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KINIK WIND POWER PLANT

DOCUMENT PREPARED BY RÜZGAR DANIŞMANLIK

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Kinik Wind Power Plant have been located in Kinik district of İzmir province in Turkey and developed by Esinti Enerji Üretim Tic. ve San. A.Ş. The project has 17 wind turbines 3.2 MWm and 16 wind turbines with a unit capacity of 3 MWe and one wind turbine with a unit capacity of 2 MWe each. With a total installed capacity of 54,4 MWm/ 50 MWe, the project is estimated to supply grid as 165,000 MWh per annum¹. An expected annual emission reduction of the project is approximately 90,271 tCO₂-eq/year and a total reduction of 902,710 tCO₂-eq over the 10-year crediting period.

The Project Proponent has been granted a 49-year generation licence by the Turkish Energy Market Regulatory Authority for the proposed Project under the provisions of Law No. 4628 governing the electricity market in the Republic of Turkey.

The purpose of the project activity is to produce renewable electricity using wind as the power source and to contribute to Turkey is growing electricity demand through a sustainable and low carbon technology. The project will displace the same amount of electricity generated by the grid dominated with fossil fired power plants.

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

- Displacing the electricity generated by fossil fuel fired power plants by utilising the renewable resources so as to avoid environmental pollution and GHG emissions,
- Increasing the income and local standard of living by providing job opportunities for the local people.
- Production of pillar and other equipment in Turkey will indirectly cause the know-how transfer and empower the local industry.

The project area belongs to the Ministry of Environment and the proposed project activity is the installation of a new grid-connected renewable power plant/unit. In the absence of the project activity, the electrical energy would have been delivered to the grid through a mix of existing power generation resources, as described in more detail in section 2.4.

¹ Generation License is available to the DOE.

The investment decision date is the bank loan agreement date; 20.04.2015.
The timeline for the project activity is explained in Table.1. below:

Table 1. Timeline of the project activity

Activity	Actual/Expected	Date
Licence received from EPDK	Actual	08.03.2012
Turbine Contract	Actual	23.05.2014
Bank Loan Agreement	Actual	20.04.2015
Construction Agreement	Actual	17.11.2015
Final Licence Amendment from EPDK	Actual	26.09.2016
Start of producing electricity by ETKB Ministry Acceptance	Actual	05.12.2016
Commisioning Date of Turbines # 1,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17	Actual	05.12..2016
Full commissioning of the wind farm (Turbine #2 will be finished)	Expected	31.12.2017

The project reduces greenhouse gas emissions by displacing electricity from Turkish national grid connected fossil fuel fired power plants, thereby contributing to climate change mitigation along with other environmental benefits. The existing electricity grid system of Turkey mostly relies on imported natural gas resources and that has been a financial burden for economical development of the country. The project increases the share of renewable energy resources in electricity generation and realize emission reductions which are estimated as 90,271 tCO₂eq/year. The total estimated emission reduction value for the crediting period will be 902,710 tCO₂eq/year.

In addition to generation of clean energy, Kinik WPP provides economic and social benefits to its surrounding area. First of all, employment opportunities have been created during both construction and operational phases of the project activity. This is a considerable impact on the income of the local people.

1.2 Sectoral Scope and Project Type

As per UNFCCC definition of sectoral scopes for CDM projects, the Project Activity is included in the Sectoral Scope 1, category “Energy Industries (renewable/non-renewable sources) Sources”. Project Type : I - Renewable Energy Projects

Kinik Wind Power Plant is a single green-field investment and is not part of a project group or bundle.

1.3 Project Proponent

Organization name	Esinti Enerji Üretim Ticaret ve Sanayi Anonim Şirketi
Contact person	Mr. Cengiz Sarıkaya
Title	Project Manager
Address	Eski Kuyumcular Mah. Yeşilyol Sok. No:4 D:2 Karesi/BALIKESİR
Telephone	+90.266.283 00 83 – 123
Email	c.sarikaya@esintienerji.com

1.4 Other Entities Involved in the Project

There is only consultant company involved.

