission sources*: Even though there may be some CH_4 and N_2O emissions during electricity generation, these emissions are negligible and not included in baseline calculation to be conservative and comply with Table-1 of the methodology (page 5).
		N_2O	No	
Project scenario	Emissions during construction and operation of the project activity	CO_2	No	*Minor emission source*
		CH_4	No	*Minor emission source*
		N_2O	No	*Minor emission source*

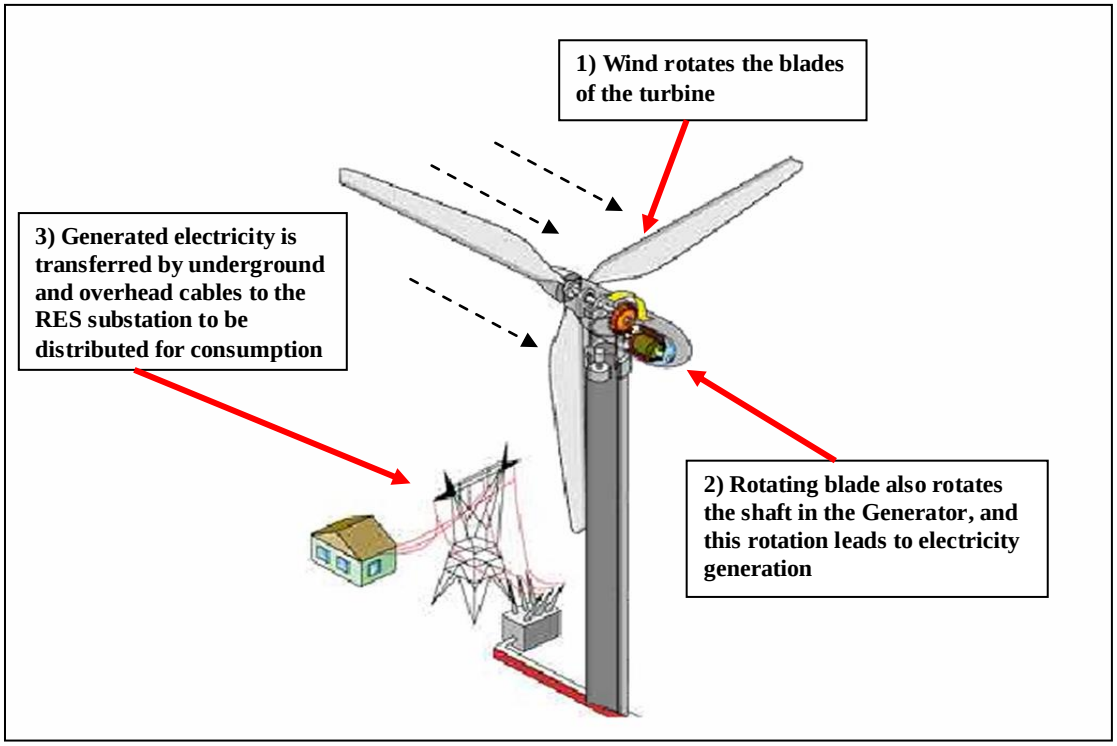

Figure 3: Operation diagram of the project

2.4 Baseline Scenario

The baseline scenario is identified according to the "Baseline Methodology Procedure" of ACM0002 ver.17 (page 10). The project activity is installation of a new grid-connected wind farm with 19 turbines and is not modification/retrofit of an existing grid-connected power plant. So, first identification of this procedure is selected for proposed project activity, which is described as:

"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, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system"(v.4).

To describe the baseline and its development for the project activity, long-term electricity demand and supply projections for Turkey are assessed.

Demand for electricity in Turkey is growing rapidly with average 5.6%[22] for previous ten years. TEİAŞ, who is responsible from the grid reliability has prepared an electricity demand projection for next ten years period (2014-2024) for Turkey and announced onJuly 2015, given in **Table 3** and **Figure 4**, reflecting the continuation of current demand growth[23].

Table 3: Low and High Demand Projection Scenarios for Ten Years Period (TWh)

Scenarios	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*	*2023*	*2024*
High Scenario	*275.14*	*297.01*	*320.47*	*340.58*	*361.81*	*384.22*	*404.92*	*426.61*	*449.32*	*473.10*
Low Scenario	*264.35*	*278.16*	*293.15*	*307.72*	*322.62*	*338.06*	*352.95*	*368.20*	*383.94*	*400.65*

[22] See, http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/index.htm (2015 report, page 8, Table 1)

[23] See, http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/index.htm (2015 report, page 17-18, Table 5 for High and Table 6 for Low Scenarios)

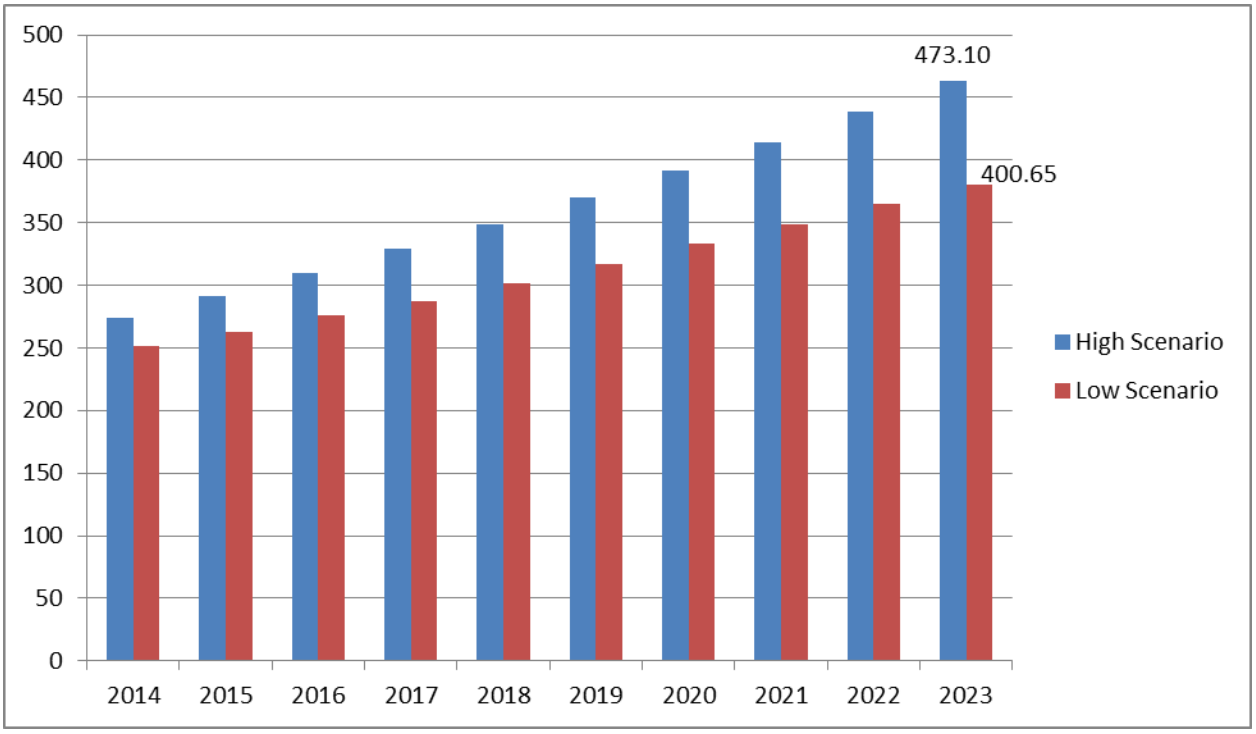

Figure 4: Electricity Demand Projections for Ten Years

In this projection, electricity supplies are also forecasted taking into account all power plants, which are operational, under construction and newly licensed. Generation projection based on project generation is given in:

Table 4: Projection of Total Generation Capacity by Fuel Types (TWh)[24]

YEARS	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***SHARE IN 2019 (%)***
LIGNITE	54,340	54,760	54,793	54,890	62,711	62,711	13.2
HARDCOAL	3,195	12,639	12,639	12,639	13,494	13,494	2.8
IMPORT. COAL	*40,146*	*40,146*	*40,782*	*40,347*	*40,394*	*39,931*	8.4
NATURAL GAS	*183,953*	*195,199*	*197,463*	*200,827*	*204,821*	*211,962*	44.7
GEOTHERMAL	2,996	4,561	4,881	5,365	5,365	5,365	1.1
FUEL OIL	3,938	4,823	5,297	5,297	5,297	5,297	1.1
DIESEL	80	80	80	80	80	80	0.0

[24] See, http://www.teias.gov.tr/YayinRapor/apk/projeksiyon/index.htm (2015 report, page 53, Table 32)

NUCLEER	0	0	0	0	0	0	0.0
OTHER	742	829	916	1,003	1,003	1,003	0.2
THERMAL TOTAL	289,390	313,037	316,850	320,448	333,164	339,843	0.4
BIOGAS+WASTE	1,862	1,973	2,004	2,076	2,076	2,076	22.1
HYDRO	68,452	76,376	95,809	102,449	104,958	104,970	4.2
WIND	11,878	12,985	13,705	19,570	19,851	19,851	1.6
SOLAR	101	1,601	3,101	4,601	6,101	7,601	13.2
TOTAL	**371,682**	**405,970**	**431,469**	**449,143**	**466,149**	**474,340**	***100.0%***

According to the 5-year projection it is clear that fossil fuels will remain the main sources for electricity generation (71.5 % in 2019). Natural gas will continue to dominate the market. Hydro will account for 22.1% of the mix whereas all non-hydro renewable combined (geothermal/biogas/waste/wind) will only account for 6.4% of all electricity generation. This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector, which is illustrated in

. The share of fossil fuels in the mix has been continuously increasing since the 1970s, reaching 71.6% in 2013.

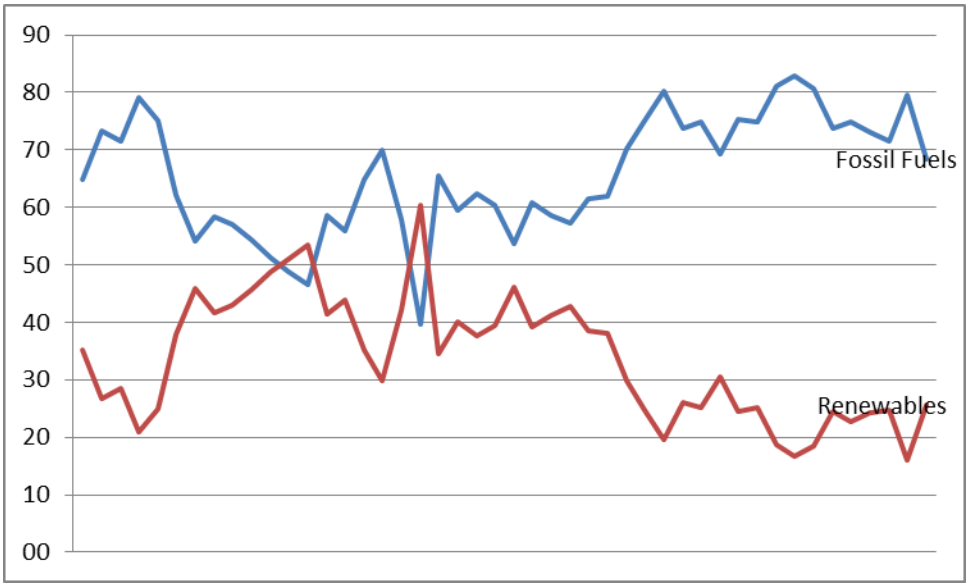

Figure 5: Fossil Fuels and Renewable in Turkish Electricity Mix (1970-2015)[25]

[25] See, http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.htm (excel file number 38)

In the shed of above analysis for the baseline scenario (continuation of current situation) it can be concluded that:

- **Conclusion-1:** Energy demand in Turkey has been increasing with significant rates since ten years, and it is expected to continue at least for next ten years.
- **Conclusion-2:** Even all operational plants, construction phase plants and licensed ones are taken into account lack of supply is projected after five operational years[26]. So, there is significant need for electricity generation investments to satisfy demand, which means electricity to be generated by the project activity would otherwise be generated by new power plants to avoid power shortage in coming years
- **Conclusion-3:** Fossil fuels will hold the dominance in generation mix till the end of 2019 with 71.5% share. Hydro included renewable will remain low with 22.1% share and non-hydro energy contribution will stay negligible with only 6.4% of total share by the end of that period. This also shows that most of new capacity additions will be fossil fuel fired power plants.

The combination of aforementioned trends indicates that if Çerçikaya WPP would not be built, power from a new grid-connected thermal plant would be the most likely scenario.

2.5 Additionality

For the explanation of how and why the project activity leads to emission reductions that are additional to what would have occurred in the absence of the project activity, the Baseline Methodology refers to the consolidated "Tool for the demonstration and assessment of additionality"[27] version 7.0.0 (Tool), which defines a step-wise approach to be applied to the proposed project.

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

Sub-step 1a. Define Alternatives to the project activity

To identify the realistic and credible alternative scenario(s) for project participants, scenarios in the Tool are assessed:

a) The proposed project activity undertaken without being registered as a VCS project activity

This alternative is realistic and credible as ZT Enerji may undertake project activity if he sees no risk for project and/or if the project turns out to be financially attractive without VCU credit income.

[26] See, http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2013.pdf (page 72)

[27] Version 7, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf (page 4)

However, investments analyze shows that the project is not economically feasible without VCU credit income. Detail information is given in Step-3.

b) Other realistic and credible alternative scenario(s) to the proposed VCS project activity scenario that deliver electricity with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;

The project activity is power generation activity without any greenhouse gas emission harnessing the energy of the wind. Being a private entity, ZT Enerji doesn't have to invest power investments even proposed project activity. Also, since ZT Enerji has licence only for wind power investment and since in the proposed project area there is no hydro or other sources for electricity generation, other project activities delivering same electricity in the same project area is not realistic for project participant.

c) Continuation of the current situation, i.e. Çerçikaya WPP is not built

The decision in favour or against a project investment depends on the expected revenues and risks, like for every other private investment. Investment decisions other than Çerçikaya WPP are independent from the question whether Çerçikaya WPP is built or not. This alternative is also realistic and credible.