Organization name	Rüzgar Danışmanlık
Role in the project	Consultant
Title	Consultant Manager
Contact person	Mrs.Çağla Balcı Eriş

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1.5 Project Start Date

Project start date is 5/12/2016 which is the first acceptance protocol date by ETKB Ministry. The final commissioning date of the project is expected as 31/10/2017.

1.6 Project Crediting Period

The project's crediting period is ten years, 0 months which is planned to be renewable twice. The start date of first crediting period is the first commissioning date of the project which is 05/12/2016. End date of the crediting period is 04/12/2026.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	X

Installed capacity of the project is 50 MWe, thus it falls into a large scale project activity.

Table 2. Emission reductions of the project

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
05.12.2016-31.12.2016	6,430
2017	90,271
2018	90,271
2019	90,271

2020	90,271
2021	90,271
2022	90,271
2023	90,271
2024	90,271
2025	90,271
01.01.2026 - 04.12.2026	83,841
Total estimated ERs	902,710
Total number of crediting years	10
Average annual ERs	90,271

1.8 Description of the Project Activity

Wind power is one of the most commonly used environment friendly technologies in energy sector all over the world. Within the scope of the project, all precautions have been taken for the environment during the design phase and the project will be implemented in line with the environmental law and related regulations.

Siemens, a turbine manufacturer based in Germany, has been selected as equipment provider due to the quality of its products in terms of high reliability, grid friendliness and low maintenance requirements. The turbines will be delivered from Germany to the project site.

The project will have 17 wind turbines with a unit capacity of 3.200 kWm and 16 wind turbines with a unit capacity of 3.000 kWe and one turbine with a unit capacity of 2.000 kWe each. The SWT 3.2 turbines are 3 bladed with a horizontal axis. The towers of turbines have a hub height of 79.5m. The diameter of the rotor is 108 m². The turbines have connected to 154 kV İzmir Havza Transformer Center. The meterings have been done at substation before electricity is fed into the grid.

The purpose of the project activity is to generate power in an efficient, clean, reliable and sustainable way with maximum respect on social and environmental aspects and to reduce emissions by partially substituting the electricity supply of fossil fuel fired power plants in Turkey. The consequences of the Project Activity

² The Siemens SWT 3.2 turbines document will be provided to the DOE.

with regards to economic, social and environmental impacts have been assessed during EIA process.

The project activity aims to reduce GHGs by replacing electricity generation from the Turkish national grid system with electricity generation from wind energy, which has zero emissions. In accordance with the applicable methodology ACM0002 "Consolidated baseline methodology for grid connected electricity generation from renewable sources" v.17.0.0, the baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants.

The lifetime of the project activity has been supposed as 25 years in accordance with the option c, "Use default values" in "Tool to determine the remaining lifetime of equipment", Version 01.

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

$PLF = \text{Annual Generation} / \text{Installed Capacity} * (\text{working hours})$

$= 165000 / 50 * 8760$

$= 0.29$

The project activity generates electricity from renewable resources and therefore replaces electricity which would be generated by Turkish grid dominated with fossil fired power plants. The annual emission reductions, which will result from the project activity, are estimated as 90,271 tCO₂eq/year. Total emission reduction over the 10 year crediting period is expected to reach 902,710 tCO₂e with the assumed total net electricity generation of 165,000 MWh per year.

1.9 Project Location

The project is located at Kinik district, in İzmir province.

The nearest residential area is Kodukburun village

The project location can be shown in Figure 1.