According to baseline scenario, there is a need for energy investment to satisfy increasing demand and if the Çerçikaya WPP is not built, the same amount of energy will be supplied by other private investors to the grid. Forecasts shows that electricity supplied in the absence of Çerçikaya WPP will be mainly based on fossil fuels as the projections for the year of 2017 forecasts 73.85% share for fossil fuels in the energy mix.

Therefore, two realistic and credible alternative scenarios are identified for the project activity:

a) The proposed project activity undertaken without being registered as a VCS project activity.

b) Continuation of the current situation, i.e. Çerçikaya WPP is not built.

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

Both alternatives are (building or not building the project activity) in compliance with the following identified applicable mandatory laws and regulations:

(1) Electricity Market Law[28]

(2) Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy[29]

[28] See: http://www.epdk.gov.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_6446.doc (Enactment Date:2013)

[29] See: http://www.epdk.org.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_Yek_Kanun.doc (Enactment Date: 2005)

(3) Environment Law[30]

Table 5: Project Implementation Schedule

Date (DD/MM/YYYY)	Activity
05/12/2013	Agreement with Carbon consultant (Life İklim ve Enerji)
10/12/2013	Turbine agreement
24/01/2014	EIA Not Required Certificate for 19 turbines
06/03/2014	Bankable Energy Yield Assessment Report for Çerçikaya WPP
13/08/2014	Loan Agreement Date
17/06/2015	Revised date of the Licence
20/03/2015	The start date of whole operation

According to Turkish regulations, to get necessary permits for further project implementation, granting generation license from Authority is required. Hence, issuance of license cannot be considered as 'Project Start Date' but a prerequisite to proceed for further project development activities. Date of turbine agreement (10/12/2013) shall be set as the investment decision date according to decision of EB41[31].

Above Implementation Schedule clearly shows that before starting to the project activity, 'ZT Enerji' started to analysis of revenue from VER credit sale, decided to get consultancy for VER development.

In the following, the investment analysis is applied to clearly demonstrate that the project activity is unlikely to be financially/economically attractive without the revenue from the sale of VERs.

Outcome of Step 1.b: ZT Enerji consisted with mandatory laws and regulations. Project implementation schedule shows us that ZT Enerji started to consideration of VER from the beginning of the project implementation and VER Revenue has decisive impact on decision of proceeding to the project.

Step 2. Investment analysis

"Guidelines on the assessment of investment analysis[32]" version 5 is taken into account when applying this step.

Sub-step 2a: Determine appropriate analysis method

Applied tool: **"Tool for the demonstration and assessment of additionality version 7.0.0"**

Three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

- Option I: Simple cost analysis

- Option II: Investment comparison analysis

[30] See: http://www2.cevreorman.gov.tr/yasa/k/2872.doc (Enactment Date: 1983)

[31] See: http://cdm.unfccc.int/EB/041/eb41rep.pdf (paragraph 67)

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

- Option III: Benchmark analysis

"Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (Sub-step 2b). If the CDM project activity and the alternatives identified in Step 1 generate no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III)."

As the project generates income other than the VER benefits (revenues from the sale of electricity to the grid), Option I that is the Simple Cost Analysis cannot be applied in this case.

The investment comparison analysis is also not applicable for the proposed project because the baseline scenario, providing the same annual electricity output by the Turkish National Grid, is not an investment project.

To conclude, the benchmark analysis will be used to identify whether the financial indicators (Equity IRR in this case) of the proposed project is better than relevant benchmark value.

Sub-step 2b: Option III: Benchmark analysis

While applying the Benchmark Analysis, Option III, the Equity IRR after taxes is selected as the financial indicator for the demonstration of the additionality of the project as permitted in the additionality tool.

Benchmark rate is calculated in line with "Tool for the demonstration and assessment of additionality" which suggests to use the government bond rates, increased by a suitable risk premium. The government bonds are used for determining the Benchmark because there is no pre-determined value for IRR or any other financial indicator for wind power projects in Turkey at the investment decision date of the project.
According to the Tool, benchmark can be derived from 'Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds'. Ministry of Development publishes "Main Economic Indicators" on a monthly basis. Since the project is a mid-term investment (exceeding one yerar), lending rate for medium term investment has been selected as the benchmark. The lending rate for the medium term investment as estimated by the Turkish Development Bank is 13% for the March 2013[33]. This 13% is taken as the benchmark value.

Sub-step 2c: Calculation and comparison of the IRR

[33] Republic of Turkey, Ministry of Development Website. Main Economic Indicators.Section 7, 13th Excel Sheet. Table 7.13- Lending and Deposit Interest Rates. Published for the second quarter of 2016, but the rate has been taken for the investment decision taken date, which is 15/03/2013
http://www.kalkinma.gov.tr/Pages/TemelEkonomikGostergeler.aspx

In the paragraph 12 of the 'Guidance on the Assessment of Investment Analysis'[34] version 5, it is stated that:

'Required/expected returns on equity are appropriate benchmarks for equity IRR after taxes '. Since, benchmark identified in the Sub-step 2b is required/expected returns on equity, equity IRR (after tax) of the project activity shall be calculated for comparison.

Name	Value	Source
Installed Power (MWm)	57	License of The project
Operational lifetime of the project (years)	25	Tool
Net Generation to be sold (MWh)	160,250.810	Net generation calculated by using P90 value from Fichtner Bankable Energy Yield Assessment Report
Electricity tariff (USD/MWh)	73	For feed-in-tariff [35]
Income Tax Rate	20%	Corporate Tax Rate[36]
LoanShare (EUR)	40,920,786	Loan Agreement
Annual Operating Cost (EUR)	1,858,455	Financial Analysis Reports
Total Project Cost (EUR)	68,695,516	Equipment agreements and Financial Analysis Reports
EUR/USD Rate	1.38	Loan Agreement Date (Investment Decision Date TCMB rare (22/04/2014))

Operational life time of the Çerçikaya WPP is determined by using the 'Tool to determine the remaining lifetime of equipment''[37]. In the tool it is said that default lifetime for the on-shore wind turbines is 25 years.

The equity IRR (after tax) of Çerçikaya WPP is calculated on the basis of expected cash flows (investment, operating costs and revenues from electricity sale), as used in the financial analysis for the feasibility assessment of the project. The parameters and values used for the IRR calculation are available to DOE during validation. The resulting IRR for 25 years is stated in below table.

Table 6: Equity IRR value for project activity (after tax)

Period	IRR
25 years	9.81%

It is evident that the project activity has a less lower IRR than the benchmark. Thus, the project activity cannot be considered as financially attractive.

Sub-step 2d: Sensitivity analysis

[34] See, http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf(page 3)
[35] See, http://www.epdk.gov.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_Yek_Kanun.doc , page 9 Table I
[36] See, http://www.gib.gov.tr/index.php?id=860
[37] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

While the main parameter determining the income of the project is the electricity sales price, a variation of the accordant value shall demonstrate the reliability of the IRR calculation Electricity price (EP) is varied with +/-10% from 73 $/MWh, which is the - feed-in-tariff value.

The investment, energy yield and operating cost parameters are varied with +/- 10%. The worst, base and best-case results for each parameter variation are given below, in

Table 7. The sensitivity analysis confirms that the proposed project activity is unlikely to be economically attractive without the revenues from VERs as even the maximum IRR result for the best case scenario (11.67%) is below the benchmark, which is 13%.

Table 7: Equity IRR results according to different parameters

Parameter	Electricity Price			TurbineCost			Energy Yield			Operating Cost		
Variance	**-10%**	**0%**	**10%**	**-10%**	**0%**	**10%**	**-10%**	**0%**	**10%**	**-10%**	**0%**	**10%**
IRRs	7.88%	9.81%	11.67%	11.45%	9.81%	6.82%	7.88%	9.81 %	11.67 %	10.21 %	9.81%	9.41%

The sensitivity analysis confirms that the proposed project activity is unlikely to be economically attractive without the revenues from VERs as even the maximum IRR result for the best case scenario (11.67%) is below the benchmark after taxes, which is 13%. Assessment of likelihood conditions for each parameter to reach benchmark IRR is provided below:

Electricity Price
In order to reach %13 equity IRR benchmark, electricity price shall increase to 93.66 USD/MWh which is about 28.3% higher than assumed price (73 USD/MWh). Even 10% increase from base case is not likely to occur. Thus it is not likely for project activity to sell electricity with benchmark threshold price.

TurbineCost
In order to reach benchmark IRR, investment costs shall be decreased about 25% and be 26,291,250EUR, comparing with investment costs used in financial analysis (35,055,000EUR). Since the equipment contract which has the higher share (approximately 60% of the total cost) of the total costs is fixed, 25% decrease in the investment cost is unlikely. Thus it is not likely for project activity to have threshold investment cost and reach to benchmark IRR.

Energy Yield
To have benchmark IRR, annual energy yield amount shall increase to 262,753MWh/yr, which is about 28% more than base case electricity generation amount used in financial analysis.
Even p50 figure of the project activity (206,012 MWh/yr[38]) is less than threshold energy yield amount. Using electricity generation amount in financial analysis, which have less than 50% probability of occurrence is not rational. Thus, it is not likely for project activity to generate threshold energy yield to reach benchmark IRR.

Operation Cost

[38] See, Çerçikaya Energy Assessment Report

In order to reach benchmark IRR, annual operation cost shall decrease about 130% meaning there will not be any operational costs. Such a decrease in annual operation cost is not likely.

Operating cost of the project almost contributes to 50% of the total cost. Moreover, total investment cost of the project also contributes to almost 50% of the total cost. The electricity price and energy yield contributes to almost 100% of the revenues so, they have been chosen for the variation analysis according to the Guidelines. These are the key parametes chosen for variation.

Step 3. Barrier analysis

The investment analysis has fully demonstrated and explained the additionality of the project, so step 3 is skipped.

Step 4: Common Practice Analysis

The section below provides the analysis as per step 4 of the "Tool for the demonstration and assessment of additionality", version 7.0.0 and according to the Guidelines on Common Practice version 02.0

Step 1. Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity: The proposed project has a capacity of 57 MW consisting of 19 turbines. Per the guideline of +/-50%, the applicable output range for the project is **28.5 MW to 85.5 MW**.

Step 2: Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area; (Turkey)

(b) The projects apply the same measure as the proposed project activity; (Renewable Energy Projects)

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity; (Wind Power Plants)

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant; (N.A.)

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1; (28.5 MW-85.5 MW)

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity; (N.A.)

Table 8: WPP's with the same output range

Page 112	2	BORES (Bozcaada)	10,2	30	Wind
Page 123	5	ALİZE ENERJİ (ÇAMSEKİ)	20,8	82	Wind
Page 123	6	ALİZE ENERJİ (KELTEPE)	20,7	73	Wind
Page 123	7	ALİZE ENERJİ (SARIKAYA ŞARKÖY)	28,8	96	Wind
Page 123	8	AK ENERJİ AYYILDIZ (BANDIRMA)	15	51	Wind
Page 123	9	AKDENİZ ELEK. MERSİN RES	33	100	Wind
Page 123	10	AKRES (AKHİSAR RÜZGAR)	43,8	165	Wind
Page 123	11	ANEMON ENERJİ (İNTEPE)	30,4	92	Wind
Page 123	12	ASMAKİNSAN (BANDIRMA-3 RES)	24	85	Wind
Page 123	13	AYEN ENERJİ (AKBÜK)	31,5	123	Wind
Page 123	15	BAKRAS ELEK.ŞENBÜK RES	15	47	Wind
Page 123	16	BARES (BANDIRMA)	30	105	Wind
Page 123	17	BELEN HATAY	36	114	Wind
Page 123	19	BORASKO BANDIRMAK	60	240	Wind
Page 123	20	BOREAS EN.(ENEZ RES)	15	49	Wind
Page 123	21	ÇANAKKALE RES (ENERJİ-SA)	29,9	92	Wind
Page 123	22	ÇATALTEPE (ALİZE EN.)	16	52	Wind
Page 123	23	DOĞAL ENERJİ (BURGAZ)	14.9	48	Wind
Page 123	26	MARE MANASTIR	39,2	129	Wind
Page 123	27	MAZI 3	30	105	Wind
Page 123	28	KİLLİK RES (PEM EN.)	40	86	Wind
Page 123	29	KORES KOCADAĞ	15	56	Wind
Page 123	30	KUYUCAK (ALİZE ENER.)	25,6	110	Wind
Page 123	33	DATÇA RES	29,6	84	Wind
Page 123	34	ERTÜRK ELEKTRİK (ÇATALCA)	60	210	Wind
Page 123	35	İNNORES ELEKT. YUNTDAĞ	52.5	213	Wind
Page 123	36	LODOS RES (TAŞOLUK)KEMERBURGAZ	24	85	Wind
Page 123	37	SARES (GARET ENER.)	22,5	91	Wind
Page 123	38	SAYALAR RÜZGAR (DOĞAL ENERJİ)	34,2	108	Wind
Page 123	39	SEBENOBA (DENİZ ELEK.)SAMANDAĞ	30	110	Wind
Page 123	40	SEYİTALİ RES (DORUK EN.)	30	110	Wind
Page 123	43	SUSURLUK (ALANTEK EN.)	45	112	Wind
Page 123	45	TURGUTTEPE RES (SABAŞ ELEK.)	24	70	Wind
Page 123	46	ÜTOPYA ELEKTRİK	30	92	Wind
Page 123	47	ZİYARET RES	57.5	210	Wind

Step 3: Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

N_{all} = 0

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

N_{diff}= 0

Step 5: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

$F = 1-N_{diff}/N_{all}$

$= 1 – (0/0)$

Factor F is therefore **unidentified**.

The proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and Nall-Ndiff is greater than 3. Since factor F is undefined and also N_{all}-N_{diff} is 0, the proposed **is not a common practice** as per the guidelines. The proposed project activity is therefore **additional** under common practice analysis. An Excel sheet is provided for the calculation.

2.6 Methodology Deviations

N/A

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Stepwise approach of „Tool to calculate the emission factor for an electricity system" version 04.0.0 [39] is used to find this combined margin (emission coefficient) as described below:

<u>Step 1</u>. Identify the relevant electric systems

[39] See, http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

There are 21 regional distribution regions in Turkey but no regional transmission system is defined. In Article 20 of License Regulation it is stated that:

"TEIAS shall be in charge of all transmission activities to be performed over the existing transmission facilities and those to be constructed as well as the activities pertaining to the operation of **national transmission system** via the National Load Dispatch Center and the regional load dispatch centers connected to this center and the operation of Market Financial Reconciliation Center[40]".