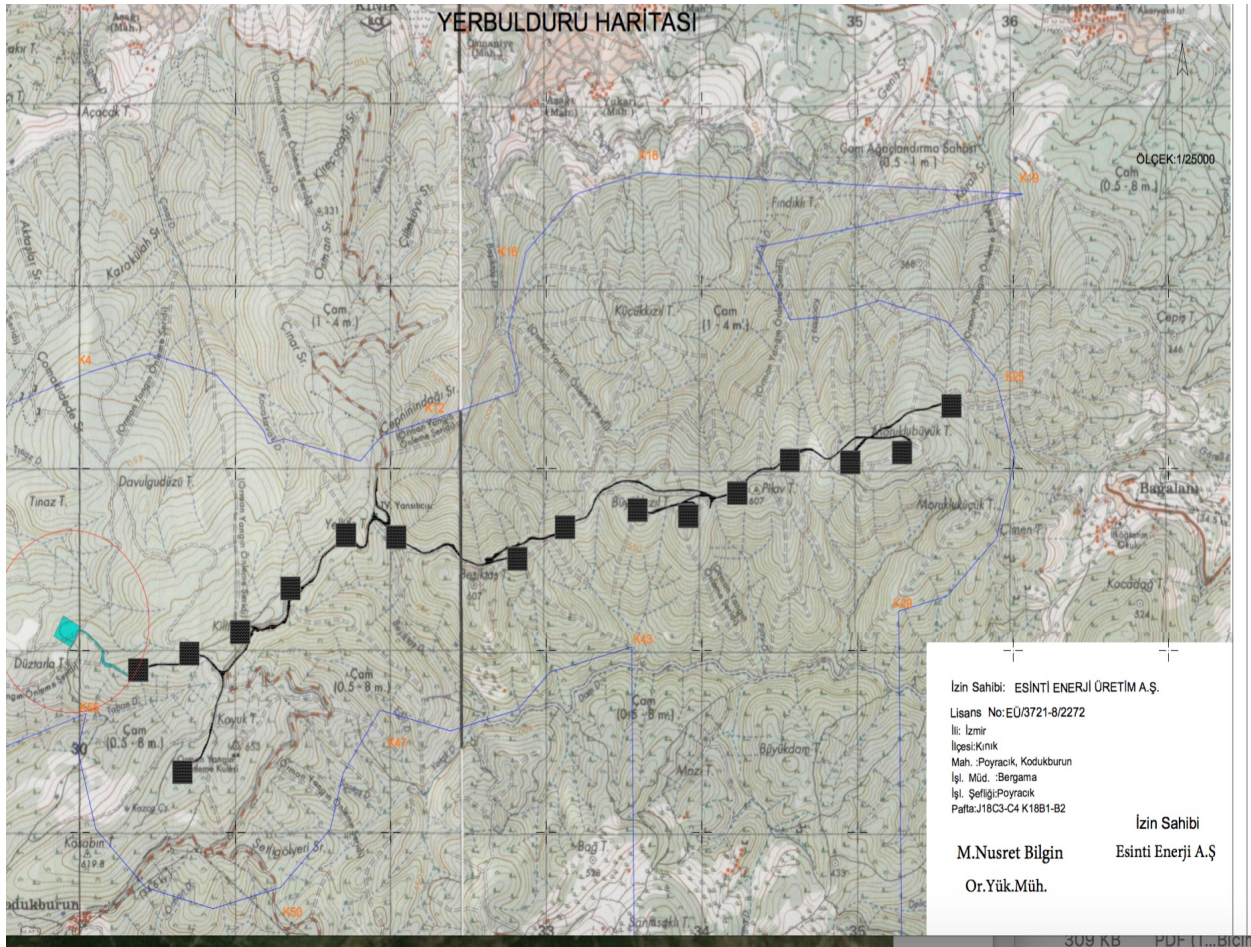
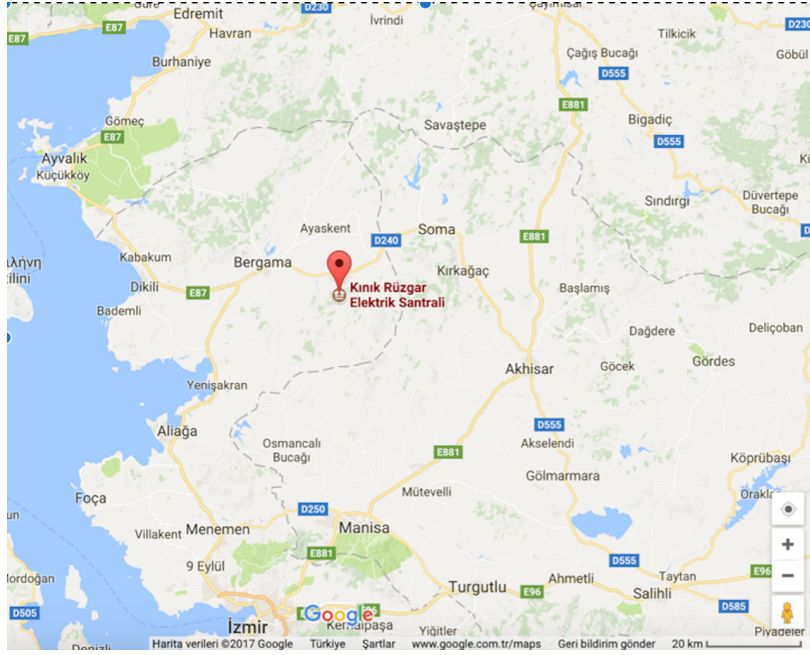


Figure 1. The location of the project

Table 3: Geographical coordinates of the wind turbines of the project activity³

T1	530.661	4.322.331	T10	533.119	4.323.676
T2	531.145	4.322.593	T11	533.586	4.323.771
T3	530.376	4.322.892	T12	533.910	4.323.738
T4	530.705	4.322.982	T13	534.226	4.323.864
T5	531.031	4.323.101	T14	534.563	4.324.044
T6	531.355	4.323.341	T15	534.952	4.324.032
T7	531.711	4.323.632	T16	535.285	4.324.086
T8	532.035	4.323.621	T17	535.602	4.324.342
T9	532.813	4.323.503			

1.10 Conditions Prior to Project Initiation

The Project area was not used for any relevant purpose prior to the Project activity. The project is a greenfield project, prior the project initiation, there was no other wind power installation at the site.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The Project is in compliance with all required relevant regulations. There is no breach of any legislation and all types of required permits are already obtained. The Project is subject to the following laws;

Table 3 summarizes the laws and regulations related with the project development and implementation:

Table 4. Relevant laws and regulations

Relevant Law	Number/Enactment Date
Electricity Market Law ⁴	Nr. 4628 / 03.03.2001
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy ⁵	Nr. 5346 / 18.05.2005
Environmental Law ⁶	Nr. 2872 / 11.08.1983

³ Generation Licence

⁴ http://www.epdk.gov.tr/index.php/kanun/elektrik/elektrik_piyasalari_kanunu.pdf

⁵ <http://www.ttg.gov.tr/content/docs/yek-8.1.2011.pdf>

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The generation license and the Project is owned by Esinti Enerji Üretim Tic. ve San. A.Ş.⁷

1.12.2 Emissions Trading Programs and Other Binding Limits

The project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions.

1.12.3 Other Forms of Environmental Credit

The project neither has not created any other form of GHG-related environmental credit for GHG emission reductions or any renewable energy certificate.

1.12.4 Participation under Other GHG Programs

N/A

1.12.5 Projects Rejected by Other GHG Programs

N/A

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is not a part of grouped projects. Therefore no eligibility criteria is required.

Leakage Management

The relevant UNFCCC methodology, ACM0002 suggests not to consider leakage. Despite the fact that the project is a Greenfield Project, no leakage is considered.