As it can be understood from this phrase, only one transmission system, which is national transmission system is defined and only TEİAŞ is in the charge of all transmission system related activities. Moreover, a communication with representative of TEIAS, which indicates that: "There are not significant transmission constraints in the national grid system which is preventing dispatch of already connected power plants" is submitted to the DOE. Therefore, the national grid is used as electric power system for project activity. The national grid of Turkey is connected to the electricity systems of neighboring countries. Complying with the rules of the tool, the emission factor for imports from neighboring countries is considered 0 (zero) tCO_2/MWh for determining the OM.

There is no information about interconnected transmission capacity investments, as TEİAŞ, who operates the grid, also didn't take into account imports-exports for electricity capacity projections.[41] Because of that, for BM calculation transmission capacity is not considered.

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

According to Tool project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included

For this project **Option I** is chosen.

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

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM; or

(b) Simple adjusted OM; or

(c) Dispatch data analysis OM; or

[40] See, http://www.ongurergan.av.tr/en-EN/mevzuat/Electric%20Market%20Licensing%20Regulation.doc (page 21)
[41] See, http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2013.pdf

(d) Average OM.

The Simple Operating Margin (OM) emission factor ($EF_{grid, OM, y}$) is calculated as the generation weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all the generating plants serving the system, excluding low-cost/must-run power plants. As electricity generation from solar and low cost biomass facilities is insignificant and there are no nuclear plants in Turkey, the only low cost /must run plants considered are hydroelectric, wind and geothermal facilities.

The Turkish electricity mix does not comprise nuclear energy. Also there is no obvious indication that coal is used as must run resources. Therefore, the only low cost resources in Turkey, which are considered as must-run, are Hydro, Renewables and Waste, Geothermal and Wind (according to statistics of TEİAŞ).

Table 9: Share of Low Cost Resource (LCR) Production 2011-2015 (Production in GWh)[42]

Share of Low Cost Resource (LCR) Production 2011-2015 (Production in GWH)					
	2011	**2012**	**2013**	**2014**	**2015**
Gross Production	229.395,1	239.496,8	240.153,95	251.962,82	261,783.3
Total LCR Production	58.226,0	65.345,8	69.512,7	52.961,42	83,981.0
Hydro	52.39,6	57.865,0	59.420,47	40.644,70	67,145.8
Renewables and Waste	469,2	720,7	1.171,20	1.432,59	1,758.2
Geothermal and Wind	5.418.2	6.760,1	8.921,04	10.884,12	15,077.0
Share of LCRs	25,38%	27,28%	28,95%	21,02%	32,08%
Average of last five years	**26,94%**				

As average share of low cost resources for the last five years is far below 50% (26,94%), the simple OM method is applicable to calculate the operating margin emission factor ($EF_{grid,OM,y}$)

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

- **Ex ante option:** A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, or
- **Ex post option:** The year, in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

The **ex-ante option is selected for Simple OM method**, with the most recent data for the baseline calculation stemming from the years 2011 to 2015.

***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 CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants. The calculation of the simple OM emission factor can be based on

- **Option A:** data on net electricity generation a CO_2 emission factor of each power unit, or
- **Option B:** data 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.

[42] See: www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/37(06-13).xls

Option B is chosen to calculate the Simple OM, as there is no power plant specific data available, renewable power generation are considered as low-cost power sources and amount of electricity supplied to the grid by these sources is known.

Where Option B is used, 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, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} x NCV_{i,y} x EF_{CO2,i,y}}{EG_y} \quad \textbf{(1)}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_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 fossil fuel types combusted in power sources in the project electricity system in year y
y	=	three most recent years for which data is available at the time of submission of the PDD to the DOE for validation

For the calculation of the OM the consumption amount and heating values of the fuels for each sources used for the years 2013, 2014 and 2015, is taken from the TEİAŞ annual statistics, which holds 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), are provided in Appendix 3. Total CO_2 emission due to electricity generation in Turkey for the years of 2013, 2014 and 2015 are given in

Table 10.

Table 10: CO_2 emissions from electricity production 2013-2015 ($ktCO_2$)

	2013	**2014**	**2015**
CO2-Emmissions	**105,254**	**122,336**	**113,727**

Table 11 presents the gross electricity production data by all the relevant energy sources. Low-cost/must run resources like hydro, wind, geothermic and biomass do not emit fossil CO_2 and thus are not taken into account in calculations.

Table 11: Gross electricity production by fossil energy sources 2013-2015 (GWh)[43]

Gross Electricity Production by Energy Source 2013-2015 [GWh]			
Natural Gas	105,116.3	120,576.0	99,218.7

[43]See; http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm, table 55

Lignite	30,262.0	36,615.4	31,335.7
Coal	33,524.0	39,647.3	44,829.9
Fuel Oil	1,192.5	1,662.9	980.4
Motor Oil	546.3	482.4	1,243.6
Naphtha	0.0	0.0	0
LPG	0.0	0.0	0
Total fossil fuels	170,641.2	198,984.0	177,608.2

Above table shows gross data, but EG_y in the above described formula means electricity delivered to the grid, i.e. net generation, the following table shall help to derive net data by calculating the net/gross proportion on the basis of overall gross and net production numbers.

Table 12: Net/gross electricity production 2013-2015 (GWh)[44]

Relation Net/Gross Electricity Production 2013-2015			
Gross Production [GWh]	240,153.95	251,962.82	261,783.3
Net Production [GWh]	228,977.00	239,448.83	249,899.5
Relation	**95.35%**	**95.03%**	**95.46%**

Multiplying these overall gross/net relation percentages with the fossil fuels generation amount does in fact mean an approximation. However this is a conservative approximation as the consumption of plant auxiliaries of fossil power plants is higher than for the plants that are not included in the baseline calculation. In the end this would lead to a lower net electricity generation and therefore to a higher OM emission factor and higher emission reductions.

Table 13 shows the resulting net data for fossil fuel generation and adds electricity imports.

Table 13: Electricity supplied to the grid, relevant for OM (GWh)

Net El. Production by fossil fuels and Import 2013-2015 [GWh]			
Net El. Prod. by fossil fuels	162.699,4	189.101,3	169,538.9
Electricity Import	7.429,4	7.953,5	7,135.5
Electricity supplied to grid by relevant sources	**170.128,8**	**197.054,8**	**176,674.4**

[44] For Net Production, See: www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/34(84-13).xls

Electricity import is added to the domestic supply in order to fulfill the Baseline Methodology requirements. Imports from connected electricity systems located in other countries are weighted with an emission factor of 0 (zero) tCO_2/MWh.

The last step is to calculate $EF_{grid,OMsimple,y}$:

Table 14: Calculation of Weighted $EF_{grid,OMsimple,y}$ ($ktCO_2$/GWh)

	2013	**2014**	**2015**
CO2-Emmissions (ktCO2)	**105,254**	**122,336**	**113,727**
Net Electricity Supplied to Grid by relevant sources (GWh)	**170,128.8**	**197,054.8**	**186.501,9**
EFgrid,OMsimple,y (ktCO2/GWh)	**0.6187**	**0.6208**	**0.6437**
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ ($ktCO_2$/GWh)	**0.6276**		

➔

$$EF_{grid,OMsimple,y} = 0.6276 \ (ktCO_2/GWh)$$

<u>Step 5</u>. Calculate the build margin (BM) emission factor

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.

Again, the project proponents can chose between two options according to the calculation tool: calculate the BM ex-ante based on the latest available data or update the BM each year ex post. Option 1, the ex-ante approach, is again chosen.

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 last plant of the sample group is built in 2010 and until the end of the 2013 which is the latest year for official statistics published for plants put in operation. VER plants are excluded from sample group. While identifying the sample group dismantled, revised, retrofits are not included. Only new capacity additions (power plants / units) are taken into account. All power plants in operation by 2013 are given in Annex 4.

Total electricity generation in 2015 is **261,783.304** GWh and 20% of this generation is **52,356.7** ($AEG_{SET->20\%}$) GWh. Total electricity generation of last five power plants in operation is 369 GWh ($AEG_{SET-5-units}$) which is lower than 20% total generation in 2013. Since $AEG_{SET->2\%0}$ is bigger than $AEG_{SET-5-units}$, $SET_{->20\%}$ is chosen as SET_{sample}. Also in the sample group there is no power plant started supply electricity to grid more than 10 years ago, steps d, e and f are ignored.

Sample group for BM emission factor is given below table. The derivation of the values presented in **Table 15** is contained in a separate excel file which is available for validation.

Table 15: Sample group generation for BM emission factor calculation (GWh)

Energy Source	2010	2011	2012	Sample Group Total Generation (GWh)
Natural Gas	1,056.3	11,815.1	10,540.0	**23,411.4**
Lignite	0	0.0	40.0	**40.0**
Coal	8,012.0	4,320.0	201.0	**12,533.0**
Fuel Oil	0	701.2	0.0	**701.2**
Hydro	3,336.8	3,730.4	5,354.0	**12,421.2**
Renewable	2.4	150.0	677.0	**829.4**
TOTAL	**12,407.5**	**20,716.7**	**16,812.0**	**49,936.2**

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} x EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (2)$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

Because of only fuel types and electricity generation data are available for the sample group, *Option B2* of Simple OM method is used to calculate emission factor. The formulation of emission factor is given below:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} x 3.6}{\eta_{m,y}} \quad \textbf{(3)}$$

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$	=	Average net energy conversion efficiency of power unit m in year y (%)
y	=	Three most recent years for which data is available at the time of submission of the PDD to the DOE for validation

BM emission factor calculation and resulted BM factor is given in **Table 16**. For BM factor calculation, since no official emission factors for different fuel types are available, lower confidence default values of IPCC Guidelines are applied. Explanation of emission factor selection for each energy sources and references are given in Appendix.3 of the PDD.

Table 16: BM emission factor calculation using equation (2) and (3)

Energy Source	Sample Group Total Generation (GWh)	Effective CO_2 emission factor (tCO_2/TJ)	Average Efficiency ($\eta_{m,y}$)	CO_2 Emission ($ktCO_2$)
Natural Gas	**23,411.4**	54.3	60.00%	7,627.4
Lignite	**40.0**	90.9	50.00%	26.2
Coal	**12,533.0**	89.5	50.00%	8,076.3
Fuel Oil	**701.2**	72.6	46.00%	398.4
Hydro	**12,421.2**	0.0	0.00%	0.0
Renewables	**829.4**	0.0	0.00%	0.0
Total	**49,936.2**			**16,128.3**
$EF_{grid,BM,y}$ (tCO_2/MWh)	**0.3230**			

➔ $EF_{grid,BM,y}$ = **0.3230 tCO_2/MWh**

<u>Step 6.</u> Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor (*EFgrid,CM,y*) is based on one of the following methods:
(a) Weighted average CM; or
(b) Simplified CM.

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM} \quad \textbf{(4)}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OMy}$	=	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (%)
w_{BM}	=	Weighting of build margin emissions factor (%)

According to the Tool for wind power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25. Then:

$EF_{grid,CM,y}$ = 0.6276 tCO2/MWh * 0.75 + 0.3230 tCO2/MWh * 0.25

= 0.5514 tCO2/MWh

➔ $EF_{grid,CM,y}$=**0.5514 tCO_2/MWh**

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(5)}$$

Where:
ER_y = Emission reductions in year *y* (t CO_2/yr).
BE_y = Baseline emissions in year *y* (t CO_2/yr).
PE_y = Project emissions in year *y* (t CO_2/yr).
LE_y = Leakage emissions in year *y* (t CO_2/yr).

The project activity is the installation of a new grid-connected renewable power plant so, EGbaseline = 0

Then:

ERy = BEy = $EG_{facility,y}$ * EFgrid,CM,

184,017 MWh/year * 0.5514 tCO_2/MWh = 101,473 tCO_2/year

3.2 Project Emissions

The proposed project activity involves the generation of electricity by development of a wind farm. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO_2/year.

3.3 Leakage

LEy is 0, as it is not considered according to ACM0002. PEy is 0 because project is a wind power generation activity (Only for geothermal and Hydro project activities, it should be considered according to ACM0002).

3.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(5)}$$

Where:

ER_y = Emission reductions in year y (t CO_2/yr).

BE_y = Baseline emissions in year y (t CO_2/yr).

PE_y = Project emissions in year y (t CO_2/yr).

LE_y = Leakage emissions in year y (t CO_2/yr).

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2015*	0	76,105	0	76,105
2016	0	101,473	0	101,473
2017	0	101,473	0	101,473
2018	0	101,473	0	101,473
2019	0	101,473	0	101,473
2020	0	101,473	0	101,473
2021	0	101,473	0	101,473
2022	0	101,473	0	101,473
2023	0	101,473	0	101,473
2024	0	101,473	0	101,473
2025**	0	25,368	0	25,368
Total (tonnes of CO2e)	0	1,116,203	0	1,116,203

*Start date; 20/03/2015
**End date; 19/03/2025

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	**Gross electricity generation**
Data unit	MWh
Description	Gross Electricity supplied to the grid by relevant sources (2013-2015)
Source of data	Turkish Electricity Transmission Company (TEİAŞ), Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (2013-2015) TEİAŞ http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm, table 55
Value applied:	See **Table 11**
Justification of choice of data or description of measurement methods and procedures applied	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Purpose of Data	Data used for emission reduction calculation
Comments	-

Data / Parameter	$\mathbf{EF_{grid, CM, y}}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for the project electricity system in year 2015
Source of data	As per "Tool to calculate the emission factor for an electricity system"
Value applied:	0.5514 tCO_2/MWh
Justification of choice of data or description of measurement methods and procedures applied	As per "Tool to calculate the emission factor for an electricity system" Calculated from data provided by the TEIAS for Turkish Power Sector; Operating Margin = 0.6276 KgCO2e/KWh Build Margin = 0.3230 KgCO2e/KWh Combined Margin = 0.5514 KgCO2/KWh
Purpose of Data	Emission Factor is fixed at ex-ante calculation.
Comments	-

Data / Parameter	**$Eg_{facility,y}$**
Data unit	MWh/yr
Description	Quantity of net electricity generation by the project plant in a year
Source of data	Turkish Electricity Transmission Company (TEIAS), Annual Development of Electricity Generation- Consumption and Losses in Turkey (1984-2014) TEIAS, see http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2014/istatistik2014.htm (excel file number 35, 38, 28 are used for the calculation of the net electricity generated by relevant sources)
Value applied:	See **Table 12** and **Table 13**
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey. This data is used to find relation between the gross and net electricity delivered to the grid by fossil fuel fired power plants. (See **Table 12**). Import and Export data is used to identify total net electricity fed into the grid in the years of 2013, 2014 and 2015 (See Table 13).
Purpose of Data	Data used for emission reduction calculation
Comments	-

Data / Parameter	**$EF_{CO2,i,y}$**
Data unit	tCO_2/GJ
Description	CO_2 emission factor of fuel type i used in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the IPCC Guidelines on National GHG Inventories. See http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied:	See **Table 16** and See **Table 19**
Justification of choice of data or description of measurement methods and procedures applied	No plant specific and national emission factor data is available in Turkey. So, IPCC default data is used. For Fuel Oil Power Plants: 'Gas/Diesel Oil' data is used for conservativeness. For Coal Power Plants: In the 205th page of official document given in the link below, it is stated that Çolakoğlu and İçdaş utilizes 'Taşkömürü' (Hardcoal). And at the Table-2 in page 157 of the same document, Taşkömürü is dived in two groups: Bituminous and Antharcite. Since Sub-Bituminous Coal is under Brown Coal in the same table and since Other Bituminous Coal has lower EF

	than Anthracite in 1.4 of IPCC Guidelines, EF for 'Other Bituminous Coal' is used. See: http://www.dpt.gov.tr/DocObjects/Icerik/4225/Enerji_Hammaddeleri_(Linyit_Taskomuru-Jeotermal)
Purpose of Data	Data used for emission reduction calculation
Comments	-

Data / Parameter	**Sample Group for BM emission factor**
Data unit	Name of the plants, MW capacities, fuel types, annual electricity generations and dates of commissioning.
Description	Most recent power plants which compromise 20% of total generation
Source of data	Annual Development Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEIAS: http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPR SIYONU2011.pdf http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPR SIYONU2012.pdf http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPR SIYONU2013.pdf
Value applied:	**Table 21**
Justification of choice of data or description of measurement methods and procedures applied	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey. The latest data available during PD preparation was for 2013.
Purpose of Data	Data used for emission reduction calculation
Comments	-

Data / Parameter	$\eta_{m,y}$
Data unit	-
Description	Average energy conversion efficiency of power unit m in year y
Source of data	Annex I the “Tool to calculate the emission factor for an electricity system”
Value applied:	Table 16
Justification of choice of data or description of measurement methods and procedures applied	For efficiency rates of Coal and Lignite Power Plants See Annex-1 of the Tool (highest rate is applied to be conservative) For Natural Gas and Oil plants efficiencies, default value given in the tool is applied: http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf
Purpose of Data	Data used for emission reduction calculation

Comments	-

Data / Parameter	**$HV_{i,y}$**
Data unit	Mass or volume unit
Description	Heating Values of fuels consumed for electricity generation in the years of 2013, 2014 and 2015
Source of data	Heating Values Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities, TEİAŞ. See: http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm excel file 69
Value applied:	See **Table 17**
Justification of choice of data or description of measurement methods and procedures applied	There is no national NVC data in Turkey. However, TEİAŞ announces Heating values of fuels. This data is used to calculate annual NCVs for each fuel type TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Purpose of Data	Data used for emission reduction calculation
Comments	-

Data / Parameter	**$FC_{i,y}$**
Data unit	Mass or volume unit
Description	Amount of fuel type i consumed in the project electricity system in year y
Source of data	Annual Development of Fuels Consumed In Thermal Power Plants In Turkey by The Electric Utilities, TEİAŞ. See: http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm excel file 67
Value applied:	See **Table 18**
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Purpose of Data	Data used for emission reduction calculation
Comments	-

Data / Parameter	**$NCV_{i,y}$**

Data unit	TJ/Gg
Description	Net Calorific Value of fuel types in the years of 2013, 2014 and 2015
Source of data	Calculated by using HVi,y to FCi,y as Net Calorific Values of fuel types are not directly available in Turkey.
Value applied:	See **Table 19**
Justification of choice of data or description of measurement methods and procedures applied	TEİAŞ is the national electricity transmission company, which makes available the official data of power plants in Turkey.
Purpose of Data	Data used for emission reduction calculation
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied to the grid in year y
Source of data	The data from the Electricity Meters are the basis for the settlement notification of PMUM. Data are gathered electronically from the meters by TEIAS and stored in secured website of PMUM, which is accessible to project developer with a private password. For monitoring, web screenshots of PMUM shall be used as source of data.
Description of measurement methods and procedures to be applied	• Two electricity meters will be placed (one main and one reserve) at the substation. These meters are sealed by TEIAS and intervention by project proponent is not possible. The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyers. • Monthly settlement notifications of PMUM (Piyasa Mali Uzlaştırma Merkezi) consist hourly electricity production and withdrawn from the grid. • Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid will be calculated by electricity supplied minus electricity withdrawn which will be taken from monthly settlement notifications.

	The above described measurement method follows Article 81 of the official regulation "Electricity Market Balancing And Settlement Regulation"[45]
Frequency of monitoring/recording	Annually
Value applied:	**184,017 MWh/year**
Monitoring equipment	Meters are in compliance with the communiqué for Metering Devices to be used in Electricity Market.
QA/QC procedures to be applied	According to the Article 2 of the Communiqué of Meters in Electricity Sector[46]: 'The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained **"Type and System Approval" certificate from the Ministry of Trade and Industry.'** Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. Also according to Article 11 of this Communiqué, meters shall be in class of 0.5s, which means error interval for measuring is in +-0.5% range which is well acceptable according to rules. Paragraph b) of the Article 9 of the 'Regulation of Metering and Testing of Metering Systems'[47] (Regulation) of Ministry states that: ' b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done **every 10 years**.' Therefore periodic calibration of the meters will be done every 10 years. Also according to Article 67 (page 20) of this regulation, the calibration shall be done in calibration stations which have been tested and approved by Ministry of Trade and Industry. Article 10 d) of Communiqué requires the meters shall be three phase four wire and Article 64 of Regulation clearly states how calibration shall be performed for this kind of meters. As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan. In addition to that the quantity of net electricity delivered to the grid will be cross checked with the meter reading records (OSF forms) provided to the company by TEIAS and internal reports provided to the head of the company by the plant manager.

[45] See, http://www.epdk.gov.tr/documents/elektrik/mevzuat/yonetmelik/elektrik/dengeleme_uzlastirma/DUYson.doc page 55
[46] See, http://www.epdk.gov.tr/documents/elektrik/mevzuat/teblig/elektrik/sayaclar_hakkinda/Elk_Tblg_Sayaclar.doc
[47] See, http://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.6381&MevzuatIliski=0&sourceXmlSearch=

Purpose of data	Calculation of emission reductions
Calculation method	The net electricity will be calculated by: a) Subtracting self consumption value from gross generation value for each month to find the net electricity supplied to the grid. b) Adding up all monthly net electricity values to calculate the total net electricity supplied to the grid during the monitoring period. c) Multiplying the total net electricity value with the CM emission factor.
Comments	-

4.3 Monitoring Plan

As the necessary baseline emission factors are all defined ex ante (Operating and Built Margin, see baseline description), the most important information to be monitored is the amount of electricity fed into the grid by Çerçikaya WPP. This value will be monitored continuously by metering devices, one of them being the main one in the substation, which provides the data for the monthly invoicing to TEİAŞ.

The collected data will be kept by ZT Enerji during the crediting period and until two years after the last issuance of VERs for the Çerçikaya WPP activity for that crediting period.

Given a data vintage based on ex ante monitoring and selection of a renewable 10 year crediting period, the Combined Margin will be recalculated at any renewal of the crediting period using the valid baseline methodology.

A backup power generator will be installed in power plant. In case, emissions from back-up power generator exceed 1% of the total emission reductions, they will be accounted as project emissions in each verification period. Operating hours of back-up power generator will be monitored with that purpose.

Potential leakage emissions in the context of power sector projects are emissions arising due to activities such as power plant construction, fuel handling and land inundation. However, according to the methodology, those emission sources do not need to be taken into account.

Operational and Management Structure

As described before, there are two main factors important for the calculation of emission reductions. The only relevant data that have to be monitored is only net electricity generation ($EG_{facility,y}$) per year. Since project emission is zero no additional monitoring is required. The generation data are subject to the strict internal quality control systems of both parties. The monthly meter reading documents are stored by ZT Enerji and TEİAŞ. The settlement notification, which is issued by TEİAŞ and includes the meter reading data, is stored on a TEİAŞ file server and accessible for ZT Enerji via a secured website. The meters themselves can always be read

as plausibility check for verification. The other important parameter is the emission factor. It is approved according to strict quality control parameters from an independent external party. With this, no additional structures or processes have to be implemented to insure the availability and high quality of the necessary data for monitoring.

At the end of each monitoring period, which is planned to generally last one year, from the monthly meter reading records the net electricity generation amounts as calculated by electricity supplied to the grid minus withdrawn from the system, will be added up to the yearly net electricity generation and total project emissions will be subtracted from this amount and result data will be multiplied with the combined margin emission factor with the help of an excel spread sheet that also contains the combined margin calculation. Thus, the complete baseline approach is always transparent and traceable. For the elaboration and quality assurance of the monitoring report, Life Enerji, an expert in the project mechanisms who already supported in the project design, is assigned. However, in order to continue improving the monitoring procedures and therefore also the future monitoring reports, internal quality check shall be fulfilled by Life İklim ve Enerji. The monitoring reports are checked and in cases of mistakes and inconsistencies in the monitoring report, revisions with improvements shall be done. Furthermore, external year verification assures that the emission reductions calculations are transparent and traceable.

For the operation of Çerçikaya WPP, below hierarchy is planned:

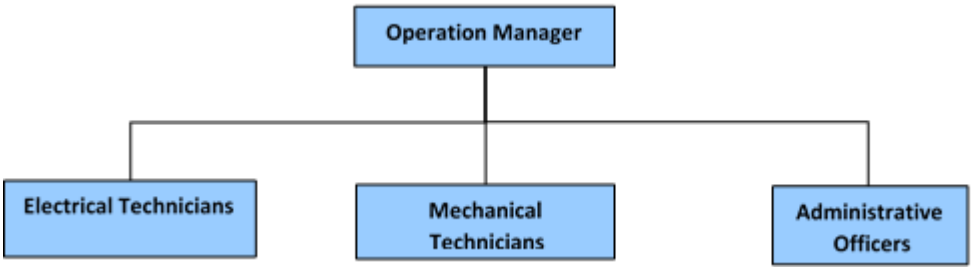

Figure 6: Operation and Management diagram

ZT Enerji will keep all the data needed for the calculation of emission reductions during the crediting period and until two years after the last issuance of VCS for Çerçikaya WPP.

Because of the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan. Dedicated emergency procedures are not provided, as there is no possibility of overstating emission reductions due to emergency cases.

5 SAFEGUARDS

5.1 No Net Harm

Çerçikaya WPP has minimum impact on terrestrial fauna, except from birds, and takes precautionary approach in regard to environmental challenges. Moreover, necessary precautions will be taken in order to minimize the impact of the project on the environment.

5.2 Environmental Impact

Çerçikaya WPP has been exempted from the preparation of a Environmental Impact Assessment by the Ministry of Environment and Urbanization with minimal social and environmental impact. The certificate is attached in Appendix 2.

Although there was no significant environmental impacts determined, the summary of the impacts outlined in the Environmental Impact Assessment.

Air Quality; Necessary precautions will be taken in order to minimize the dust formed during construction.

Water quality; the project has no negative impact on the water quality and quantity.

Biodiversity; In Turkey there are 35 Nature Preservation Area and 37 National Parks. The project is not located in any of these. Furthermore in Turkey there are 58 registered Monument of Nature and 16 registered Nature Park. None of these Monuments of Nature and Nature Parks is located in the project area.

5.3 Local Stakeholder Consultation

Local Stakeholder Consultation meeting was held on 06/12/2013 in Kömürçukuru Village of Belen District. At the meeting in Kömürçukuru, the plan to build the wind power project was presented to the public for the first time. The purpose of the meeting was to inform public and stakeholders about the plan and present and discuss social and environmental impacts of the project.

Invitation process for local stakeholder meeting was followed and about 20 associations/governmental offices were invited by invitation letters or calling. Apart from this kind of invitation other stakeholders were invited by local announcements such as announcement done on village coffeehouse and in newspaper.

All possible stakeholders were tried to be contacted via different kinds of communication ways such as sending letters to the invitees and local announcements. After sending letters to stakeholder, telephone calls were done to confirm receipt of invitation letters. Although all invitees respond positively to the project, many of them did not attend to the stakeholder meeting. Some reasons for non presence of stakeholders are: lack of personnel that can attend to the meeting and lack of interest in project activity. At the meeting in Kömürçukuru besides project developers, there were two representatives from local governmental institutions and many participants from the village.

During the meeting, representative of local governmental institutions and villagers expressed their support for renewable energy project of Çerçikaya WPP.

5.4 Public Comments

Public comments received during local stakeholder consultation meeting and also continuous input process book was handed into the mayor of Kömürçukuru, Abdullah Öner in order to receive comments after the meeting.

The other way of encouraging people to comment on the project was explained in the announcements and invitation letter as writing e-mail, calling or sending letters. Although it is explained in the announcements and invitation letter that it is possible to comment on the project by sending e-mail or just calling, there was no solid feedbacks, comments or questions by phone call or e-mail as a result of these announcements on Çerçikaya WPP.

Stakeholder comments received during meeting can be given as:

Stakeholder comment	**Was comment taken into account (Yes/ No)?**	**Explanation (Why? How?)**
What can be negative impact of the project?	Yes	There is no or very minimum negative impact of the project on environment and surroundings which is during construction for a short time.
Can you give electricity free to our village?	Yes	There is no possibility to provide village with free electricity.
Will there be local employment?	Yes	Our priority is having a local employment when the requirement is met.