Commercially Sensitive Information

The following information is commercially sensitive:

⁶ <http://www.mevzuat.adalet.gov.tr/html/631.html>

⁷ The Energy Generation License for 49 years obtained from Electricity Market Regulation Authority (EMRA)

- Financial details of the Project
- Consultancy and feasibility reports prepared by 3rd parties
- Spreadsheet of baseline calculations
- All contracts signed with other parties for construction, purchase of electromechanical equipment and turbine manufacture, maintenance and service

Sustainable Development

Kinik 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

The project applies CDM-EB approved consolidated baseline and monitoring methodology ACM0002, Version 17.0.0, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"⁸.

The methodology refers to:

- "Tool to calculate the emission factor for an electricity system", Version 06.0)⁹;
- Tool for demonstration and assessment of additionality", Version 07.0.0¹⁰
- "Combined tool to identify the baseline scenario and demonstrate additionality", (Version 06.0.0)¹¹;
- Tool to determine the remaining lifetime of equipment", Version 01¹²

⁸<http://cdm.unfccc.int/methodologies/DB/8W400U6E7LFHHYH2C4JR1RJWWO4PVN>

⁹<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v6.pdf>

¹⁰<http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-01-v7.0.0.pdf>

¹¹<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-02-v6.0.pdf>

¹²<http://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-10-v1.pdf>

2.2 Applicability of Methodology

The choice of methodology ACM0002/Version 17.0.0 is justified as the proposed project activity meets relevant applicability criteria:

Applicability Conditions in the ACM002/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); (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 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.
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 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	The project activity is not a hydro power plant. Hence this applicability criterion is not relevant to the project activity.

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/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
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	The project activity is not a hydro power plant. Hence this applicability criterion is not relevant to the project activity.

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 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

Based on the above arguments it could be concluded that the methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 17.0.0 is applicable to the proposed project activity.

In addition, the methodologies also refer to several tools described under section 2.1 “Title and Reference of Methodology”. The applicability of these tools has been discussed below:

Applicability of “Combined tool to identify the baseline and scenario and demonstrate additionality” v 06.0.0

The tool for demonstration and assessment of additionality provides a general framework demonstrating and assessing additionality and is applicable to a wide range of project types. As referred in ACM0002, the additionality tool is applicable for the proposed project activity.

Applicability of “Tool to calculate the emission factor for an electricity system” v 06.0.:

This methodological tool determines the CO₂ emission factor for displacement of electricity generated by power plants in an electricity system, by calculating the “combined margin” emission factor (CM) of the electricity system. This tool may be applied to estimate the Operating Margin, Build Margin and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity. As the proposed project activity supplies electricity to the national grid, the “Tool to calculate the emission factor for an electricity system” v 06.0. is applicable to 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 greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 4:

Table 5. The project’s boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO ₂ emissions that are displaced due to the Project Activity from electricity generation in	CO ₂	Yes	Main emission source. The dominant emissions from power plants are in the form of CO ₂ , therefore CO ₂ emissions from fossil fuel fired power plants connected to the grid is accounted for in baseline calculations.

Source		GHGs	Included?	Justification/Explanation
	fossil fuel fired power plants connected to national grid	CH ₄	No	Minor emission source. Even though there may be some CH ₄ and N ₂ O emissions during electricity generation, these emissions are negligible and not included in baseline calculation to be conservative.
		N ₂ O	No	
		N ₂ O	No	
Project scenario	Emissions as a result of Project Activity	CO ₂	No	Minor emission source. The project activity will have a diesel generator, however the use of fossil fuels for the back up or emergency purposes (e.g. diesel generators) can be neglected as per the applicable methodology As suggested by the baseline methodology, project emissions (PEy) are assumed to be 0 and will not be considered
		CH ₄	No	
		N ₂ O	No	
		Other	No	



Figure 3. Project Boundary

2.4 Baseline Scenario

The proposed project activity is the installation of a new grid-connected renewable power plant/unit. The baseline scenario in accordance with ACM0002 v17.0.0 is defined as followed:

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.