APPENDIX 1: < BASELINE INFORMATION >

Calculation of Total CO_2 from OM Power Plants:

Table 17[48]: $HV_{i,y}$ (Heating Values for Fossil Fuels for Electricity Generation (TCal)

Energy Sources	2013	2014	2015
Hard Coal + Imported Coal	68.785	82.874	95.624
Lignite	81.676	97.916	85.417
Fuel Oil	5.837	7.444	5.459
Diesel Oil	1.363	1.245	2.493
Lpg	0	0	0
Naphta	0	0	0
Natural Gas	203.244	227.649	189.01

Table 18: $FC_{i,y}$ (Fuel Consumptions for Fossil Fuels for Electricity Generation (million m^3 for Natural Gas and ton for others)[49]

Energy Sources	2013	2014	2015
Hard Coal + Imported Coal	12.105.930	14.501.934	16.629.492
Lignite	47.120.306	57.696.139	49.940.131
Fuel Oil	573.534	754.283	516.912
Diesel Oil	176.379	119.988	238.388
Lpg	0	0	0
Naphta	0	0	0
Natural Gas	23.090.121	25.426.014	20.914.868

1	**Tcal**	**=**	**4.1868**	**TJ**

48 See; http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm excel file 69

49 See; http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2015/istatistik2015.htm excel file 67

Table 19: $NCV_{i,y}$ (Average Net Calorific Values for Fossil Fuels for Electricity Generation (TJ/million m^3 for Natural Gas and TJ/kton for others) and EF_i (Emission Factor of Fossil Fuels)

Energy Sources	NCVi 2013 (TJ/Gg)	NCVi 2014 (TJ/Gg)	NCVi 2015 (TJ/Gg)	EFCO2, I (kg/TJ)
Hard Coal+Imported Coal	23.79	23.93	24.08	*89.50*
Lignite	7.26	7.11	7.16	*90.90*
Fuel Oil	42.61	41.32	44.22	*72.60*
Diesel Oil	44.12	0.00	43.78	*72.60*
LPG	0.00	0.00	0.00	*61.60*
Naphta	0.00	0.00	0.00	*69.30*
Natural Gas	37.14	37.49	37.84	*54.30*

Table 20: CO_2 Emission by each Fossil Fuels Types ($ktCO_2e$)

Energy Sources	2013	2014	2015
Hard Coal+Imported Coal	25,775	31,054	35,832
Lignite	31,084	37,265	32,508
Fuel Oil	1,774	2,263	1,659
Diesel Oil	414	0	758
Lpg	0	0	0
Naphta	0	0	0
Natural Gas	46,206	51,754	42,970
TOTAL	**105,254**	**122,336**	113,727

RECENT POWER PLANTS: CAPACITY AND FUEL TYPE

<u>Identification of Sample Group</u>

Table 21: Sample Group PPs for BM Emission Factor Calculation

No	Information to clearly identify the Plant (Name of the Plant)	Date of Commissioning	Capacity in MW	Fuel Type	Annual Generation (GWh)
1	Eren Enerji (Addition)	2010	600.0	Imported coal	4006.00
2	Eren Enerji (Addition)	2010	600.0	Imported coal	4006.00
3	MARMARA PAMUKLU MENS. SN.TİC.A.Ş. (Addition)	2010	26.2	Natural Gas	203.76
4	Aliağa Çakmaktepe Enerji A.Ş.(Aliağa/İZMİR) (Addition)	2010	69.8	Natural Gas	556.00
5	FRİTOLAY GIDA SAN.VE TİC. AŞ. (Addition)	2010	0.3	Biogas	2.40

6	Sönmez Enerji Üretim (Uşak) (Addition)	2010	2.6	Natural Gas	19.77
7	Ak-Enerji (Uşak OSB)	2010	-15.2	Liqued Fuel + N.Gas	0.00
8	Ak-Enerji (DG+N) (Deba-Denizli)	2010	-15.6	Liqued Fuel + N.Gas	0.00
9	Polyplex Europa Polyester Film	2010	7.8	Natural Gas	61.00
10	ALTEK ALARKO Elektrik Santralleri	2010	21.9	Natural Gas	151.36
11	Aksa Enerji (Demirtaş/Bursa)	2010	-1.1	Natural Gas	0.00
12	RASA ENERJİ (VAN) (Addition)	2010	10.1	Natural Gas	64.41
13	SİLOPİ ELEKTRİK ÜRETİM A.Ş.(ESENBOĞA)	2010	-44.8	Fuel Oil	0.00
14	International Hospital Istanbul	2010	0.8	Natural Gas	6.00
15	Tuzla Jeotermal	2010	7.5	Geothermal	0.00
16	Menderes Jeotermal Dora-2	2010	9.5	Geothermal	0.00
17	Selimoğlu Reg. Ve Hes	2010	8.0	Hydro (run of river)	0.00
18	Kulp IV HES	2010	12.3	Hydro (run of river)	46.00
19	Cindere HES (Denizli) (Addition)	2010	9.1	Hydro (With Dam)	28.29
20	Bayburt Hes	2010	14.6	Hydro (run of river)	51.00
21	UZUNÇAYIR HES (Tunceli) (Addition)	2010	27.3	Hydro (With Dam)	105.00
22	Alakır Hes.	2010	2.1	Hydro (run of river)	6.00
23	Peta Müh. En. (Mursal II Hes.)	2010	4.5	Hydro (run of river)	19.00
24	Asa Enerji (Kale Reg. Ve Hes.)	2010	9.6	Hydro (run of river)	0.00
25	Hetaş Hacısalihoğlu (Yıldızlı Hes)	2010	1.2	Hydro (run of river)	5.00
26	Doğubay Elektrik (Sarımehmet Hes)	2010	3.1	Hydro (run of river)	10.00
27	Nuryol Enerji (Defne Reg. Ve hes.)	2010	7.2	Hydro (run of river)	22.00
28	ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	2010	5.9	Hydro (run of river)	0.00
29	Birim Hidr. Üretim A.Ş. (Erfelek Hes)	2010	3.2	Hydro (run of river)	19.00
30	Beytek El. Ür. A.Ş. (Çataloluk Hes.)	2010	9.5	Hydro (run of river)	0.00
31	Nisan E. Mekanik En. (Başak Reg. Hes.)	2010	6.9	Hydro (run of river)	22.00
32	UZUNÇAYIR HES (Tunceli) (Addition)	2010	27.3	Hydro (With Dam)	105.00

33	Fırtına Elektrik Üretim A.Ş. (Sümer Hes)	2010	21.6	Hydro (run of river)	70.00
34	KAR-EN Karadeniz El. A.Ş. Aralık Hes	2010	12.4	Hydro (run of river)	0.00
35	Birim Hidr. Üretim A.Ş. (Erfelek Hes)	2010	3.2	Hydro (run of river)	19.00
36	Karadeniz El. Üret. (Uzundere-1 Hes)	2010	62.2	Hydro (run of river)	165.00
37	Akım Enerji (Cevizli Reg. Ve Hes.)	2010	91.4	Hydro (run of river)	330.00
38	Çakıt Hes. (Çakıt Enerji)	2010	20.2	Hydro (run of river)	0.00
39	Ceyhan Hes. (Oşkan Hes.) (Enova En.)	2010	23.9	Hydro (run of river)	98.00
40	Erenler Reg. Ve Hes. (BME Bir. Müt. En.)	2010	45.0	Hydro (run of river)	85.00
41	Paşa Reg. Ve Hes (Özgür Elektrik)	2010	8.7	Hydro (run of river)	0.00
42	Güzelçay-I-II Hes (İlk Elektrik Enerji)	2010	8.1	Hydro (run of river)	0.00
43	Kale Reg. Ve Hes (Kale Enerji Ür.)	2010	34.1	Hydro (run of river)	116.00
44	Erikli-Akocak Reg. Ve Hes	2010	82.5	Hydro (run of river)	0.00
45	Çamlıkaya Reg. Ve Hes	2010	5.6	Hydro (run of river)	19.00
46	Dinar Hes. (Elda Elekrik Üretim)	2010	4.4	Hydro (run of river)	15.00
47	Damlapınar Hes. (Cenay Elektrik Üretim)	2010	16.4	Hydro (run of river)	0.00
48	Dim Hes (Diler Elektrik Üretim)	2010	38.3	Hydro (run of river)	123.00
49	ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	2010	5.9	Hydro (run of river)	0.00
50	Kirpilik Reg. Ve Hes (Özgür Elektrik)	2010	6.2	Hydro (run of river)	22.00
51	Yavuz Reg. Ve Hes (Masat Enerji)	2010	22.5	Hydro (run of river)	83.00
52	Kayabükü Reg. Ve Hes (Elite Elektrik)	2010	14.6	Hydro (run of river)	0.00
53	Gök Reg. Ve Hes (Gök Enerji El. San.)	2010	10.0	Hydro (run of river)	43.00
54	Bulam Reg. Ve Hes (MEM Enerji ELK.)	2010	7.0	Hydro (run of river)	0.00
55	Karşıyaka HES (Akua Enerji Üret.)	2010	1.6	Hydro (run of river)	8.00
56	Ceyhan Hes. (Berkman Hes) (Enova En.)	2010	25.2	Hydro (run of river)	103.00
57	Güdül I Reg. Ve HES (Yaşam Enerji)	2010	2.4	Hydro (run of river)	14.00
58	Tektuğ Elektrik (Andırın Hes)	2010	40.5	Hydro (run of river)	106.00
59	Selen Elektrik (Kepezkaya Hes)	2010	28.0	Hydro (run of river)	0.00

60	REŞADİYE 2 HES (TURKON MNG ELEKT.)	2010	26.1	Hydro (run of river)	0.00
61	Kozan Hes (Ser-Er Enerji)	2010	4.0	Hydro (run of river)	9.00
62	Kahraman Reg. Ve Hes (Katırcıoğlu)	2010	1.4	Hydro (run of river)	6.00
63	Narinkale Reg. Ve Hes (EBD Enerji)	2010	3.1	Hydro (run of river)	10.00
64	Erenköy Reg. Ve Hes (Türkerler)	2010	21.5	Hydro (run of river)	87.00
65	Kahta I HES (Erdemyıldız Elektrik Üretim)	2010	7.1	Hydro (run of river)	35.00
66	Azmak II Reg. Ve Hes	2010	-18.1	Hydro (run of river)	0.00
67	Ulubat Kuvvet Tüneli ve Hes	2010	97.0	Hydro (With Dam)	372.00
68	REŞADİYE 1 HES (TURKON MNG ELEKT.)	2010	15.7	Hydro (run of river)	0.00
69	Egemen 1 HES (Enersis Elektrik)	2010	19.9	Hydro (run of river)	0.00
70	Sabunsuyu II HES (Ang Enerji Elk.)	2010	7.4	Hydro (run of river)	21.00
71	Burç Bendi ve Hes (Akkur Enerji)	2010	27.3	Hydro (run of river)	113.00
72	Murgul Bakır (Ç.kaya) (Addition)	2010	19.6	Hydro (run of river)	40.50
73	Güzelçay II Hes (İlk Elektrik Enerji) (Addition)	2010	5.0	Hydro (run of river)	0.00
74	REŞADİYE 1 HES (TURKON MNG ELEKT.)	2010	15.7	Hydro (run of river)	0.00
75	Egemen 1 HES (Enersis Elektrik)	2010	8.8	Hydro (run of river)	0.00
76	Yedigöze HES (Yedigöze Elektrik)	2010	155.3	Hydro (With Dam)	474.00
77	Umut III Reg. Ve HES (Nisan Elek.)	2010	12.0	Hydro (run of river)	26.00
78	FEKE 2 Barajı ve HES (Nisan Elek.)	2010	69.3	Hydro (With Dam)	223.00
79	Egemen 1B HES (Enersis Elektrik)	2010	11.1	Hydro (run of river)	0.00
80	Kalkandere Reg. Ve Yokuşlu HES.	2010	14.5	Hydro (run of river)	63.00
81	ROTOR ELEKTRİK (OSMANİYE RES)	2010	55.0	Wind	0.00
82	Asmakinsan (Bandırma 3 RES)	2010	24.0	Wind	0.00
83	Soma Enerji Üretim (Soma Res)	2010	34.2	Wind	0.00
84	Deniz Elektrik (Sebenoba Res)	2010	10.0	Wind	0.00
85	Akdeniz Elektrik (Mersin Res)	2010	33.0	Wind	0.00
86	Boreas Enerji (Boreas I Enez Res)	2010	15.0	Wind	0.00

87	Bergama Res En. Ür. A.Ş. Aliağa Res	2010	90.0	Wind	0.00
88	Bakras En. Elek. Ür. A.Ş. Şenbük Res	2010	15.0	Wind	0.00
89	ALİZE ENERJİ (KELTEPE RES)	2010	1.8	Wind	0.00
90	ROTOR ELEKTRİK (Gökçedağ Res)	2010	22.5	Wind	0.00
91	MAZI-3 RES ELEKT.ÜR. A.Ş. (MAZI-3 RES)	2010	7.5	Wind	0.00
92	BORASKO ENERJİ (BANDIRMA RES)	2010	12.0	Wind	0.00
93	Ziyaret Res (Ziyaret Res Elektirk)	2010	35.0	Wind	0.00
94	Soma Res (Bilgin Rüzgar San. En. Ür.)	2010	90.0	Wind	0.00
95	Belen ELEKTRİK BELEN Res (Addition)	2010	6.0	Wind	0.00
96	ÜtOPYA ELEKTRİK (DÜZOVA RES) (Addition)	2010	15.0	Wind	0.00
97	Kuyucak Res (Alize Enerji Ür.)	2010	25.6	Wind	0.00
98	Sares Res (Garet Enerji Üretim)	2010	15.0	Wind	0.00
99	Turguttepe Res (Sabaş Elektrik Ür.)	2010	22.0	Wind	0.00
100	AKIM ENERJİ BAŞPINAR (SÜPER FİLM)	2011	25.3	Natural Gas	177.00
101	AKSA AKRİLİK (İTHAL KÖM.+D.G)	2011	25.0	Natural Gas	189.08
102	AKSA ENERJİ (Antalya)	2011	600.0	Natural Gas	3600.00
103	ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	2011	139.7	Natural Gas	1051.60
104	BEKİRLİ TES (İÇDAŞ ELEKTRİK EN.)	2011	600.0	Imported coal	4320.00
105	BOLU BELEDİYESİ ÇÖP TOP. TES. BİYOGAZ	2011	1.1	Landfill Gas	0.00
106	BOSEN ENERJİ ELEKTRİK ÜRETİM AŞ.	2011	93.0	Natural Gas	698.49
107	CENGİZ ÇİFT YAKITLI K.Ç.E.S.	2011	131.3	Natural Gas	985.00
108	CENGİZ ENERJİ SAN.VE TİC.A.Ş.	2011	35.0	Natural Gas	281.29
109	CEV ENERJİ ÜRETİM(GAZİANTEP ÇÖP BİOGAZ)	2011	5.7	Landfill Gas	0.00
110	FRAPORT IC İÇTAŞ ANTALYA HAVALİMANI	2011	8.0	Natural Gas	64.00
111	GLOBAL ENERJİ (PELİTLİK)	2011	4.0	Natural Gas	29.91
112	GORDİON AVM (REDEVCO ÜÇ EMLAK)	2011	2.0	Natural Gas	15.00
113	GOREN-1 (GAZİANTEP ORGANİZE SAN.)	2011	48.7	Natural Gas	277.00

114	GÜLLE ENERJİ(Çorlu) (İlave)	2011	3.9	Natural Gas	17.97
115	HASIRCI TEKSTİL TİC. VE SAN. LTD. ŞTİ.	2011	2.0	Natural Gas	15.00
116	HG ENERJİ ELEKTRİK ÜRET. SAN.TİC. A.Ş.	2011	52.4	Natural Gas	366.00
117	ISPARTA MENSUCAT (Isparta)	2011	4.3	Natural Gas	33.00
118	ITC ADANA ENERJİ ÜRETİM (İlave)	2011	1.4	Landfill Gas	0.00
119	ITC-KA EN. (ASLIM BİYOKÜTLE) KONYA	2011	5.7	Landfill Gas	0.00
120	ITC-KA ENERJİ (SİNCAN) (İlave)	2011	1.4	Landfill Gas	0.00
121	ITC-KA ENERJİ MAMAK KATI ATIK TOP.	2011	2.8	Landfill Gas	0.00
122	İSTANBUL SABİHA GÖKÇEN UL.AR. HAV.	2011	4.0	Natural Gas	32.00
123	KARKEY (SİLOPİ 1)	2011	100.4	Fuel Oil	701.15
124	KAYSERİ KATI ATIK DEPONİ SAHASI	2011	1.6	Landfill Gas	0.00
125	KNAUF İNŞ. VE YAPI ELEMANLARI SN.	2011	1.6	Natural Gas	12.00
126	LOKMAN HEKİM ENGÜRÜ SAĞ.(SİNCAN)	2011	0.5	Natural Gas	4.00
127	MARDİN-KIZILTEPE (AKSA ENERJİ)	2011	32.1	Natural Gas	225.00
128	NUH ENERJİ EL. ÜRT.A.Ş. (ENERJİ SANT.-2)	2011	120.0	Natural Gas	900.00
129	ODAŞ DOĞALGAZ KÇS (ODAŞ ELEKTRİK)	2011	55.0	Natural Gas	415.00
130	POLYPLEX EUROPA POLYESTER FİLM	2011	3.9	Natural Gas	30.70
131	SAMSUN TEKKEKÖY EN. SAN. (AKSA EN.)	2011	131.3	Natural Gas	980.00
132	SAMUR HALI A.Ş.	2011	4.3	Natural Gas	33.00
133	SARAY HALI A.Ş.	2011	4.3	Natural Gas	33.00
134	TEKİRDAĞ-ÇORLU TEKS.TES.(NİL ÖRME)	2011	2.7	Natural Gas	21.00
135	TİRENDA TİRE ENERJİ ÜRETİM A.Ş.	2011	58.4	Natural Gas	410.00
136	YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	2011	8.7	Natural Gas	65.00
137	ZORLU ENERJİ (B.Karıştıran)	2011	7.2	Natural Gas	54.07
138	ŞANLIURFA OSB (RASA ENERJİ ÜR. A.Ş.)	2011	116.8	Natural Gas	800.00
139	AYDIN/GERMENCİK JEOTERMAL	2011	20.0	Geothermal	150.00
140	ÇEŞMEBAŞI REG. VE HES (GİMAK EN.)	2011	8.2	Hydro (run of river)	39.00

141	ÇUKURÇAYI HES (AYDEMİR ELEKTRİK ÜR.)	2011	1.8	Hydro (run of river)	8.00
142	DARCA HES (BÜKOR ELEKTRİK ÜRETİM)	2011	8.9	Hydro (run of river)	0.00
143	DERME (KAYSERİ VE CİVARI ENERJİ)	2011	4.5	Hydro (run of river)	14.00
144	DURU 2 REG. VE HES (DURUCASU ELEK.)	2011	4.5	Hydro (run of river)	22.00
145	ERENKÖY REG. VE HES (NEHİR ENERJİ)	2011	21.5	Hydro (run of river)	87.00
146	ERKENEK (KAYSERİ VE CİVARI ENERJİ)	2011	0.3	Hydro (run of river)	0.00
147	EŞEN-1 HES (GÖLTAŞ ENERJİ ELEKTRİK)	2011	60.0	Hydro (run of river)	240.00
148	GİRLEVİK (BOYDAK ENERJİ)	2011	3.0	Hydro (run of river)	21.00
149	GÖKMEN REG. VE HES (SU-GÜCÜ ELEKT.)	2011	2.9	Hydro (run of river)	13.00
150	HACININOĞLU HES (ENERJİ-SA ENERJİ)	2011	142.3	Hydro (run of river)	360.00
151	HAKKARİ (Otluca) (NAS ENERJİ A.Ş.)	2011	1.3	Hydro (run of river)	6.00
152	HASANLAR	2011	9.4	Hydro (run of river)	39.00
153	HASANLAR HES (DÜZCE ENERJİ BİRLİĞİ)	2011	4.7	Hydro (run of river)	0.00
154	İNCİRLİ REG. VE HES (LASKAR ENERJİ)	2011	25.2	Hydro (run of river)	126.00
155	KALKANDERE REG. VE YOKUŞLU HES	2011	23.4	Hydro (run of river)	0.00
156	KARASU 4-2 HES (İDEAL ENERJİ ÜRETİMİ)	2011	10.4	Hydro (run of river)	0.00
157	KARASU 4-3 HES (İDEAL ENERJİ ÜRETİMİ)	2011	4.6	Hydro (run of river)	0.00
158	KARASU 5 HES (İDEAL ENERJİ ÜRETİMİ)	2011	4.1	Hydro (run of river)	0.00
159	KARASU I HES (İDEAL ENERJİ ÜRETİMİ)	2011	3.8	Hydro (run of river)	0.00
160	KARASU II HES (İDEAL ENERJİ ÜRETİMİ)	2011	3.1	Hydro (run of river)	13.00
161	KAZANKAYA REG. VE İNCESU HES (AKSA)	2011	15.0	Hydro (run of river)	48.00
162	KESME REG. VE HES (KIVANÇ ENERJİ)	2011	4.6	Hydro (run of river)	16.00
163	KIRAN HES (ARSAN ENERJİ A.Ş.)	2011	9.7	Hydro (run of river)	0.00
164	KORUKÖY HES (AKAR ENERJİ SAN. TİC.)	2011	3.0	Hydro (run of river)	22.00
165	KOVADA-I (BATIÇİM ENERJİ ELEKTRİK)	2011	51.2	Hydro (run of river)	36.20
166	KOVADA-II (BATIÇİM ENERJİ ELEKTRİK)	2011	8.3	Hydro (run of river)	4.10
167	KOZDERE HES (ADO MADENCİLİK ELKT.)	2011	3.1	Hydro (run of river)	0.00

168	KÖYOBASI HES (ŞİRİKOĞLU ELEKTRİK)	2011	1.1	Hydro (run of river)	5.00
169	KULP I HES (YILDIZLAR ENERJİ ELK.ÜR.)	2011	22.9	Hydro (run of river)	78.00
170	KUMKÖY HES (AES-IC İÇTAŞ ENERJİ)	2011	17.5	Hydro (run of river)	98.00
171	AKSU REG. VE HES (KALEN ENERJİ)	2011	5.2	Hydro (run of river)	16.00
172	ALKUMRU BARAJI VE HES (LİMAK HİD.)	2011	261.3	Hydro (run of river)	828.00
173	AYRANCILAR HES (MURADİYE ELEKTRİK)	2011	32.1	Hydro (run of river)	0.00
174	BALKONDU I HES (BTA ELEKTRİK ENERJİ)	2011	9.2	Hydro (run of river)	33.00
175	BAYRAMHACILI BARAJI VE HES	2011	47.0	Hydro (run of river)	175.00
176	BERDAN	2011	10.2	Hydro (run of river)	47.20
177	BOĞUNTU HES (BEYOBASI ENERJİ)	2011	3.8	Hydro (run of river)	17.00
178	CEVHER I-II REG. VE HES (ÖZCEVHER EN.)	2011	16.4	Hydro (run of river)	0.00
179	ÇAKIRMAN REG. VE HES (YUSAKA EN.)	2011	7.0	Hydro (run of river)	22.00
180	ÇAMLIKAYA REG.VE HES (ÇAMLIKAYA EN)	2011	2.8	Hydro (run of river)	0.80
181	ÇANAKÇI HES (CAN ENERJİ ENTEGRE)	2011	9.3	Hydro (run of river)	39.00
182	MENGE BARAJI VE HES (ENERJİSA ENERJİ)	2011	44.7	Hydro (run of river)	0.00
183	MOLU ENERJİ (Zamantı-Bahçelik HES)	2011	4.2	Hydro (run of river)	30.00
184	MURATLI REG. VE HES (ARMAHES EL.)	2011	26.7	Hydro (run of river)	94.00
185	NARİNKALE REG. VE HES (EBD ENERJİ)	2011	30.4	Hydro (run of river)	108.00
186	OTLUCA I HES (BEYOBASI ENERJİ ÜR.)	2011	37.5	Hydro (run of river)	0.00
187	OTLUCA II HES (BEYOBASI ENERJİ ÜR.)	2011	6.4	Hydro (run of river)	0.00
188	ÖREN REG. VE HES (ÇELİKLER ELEKTRİK)	2011	6.6	Hydro (run of river)	16.00
189	POYRAZ HES (YEŞİL ENERJİ ELEKTRİK)	2011	2.7	Hydro (run of river)	10.00
190	SARAÇBENDİ HES (ÇAMLICA ELEKTRİK)	2011	25.5	Hydro (run of river)	0.00
191	SARIKAVAK HES (ESER ENERJİ YAT. AŞ.)	2011	8.1	Hydro (run of river)	0.00
192	SAYAN HES (KAREL ELEKTRİK ÜRETİM)	2011	14.9	Hydro (run of river)	0.00
193	SEFAKÖY HES (PURE ENERJİ ÜRETİM AŞ.)	2011	33.1	Hydro (run of river)	0.00
194	DAREN HES ELEKTRİK (SEYRANTEPE)	2011	49.7	Hydro (run of river)	181.13

195	SIZIR (KAYSERİ VE CİVARI EL. T.A.Ş)	2011	5.8	Hydro (run of river)	46.00
196	SÖĞÜTLÜKAYA (POSOF III) HES	2011	6.1	Hydro (run of river)	31.00
197	TEFEN HES (AKSU MADENCİLİK SAN.)	2011	33.0	Hydro (run of river)	141.00
198	TUZTAŞI HES (GÜRÜZ ELEKTRİK ÜR.)	2011	1.6	Hydro (run of river)	10.00
199	ÜZÜMLÜ HES (AKGÜN ENERJİ ÜRETİM)	2011	11.4	Hydro (run of river)	41.00
200	YAMAÇ HES (YAMAÇ ENERJİ ÜRETİM A.Ş.)	2011	5.5	Hydro (run of river)	0.00
201	YAPISAN (KARICA REG. ve DARICA I HES)	2011	13.3	Hydro (run of river)	0.00
202	YAPRAK II HES (NİSAN ELEKTROMEK.)	2011	10.8	Hydro (run of river)	32.00
203	YAŞIL HES (YAŞIL ENERJİ ELEKTRİK)	2011	3.8	Hydro (run of river)	15.00
204	YEDİGÖL REG. VE HES (YEDİGÖL HİDR.)	2011	21.9	Hydro (run of river)	77.00
205	YEDİGÖZE HES (YEDİGÖZE ELEK.) (İlave)	2011	155.3	Hydro (run of river)	425.00
206	SARES RES (GARET ENERJİ ÜRETİM)	2011	7.5	Wind	0.00
207	SEYİTALİ RES (DORUK ENERJİ ELEKTRİK)	2011	30.0	Wind	0.00
208	SOMA RES (SOMA ENERJİ) (İlave)	2011	36.9	Wind	0.00
209	SUSURLUK RES (ALANTEK ENERJİ ÜRET.)	2011	45.0	Wind	0.00
210	ŞAH RES (GALATA WİND ENERJİ LTD. ŞTİ)	2011	93.0	Wind	0.00
211	TURGUTTEPE RES (SABAŞ ELEKTRİK)	2011	2.0	Wind	0.00
212	ZİYARET RES (ZİYARET RES ELEKTRİK)	2011	22.5	Wind	0.00
213	AKRES (AKHİSAR RÜZGAR EN. ELEKT.)	2011	43.8	Wind	0.00
214	AYVACIK RES (AYRES AYVACIK RÜZG.)	2011	5.0	Wind	0.00
215	BAKİ ELEKTRİK ŞAMLI RÜZGAR (İlave)	2011	24.0	Wind	0.00
216	ÇANAKKALE RES (ENERJİ-SA ENERJİ)	2011	29.2	Wind	0.00
217	ÇATALTEPE RES (ALİZE ENERJİ ELEKTRİK)	2011	16.0	Wind	0.00
218	İNNORES ELEKTRİK YUNTDAĞ RÜZGAR	2011	10.0	Wind	0.00
219	KİLLİK RES (PEM ENERJİ A.Ş.)	2011	40.0	Wind	0.00
220	ACARSOY TERMİK KOM.ÇEV.SANT. (ACARSOY EN.)	2012	50.0	Natural Gas	375.00
221	AFYON DGKÇ (DEDELİ DOĞALGAZ ELEKTRİK ÜR.)	2012	126.1	Natural Gas	945.00