The electricity generation is mainly done by fossil fuel fired power plants in Turkey. The share of resources in the electricity generation in Turkey has been shown in the Figure 4.

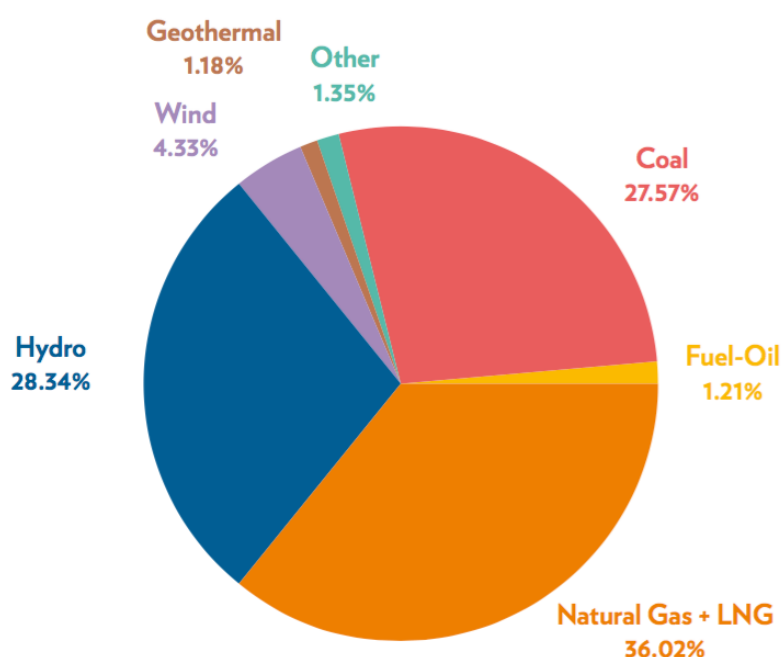


Figure 4. *Electricity generation by resources by the end of June 2015 in Turkey*¹³

According to the 10-year projection of TEIAS (Turkish Electricity Transmission Company), it is clear that fossil fuels will remain the main sources for electricity

¹³ Source: MENR, 2015; <http://ipc.sabanciuniv.edu/wp-content/uploads/2016/01/Coal-Report-Turkeys-Coal-Policies-Related-to-Climate-Change-Economy-and-Health.pdf>

generation (70.9% in 2021). This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector. High growth rate of energy demand is expected to continue over coming decade. Fossil fuels will remain dominant in the electricity generation mix, with an expected share of 70.9 % in 2021. Renewables including wind will hold a limited share of then 28.7%. Thus most of the new capacity will be fossil fuel based.

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

According to the “Baseline Methodology Procedure” in “Tool to calculate the emission factor for an electricity system, Version 06.0.” following steps would be followed.

2.5 Additionality

For the demonstration of additionality, the methodological tool, “Tool for the demonstration and assessment of addionality” version 07.0.0 has been referred.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project is not the first-of-its-kind

Outcome of Step 0: The proposed project is not the first-of-its-kind

Step 1: Identification of alternative scenarios

Step 1a: define alternative scenarios to the proposed project activity

Alternative 1 : The proposed project activity not undertaken as a VER project activity

Alternative 2 : Construction of some other renewable energy plant with the same annual power output

Alternative 3 : Continuation of the current situation (in the situation that Kinik WPP is not built)

The proposed project activity not undertaken as a VER project activity” is not a realistic alternative, since the project IRR of the proposed project activity is far below the benchmark IRR. (Please see Investment Analysis Section)

As for building a new power plant utilizing other renewable resources, The Electricity Market Regulatory Authority (EMRA) gives priority to local resources with low environmental impact to generate electricity and therefore other renewable resources may be considered as alternatives to the proposed project.