222	AGE DOĞALGAZ KOM. ÇEV. SANT. (AGE DENİZLİ)	2012	141.0	Natural Gas	1057.00
223	AKDENİZ KİMYA SAN. VE TİC. A.Ş.	2012	4.0	Natural Gas	30.00
224	AKKÖPRÜ (DALAMAN)	2012	115.0	Hydro (run of river)	176.00
225	AKKÖY II HES (AKKÖY ENERJİ A.Ş.)	2012	229.7	Hydro (run of river)	508.00
226	AKKÖY-ESPİYE HES (KONİ İNŞAAT SAN. A.Ş.)	2012	8.9	Hydro (run of river)	40.00
227	AKSA AKRİLİK KİMYA SAN. A.Ş. (İTHAL KÖM.+D.G)	2012	42.5	Natural Gas	298.00
228	AKSU RES (AKSU TEMİZ ENERJİ ELEKTRİK ÜRETİM)	2012	72.0	Wind	0.00
229	ALABALIK REG. VE HES SANTRALI I-II (DARBOĞAZ ELK. ÜR. SAN.)	2012	13.8	Hydro (run of river)	0.00
230	ALES DOĞALGAZ KOM. ÇEV. SANT. (ALES ELEKT.)	2012	49.0	Natural Gas	370.00
231	ALPASLAN I (ELEKTRİK ÜRETİM A.Ş.)	2012	80.0	Hydro (run of river)	0.00
232	ALTINYILDIZ MENSUCAT VE KONF. FAB. (Tekirdağ)	2012	5.5	Natural Gas	38.00
233	ANAK HES (KOR-EN KORKUTELİ ELEK. ÜRET. SAN.)	2012	3.8	Hydro (run of river)	9.00
234	ARAKLI-1 REG. VE HES(YÜCEYURT ENERJİ ÜRETİM)	2012	13.1	Hydro (run of river)	0.00
235	ARCA HES (GÜRSU TEMİZ ENERJİ ÜRETİM A.Ş.)	2012	5.5	Hydro (run of river)	0.00
236	AREL ENERJİ BİYOKÜTLE TESİSİ (AREL ÇEVRE)	2012	2.4	Biomass	0.00
237	ARPA REG. VE HES (MCK ELEKTRİK ÜRETİM A.Ş.)	2012	32.4	Hydro (run of river)	44.00
238	ASAŞ ALÜMİNYUM SANAYİ VE TİCARET A.Ş.	2012	8.6	Natural Gas	65.00
239	ATAKÖY (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	5.5	Hydro (run of river)	11.00
240	AVCILAR HES (AVCILAR ENERJİ ELEKTRİK ÜRET.)	2012	16.7	Hydro (run of river)	28.00
241	AYANCIK HES (İLK ELEKTRİK ENERJİ ÜRETİMİ SN.)	2012	15.6	Hydro (run of river)	37.00
242	AYRANCILAR HES (MURADİYE ELEKTRİK ÜRETİM)	2012	9.3	Hydro (run of river)	0.00
243	BAĞIŞTAŞ II HES (AKDENİZLİ ELEKTRİK ÜRETİM)	2012	32.4	Hydro (run of river)	69.00
244	BALIKESİR RES (BARES ELEKTRİK ÜRETİM A.Ş.)	2012	30.3	Wind	0.00
245	BALIKESİR RES (ENERJİSA ENERJİ ÜRETİM A.Ş.)	2012	82.5	Wind	0.00
246	BALKUSAN BARAJI VE HES 1 NOLU SANT. (KAREN)	2012	13.0	Hydro (run of river)	0.00
247	BALKUSAN BARAJI VE HES 2 NOLU SANT. (KAREN)	2012	25.0	Hydro (run of river)	0.00
248	BALSUYU MENSUCAT SAN. VE TİC. A.Ş.	2012	9.7	Natural Gas	68.00

249	BAMEN KOJENERASYON (BAŞYAZICIOĞLU TEKSTİL)	2012	2.1	Natural Gas	14.00
250	BANDIRMA RES (YAPISAN ELEKTRİK ÜRETİM A.Ş.)	2012	5.0	Wind	0.00
251	BANGAL REG. VE KUŞLUK HES (KUDRET ENERJİ)	2012	17.0	Hydro (run of river)	32.00
252	BEKTEMUR HES (DİZ-EP ELEKTRİK ÜRETİM LTD.)	2012	3.5	Hydro (run of river)	11.00
253	BEREKET ENERJİ ÜRETİM A.Ş. (BİOGAZ)	2012	0.6	Biogas	5.00
254	BEYKÖY (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	16.8	Hydro (run of river)	87.00
255	BEYPİ BEYPAZARI TARIMSAL ÜRETİM PZ. SN. A.Ş.	2012	8.6	Natural Gas	63.00
256	BİLECİK DOĞALGAZ ÇS. (TEKNO DOĞALGAZ ÇEV.)	2012	25.8	Natural Gas	190.00
257	BİLECİK DOĞALGAZ KÇS. (DEDELİ DOĞALGAZ EL.)	2012	126.1	Natural Gas	945.00
258	BİLKUR TEKSTİL BOYA TİC. A.Ş.	2012	2.0	Natural Gas	14.00
259	BİNATOM ELEKTRİK ÜRETİM A.Ş. (Emet/KÜTAHYA)	2012	10.4	Natural Gas	78.00
260	BİS ENERJİ(Sanayi/ Bursa)	2012	48.0	Natural Gas	361.00
261	BOSEN ENERJİ ELEKTRİK ÜRETİM AŞ.(Bursa)	2012	27.9	Natural Gas	210.00
262	BOYABAT BARAJI VE HES (BOYABAT ELEKTRİK)	2012	513.0	Hydro (run of river)	830.00
263	BOZYAKA RES (KARDEMİR HADDECİLİK VE ELEKT.)	2012	12.0	Wind	32.00
264	BÜYÜKDÜZ HES (AYEN ENERJİ A.Ş.)	2012	68.9	Hydro (run of river)	192.00
265	CAN 1 HES (HED ELEKTRİK ÜRETİM A.Ş.)	2012	1.8	Hydro (run of river)	6.00
266	CEYHAN HES (BERKMAN HES) (ENOVA EN ÜRET.)	2012	12.6	Hydro (run of river)	31.00
267	CUNİŞ REG. VE HES (RİNERJİ RİZE ELEKTRİK ÜR.)	2012	8.4	Hydro (run of river)	21.00
268	ÇAĞLAYAN HES (ÇAĞLAYAN HES ENERJİ ÜRETİM)	2012	6.0	Hydro (run of river)	12.00
269	ÇARŞAMBA HES (ÇARŞAMBA ENERJİ ELEKTRİK)	2012	11.3	Hydro (run of river)	36.00
270	ÇILDIR (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	15.4	Natural Gas	20.00
271	ÇINAR-1 HES (AYCAN ENERJİ ÜRETİM TİC. VE SN.)	2012	9.3	Hydro (run of river)	19.00
272	ÇUKURÇAYI HES (AYDEMİR ELEKTRİK ÜRETİM A.Ş.)	2012	1.8	Hydro (run of river)	2.00
273	DAĞPAZARI RES (ENERJİSA ENERJİ ÜRETİM A.Ş.)	2012	39.0	Wind	0.00
274	DEMİRCİLER HES (PAK ENERJİ ÜRETİMİ SAN.)	2012	8.4	Hydro (run of river)	0.00
275	DENİZ JEOTERMAL (MAREN MARAŞ ELEKTRİK)	2012	24.0	Geothermal	0.00

276	DENİZLİ JEOTERMAL (ZORLU DOĞAL ELEK. ÜR.A.Ş.)	2012	15.0	Geothermal	105.00
277	DİNAR RES (OLGU ENERJİ YATIRIM ÜRETİM)	2012	16.1	Wind	51.00
278	DOĞANKAYA HES (MAR-EN ENERJİ ÜRET. TİC.)	2012	20.6	Hydro (run of river)	56.00
279	DUMLU HES (DUMLU ENERJİ ELEKTRİK ÜRETİM)	2012	4.0	Hydro (run of river)	5.00
280	DURMAZLAR MAKİNA SANAYİ VE TİCARET A.Ş.	2012	1.3	Natural Gas	10.00
281	DURUM GIDA TERMİK KOJEN. SANT. (DURUM GIDA)	2012	3.6	Natural Gas	29.00
282	EGE SERAMİK ENERJİ SANTRALI	2012	13.1	Natural Gas	90.00
283	EGER HES (EGER ELEKTRİK ÜRETİM LTD. ŞTİ.)	2012	1.9	Hydro (run of river)	6.00
284	EKİM BİYOGAZ (EKİM GRUP ELEKTRİK ÜRETİM)	2012	1.2	Biogas	10.00
285	ENERJİ-SA (ÇANAKKALE)	2012	0.9	Wind	0.00
286	ENERJİ-SA (KÖSEKÖY)	2012	120.0	Natural Gas	930.00
287	ENERJİ-SA (MERSİN)	2012	1.4	Natural Gas	11.00
288	ERDEMİR(F.O+K.G+Y.F.G+DG)(Ereğli-Zonguldak)	2012	53.9	Natural Gas	355.00
289	EREN ENERJİ ELEKTRİK ÜRETİM A.Ş.	2012	30.0	Imported coal	195.00
290	ERİK HES (ELEKTRİK ÜRETİM A.Ş.)	2012	6.5	Hydro (run of river)	21.00
291	ERMENEK (ELEKTRİK ÜRETİM A.Ş.)	2012	302.4	Hydro (run of river)	1187.00
292	ERZURUM MEYDAN AVM (REDEVKO BİR EMLAK)	2012	2.4	Natural Gas	16.00
293	ES ES ESKİŞEHİR ENERJİ SAN. VE TİC. A.Ş.	2012	2.0	Biogas	15.00
294	ESENDURAK HES (MERAL ELEKTRİK ÜRETİM)	2012	9.3	Hydro (run of river)	0.00
295	FEKE 1 HES (AKKUR ENERJİ ÜRETİM TİC. VE SAN.)	2012	29.4	Hydro (run of river)	0.00
296	FEKE 2 BARAJI VE HES (AKKUR ENERJİ ÜRETİM)	2012	69.3	Hydro (run of river)	0.00
297	FINDIK I HES (ADV ELEKTRİK ÜRETİM LTD. ŞTİ.)	2012	11.3	Hydro (run of river)	27.00
298	GOODYEAR (İzmit/Köseköy)	2012	5.2	LPG	35.00
299	GÖKGEDİK HES (UHUD ENERJİ ÜRETİM TİC.)	2012	24.3	Hydro (run of river)	75.00
300	GÖKNUR GIDA MAD. EN. İM. İT. İH. TİC. VE SAN. AŞ.	2012	1.6	Imported coal	6.00
301	GÜDÜL 2 HES (YAŞAM ENERJİ ELEKTRİK ÜRETİM)	2012	4.9	Hydro (run of river)	15.00
302	GÜLLÜBAĞ BARAJI VE HES (SENENERJİ ENERJİ)	2012	96.0	Hydro (run of river)	280.00

303	GÜNAYDIN RES (MANRES ELEKTRİK ÜRETİM A.Ş.)	2012	10.0	Wind	0.00
304	GÜNDER REG. VE HES (ARIK ENERJİ ÜRETİM A.Ş.)	2012	28.2	Hydro (run of river)	0.00
305	GÜRTEKS İPLİK SANAYİ VE TİCARET A.Ş.	2012	6.7	Natural Gas	53.00
306	HATİPOĞLU PLASTİK YAPI ELEMANLARI SAN.	2012	2.0	Natural Gas	14.00
307	HORU REG. VE HES (MARAŞ ENERJİ YATIRIM SN.)	2012	8.5	Hydro (run of river)	25.00
308	HORYAN HES (HORYAN ENERJİ A.Ş.)	2012	5.7	Hydro (run of river)	15.00
309	ITC ADANA ENERJİ ÜRETİM (ADANA BİOKÜTLE SNT)	2012	4.2	Waste	35.00
310	ITC BURSA ENERJİ ÜRETİM SAN. VE TİC. A.Ş.	2012	9.8	Waste	37.00
311	İKİZDERE (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	18.6	Hydro (run of river)	100.00
312	İNNORES ELEKTRİK YUNTDAĞ RÜZGAR (Aliağa-İZMİR)	2012	5.0	Wind	0.00
313	İŞBİRLİĞİ ENERJİ ÜRETİM SAN. VE TİC. A.Ş.	2012	19.5	Natural Gas	146.00
314	İZAYDAŞ (İZMİT ÇÖP)(Köseköy)	2012	0.3	Waste	2.00
315	İZMİR BÜYÜK EFES OTELİ KOJENERASYON TES.	2012	1.2	Natural Gas	9.00
316	JTI TORBALI KOJENERASYON SANTR. (JTI TÜTÜN)	2012	4.0	Natural Gas	30.00
317	KARADAĞ RES (GARET ENERJİ ÜRETİM)	2012	10.0	Wind	0.00
318	KARTALKAYA HES (SIR ENERJİ ÜRETİM SAN.)	2012	8.0	Hydro (run of river)	15.00
319	KAYADÜZÜ RES (BAKTEPE ENERJİ A.Ş.)	2012	39.0	Wind	0.00
320	KAYAKÖPRÜ 2 HES (ARSAN ENERJİ A.Ş.)	2012	10.2	Hydro (run of river)	36.00
321	KAYSERİ KATI ATIK DEPONİ SAHASI (HER ENERJİ)	2012	1.4	Waste	10.00
322	KESKİNOĞLU TAVUKÇULUK VE DAMIZLIK İŞLET.	2012	6.0	Natural Gas	45.00
323	KILAVUZLU HES (ELEKTRİK ÜRETİM A.Ş.)	2012	40.5	Hydro (run of river)	150.00
324	KIRIKDAĞ HES (ÖZENİR ENERJİ ELEKTRİK ÜRET.)	2012	16.9	Hydro (run of river)	40.00
325	KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	2012	2.1	Natural Gas	11.00
326	KOCAELİ ÇÖP BİYOGAZ (LFG) (KÖRFEZ ENERJİ)	2012	2.3	Waste	18.00
327	KOZBEYLİ RES (DOĞAL ENERJİ ELEKTRİK ÜRETİM)	2012	20.0	Wind	60.00
328	KOZDERE HES (ADO MADENCİLİK ELEKTRİK ÜR.)	2012	6.1	Hydro (run of river)	5.00
329	KÖKNAR HES (AYCAN ENERJİ ÜRETİM TİC.)	2012	8.0	Hydro (run of river)	15.00

330	KUZGUN (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	20.9	Hydro (run of river)	0.00
331	KÜÇÜKER TEKSTİL SAN. VE TİC. A.Ş.	2012	5.0	Lignite	40.00
332	KÜRCE REG. VE HES (DEDEGÖL ENERJİ)	2012	12.0	Hydro (run of river)	36.00
333	MENGE BARAJI VE HES (ENERJİSA ENERJİ)	2012	44.7	Hydro (run of river)	58.00
334	MERCAN (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	20.4	Hydro (run of river)	78.00
335	METRİSTEPE RES (CAN ENERJİ ENTEGRE ELEKT.)	2012	39.0	Wind	0.00
336	MİDİLLİ REG. VE HES (MASAT ENERJİ ELEKTRİK)	2012	20.9	Hydro (run of river)	45.00
337	MURAT I-II REG. VE HES (MURAT HES ENERJİ EL.)	2012	35.6	Hydro (run of river)	107.00
338	MURATLI REG. VE HES (ARMAHES ELEKTRİK ÜR.)	2012	11.0	Hydro (run of river)	17.00
339	MURSAL I HES (PETA MÜHENDİSLİK ENERJİ)	2012	4.2	Hydro (run of river)	13.00
340	MUTLU MAKARNACILIK SANAYİ VE TİCARET A.Ş.)	2012	2.0	Natural Gas	18.00
341	NAKSAN ENERJİ ELEKTRİK ÜRETİM A.Ş.	2012	16.0	Natural Gas	120.00
342	NİKSAR HES (NİKSAR ENERJİ ÜRETİM LTD. ŞTİ.)	2012	40.2	Hydro (run of river)	140.00
343	ODAŞ DOĞALGAZ KÇS (ODAŞ ELEKTRİK ÜRETİM)	2012	128.2	Natural Gas	450.00
344	OFİM ENERJİ SANTRALI (OSTİM FİNANS VE İŞ MER.)	2012	2.1	Natural Gas	16.00
345	ORTADOĞU ENERJİ (KÖMÜRCÜODA) (Şile/İSTANBUL)	2012	2.8	Waste	17.00
346	ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İSTANBUL)	2012	4.1	Waste	22.00
347	ÖREN REG. VE HES (ÇELİKLER ELEKTRİK ÜRETİM)	2012	19.9	Hydro (run of river)	12.00
348	ÖZMAYA SANAYİ A.Ş.	2012	5.4	Hydro (run of river)	40.00
349	PAMUKOVA YEN. EN. VE ELEK. ÜR. A.Ş.	2012	1.4	Waste	0.00
350	PANCAR ELEKTRİK ÜRETİM A.Ş.	2012	34.9	Natural Gas	731.00
351	PAPART HES (ELİTE ELEKTRİK ÜRETİM)	2012	26.6	Hydro (run of river)	80.00
352	PİSA TEKSTİL VE BOYA FABRİKALARI (İstanbul)	2012	1.0	Natural Gas	7.00
353	POLAT HES (ELESTAŞ ELEKTRİK ÜRETİM A.Ş.)	2012	6.6	Hydro (run of river)	20.00
354	POYRAZ RES (POYRAZ ENERJİ ELEKTRİK ÜRETİM)	2012	50.0	Wind	0.00
355	SAMSUN AVDAN KATI ATIK (SAMSUN AVDAN EN.)	2012	2.4	Waste	18.00
356	SAMURLU RES (DOĞAL ENERJİ ELEKTRİK ÜRET.)	2012	22.0	Hydro (run of river)	60.00

357	SARIHIDIR HES (MOLU ENERJİ ÜRETİM A.Ş.)	2012	6.0	Hydro (run of river)	18.00
358	SELÇUK İPLİK SAN. VE TİC. A.Ş.	2012	8.6	Natural Gas	65.00
359	SELVA GIDA SAN. A.Ş.	2012	1.7	Natural Gas	14.00
360	SEYRANTEPE HES (SEYRANTEPE ELEKT. ÜRET.)	2012	56.8	Hydro (run of river)	161.00
361	SEZER BİO ENERJİ (KALEMİRLER ENERJİ ELEKTR.)	2012	0.5	Waste	4.00
362	SIRAKONAKLAR HES (2M ENERJİ ÜRETİM A.Ş.)	2012	18.0	Hydro (run of river)	39.00
363	SİNEM JEOTERMAL (MAREN MARAŞ ELEKTRİK)	2012	24.0	Geothermal	191.00
364	SODA SANAYİ A.Ş. (Mersin)	2012	252.2	Natural Gas	1765.00
365	SOMA RES (SOMA ENERJİ ELEKTRİK ÜRETİM A.Ş.)	2012	24.0	Wind	0.00
366	SÖKE-ÇATALBÜK RES (ABK ENERJİ ELEKTRİK)	2012	18.0	Wind	0.00
367	SÖKE-ÇATALBÜK RES (ABK ENERJİ ELEKTRİK)	2012	12.0	Wind	0.00
368	SULUKÖY HES (DU ELEKTRİK ÜRETİM A.Ş.)	2012	6.9	Hydro (run of river)	18.00
369	ŞANLIURFA OSB (RASA ENERJİ ÜRETİM A.Ş.)	2012	11.7	Natural Gas	82.00
370	ŞENKÖY RES (EOLOS RÜZGAR ENERJİSİ ÜRETİM)	2012	26.0	Wind	0.00
371	ŞİFRİN REG. VE HES (BOMONTİ ELK. MÜH. MÜŞ.)	2012	6.7	Hydro (run of river)	10.00
372	TELEME REG. VE HES (TAYEN ELEKTRİK ÜRET.)	2012	1.6	Hydro (run of river)	6.00
373	TELLİ I-II HES (FALANJ ENERJİ ELEKTRİK ÜRET.)	2012	8.7	Hydro (run of river)	18.00
374	TERCAN (ZORLU DOĞAL ELEKTRİK ÜRETİMİ A.Ş.)	2012	15.0	Hydro (run of river)	28.00
375	TRAKYA YENİŞEHİR CAM SAN. A.Ş.	2012	6.0	Biogas	45.00
376	TUĞRA REG. VE HES (VİRA ELEKTRİK ÜRETİM A.Ş.)	2012	4.9	Hydro (run of river)	10.00
377	TUNA HES (NİSAN ELEKTROMEKANİK ENERJİ)	2012	37.2	Hydro (run of river)	0.00
378	TUZKÖY HES (BATEN ENERJİ ÜRETİMİ A.Ş.)	2012	8.4	Hydro (run of river)	0.00
379	TUZLAKÖY-SERGE REG. VE HES (TUYAT ELEKT.)	2012	7.1	Hydro (run of river)	0.00
380	UMUT I REG. VE HES (NİSAN ELEKTROMEKANİK)	2012	5.8	Hydro (run of river)	0.00
381	ÜÇKAYA HES (ŞİRİKÇİOĞLU ELEKTRİK ÜRETİM A.Ş.)	2012	1.0	Hydro (run of river)	3.00
382	VİZARA REG. VE HES (ÖZTÜRK ELEKT. ÜRET. LTD.)	2012	8.6	Hydro (run of river)	0.00
383	YAĞMUR REG. VE HES (BT BORDO ELK. ÜR.)	2012	8.9	Hydro (run of river)	0.00

384	YAMANLI III KAPS. GÖKKAYA HES (MEM ENERJİ)	2012	28.5	Hydro (run of river)	0.00
385	YAMANLI III KAPS. HİMMETLİ HES (MEM ENERJİ)	2012	27.0	Hydro (run of river)	0.00
386	YAVUZ HES (AREM ENERJİ ÜRETİM A.Ş.)	2012	5.8	Hydro (run of river)	0.00
387	YEDİSU HES (ÖZALTIN ENERJİ ÜRETİM VE İNŞAAT)	2012	22.7	Hydro (run of river)	41.00
388	YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	2012	9.7	Natural Gas	62.00
389	YILDIRIM HES (BAYBURT ENERJİ ÜRETİM VE TİC.)	2012	10.7	Hydro (run of river)	22.00
390	YOKUŞLU KALKANDERE HES (SANKO ENERJİ)	2012	5.2	Hydro (run of river)	0.00
391	YONGAPAN (KASTAMONU ENTEGRE)(D.İskelesi)	2012	15.0	Natural Gas	90.00
392	ZORLU ENERJİ (B.Karıştıran)	2012	25.7	Natural Gas	195.00
393	YAĞMUR REG. VE HES (BT BORDO ELK. ÜR.)	2012	8.9	Hydro (run of river)	0.00
394	YAMANLI III KAPS. GÖKKAYA HES (MEM ENERJİ)	2012	28.5	Hydro (run of river)	0.00
395	YAMANLI III KAPS. HİMMETLİ HES (MEM ENERJİ)	2012	27.0	Hydro (run of river)	0.00
396	YAVUZ HES (AREM ENERJİ ÜRETİM A.Ş.)	2012	5.8	Hydro (run of river)	0.00
397	YEDİSU HES (ÖZALTIN ENERJİ ÜRETİM VE İNŞAAT)	2012	22.7	Hydro (run of river)	41.00
398	YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	2012	9.7	Natural Gas	62.00
399	YILDIRIM HES (BAYBURT ENERJİ ÜRETİM VE TİC.)	2012	10.7	Hydro (run of river)	22.00
400	YOKUŞLU KALKANDERE HES (SANKO ENERJİ)	2012	5.2	Hydro (run of river)	0.00
401	YONGAPAN (KASTAMONU ENTEGRE)(D.İskelesi)	2012	15.0	Natural Gas	90.00
402	ZORLU ENERJİ (B.Karıştıran)	2012	25.7	Natural Gas	195.00

APPENDIX 2: < GENERATION LICENCE AND EIA IS NOT REQUIRED CERTIFICATE >

EPDK

T.C. ENERJİ PİYASASI DÜZENLEME KURUMU

ÜRETİM LİSANSI

Bu Lisans kapsamındaki üretim tesisi Yenilenebilir Enerji Kaynağı kullanmaktadır.

Lisans No : EÜ/3712-4/2263

Tarih : 01/03/2012

Bu Lisans; ZT Enerji Elektrik Üretim Sanayi ve Ticaret Anonim Şirketi'ne, Hatay ili İskenderun ilçesinde, rüzgar enerjisine dayalı Çerçikaya RES projesi kapsamında 01/03/2012 tarihinden itibaren 49 yıl süreyle üretim faaliyeti göstermek üzere 4628 sayılı Elektrik Piyasası Kanunu ve ilgili mevzuat uyarınca Enerji Piyasası Düzenleme Kurulu'nun 01/03/2012 tarihli ve 3712-4 sayılı Kararı ile verilmiştir.

Hasan KÖKTAŞ
Başkan

Bu lisans, genel ve özel hükümleri ile ayrılmaz bir bütündür.

		Tesis toplam kurulu gücü : 57 MWm/53 MWe
8	25/11/2014 tarih ve 5317-2 sayılı Kurul Kararı ve 03/01/2015 tarih ve 4 sayılı Daire Başkanlığı Olur'u	<u>Tadil öncesi durum:</u> Tesis tamamlanma süresi : 60 Ay (inşaat öncesi dönem için 22 ay, inşaat dönemi için 38 ay) Tesis tamamlanma tarihi : 01/03/2017 <u>Tadil sonrası durum:</u> Tesis tamamlanma süresi : 70 Ay Tesis tamamlanma tarihi: : 01/01/2018 (6446 sayılı Elektrik Piyasası Kanunu'nun Geçici 9 uncu maddesi ve Elektrik Piyasası Lisans Yönetmeliği'nin Geçici 15 inci maddesinin ikinci fıkrasının (a) bendi kapsamında inşaat öncesi dönem 01/07/2014 olarak tadil edilmiş, 25/11/2014 tarih ve 5317-2 sayılı Kurul Kararı ve 03/01/2015 tarihli ve 4 sayılı Daire Başkanlığı Olur'u kapsamında ise inşaat öncesi döneme 10 ay ilave süre verilerek 01/05/2015 olarak tadil edilmiştir. Dolayısıyla tesis tamamlanma tarihi de 10 aylık ilave süre dikkate alınarak 01/01/2018 şeklinde tadil edilmiştir.)
9	17/06/2015 tarihli ve 5641-4 sayılı Kurul Kararı	<u>Tadil Öncesi Durum:</u> Ünite kurulu güçleri : 19 x (2789,47 kWe / 3.000 kWm) Tesis toplam kurulu gücü : 57 MWm/53 MWe Öngörülen ortalama yıllık üretim miktarı : 185.500.000 kWh <u>Tadil Sonrası Durum:</u> Ünite kurulu güçleri :: 19 x (3.000 kWe / 3.000 kWm) Tesis toplam kurulu gücü : 57 MWm/57 MWe Öngörülen ortalama yıllık üretim miktarı : 199.500.000 kWh

T.C.
ÇEVRE ve ŞEHİRCİLİK BAKANLIĞI

T.C.
HATAY VALİLİĞİ
ÇEVRE ve ŞEHİRCİLİK İL MÜDÜRLÜĞÜ

Karar Tarihi : 24-01-2014
Karar No : 26634441 220-02 E-201419

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

03.10.2013 tarih ve 28784 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği'nin Ek-II listesinde yer alan **'ÇERÇİKAYA RES (KAPASİTE ARTIŞI)'** projesi ile ilgili olarak inceleme-değerlendirme yapılmış ve Proje Tanıtım Dosyasında çevresel etkilere karşı alınması öngörülen önlemler yeterli görülmüştür. Ayrıca ÇED Raporu hazırlanmasına gerek bulunmadığı tespit edilmiş olup, söz konusu projeye ÇED Yönetmeliğinin 17. Maddesi gereğince Valiliğimizce **"Çevresel Etki Değerlendirmesi Gerekli Değildir"** kararı verilmiştir.

H.Volkan KÖKSAL
Vali a.
Vali Yardımcısı

Proje Sahibi : ZT ENERJİ ELEKTRİK ÜRETİM SAN. VE TİC. A.Ş.
Proje Yeri : HATAY İli, ISKENDERUN İlcesi, ÇERÇİKAYA- KOCA TEPE DEREKUYU - KARAYOL TEPE - BOZBURUN TEPEERİKLİ Y. - KIRMIZI TEPE Mevkii
Kapasite : 53 MWe/57MWm