With this respect, the Eastern Anatolia region is not very rich of wind and the high forest density combined with very steep terrain does not allow for wind power plants. Also, it can be seen in the REPA (Wind Energy Potential Map), the areas which have enough potential for economically feasible wind farm investments do not exist in the region¹⁴. Please see below the wind potential map.

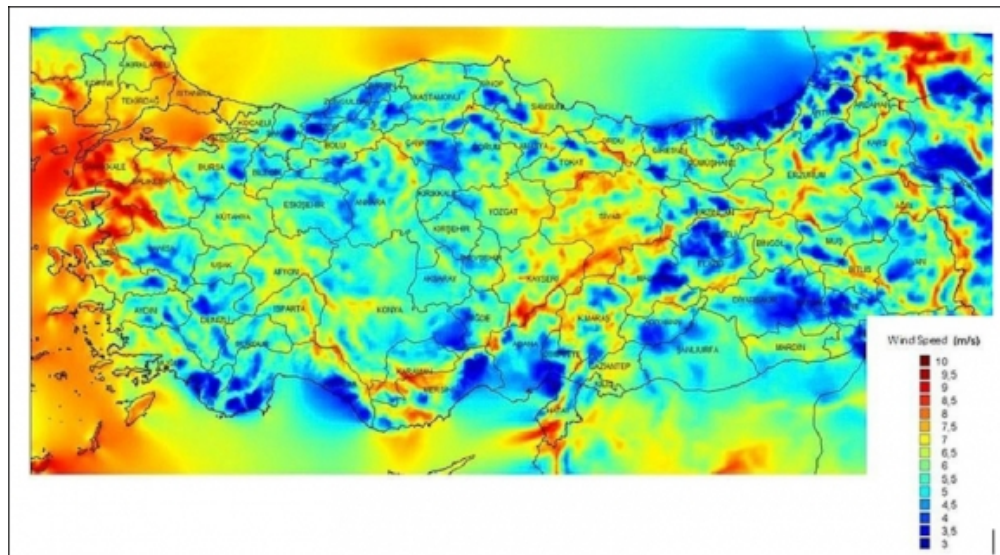


Figure 5: Wind Potential Map of Turkey

As for the geothermal energy, this renewable energy source primarily exists in west side of the country. Therefore, at the project area, there is no geothermal source either. Using solar power or biomass for electricity generation is still in the infancy state in Turkey. The biomass sector in Turkey lacks adequate regulatory framework. Especially for landfill gas, investors are dependent on municipal administrations since they hold the authority to control landfills. As for solar, the EPDK has awarded a few license for solar. The reason why solar capacity has not been utilised is that the regulatory framework has been absent. This delay is largely due to the commercial infeasibility of solar projects. As a result, Alternative 2 for the region is; therefore, eliminated. As for geothermal, the

¹⁴ http://www.google.com.tr/imgres?imgurl=http://echogeo.revues.org/docannexe/image/12457/img-5-small1580.jpg&imgrefurl=http://echogeo.revues.org/12457&h=319&w=580&sz=187&tbnid=Bt4_VwT89JTI4M:&tbnh=68&tbnw=124&zoom=1&usq=inH471z5osYFjoHR-VHIAZG7DtQ=&docid=WyluAiuVtTWqjM&hl=en&sa=X&ei=bC8jUb_gA8HQAbCx4HwDw&ved=0CDUQ9QEwAQ&dur=3147

resource potential is heavily located in the western Turkey. Please see below the map for demonstrating the locations of geothermal resources of Turkey:



Figure 6: Geothermal Potential Map of Turkey

Last, “the same service of power supply is provided from the grid” is a realistic alternative. In this case Kinik WPP is not built and the same amount of electricity will continue to be produced by the current power plant mix of Turkey. As a result, no emission reductions occur.

Outcome of Sub-Step1a

Under these circumstances, the only realistic alternative is 3. Analyzing the third alternative, it is seen that this scenario is consistent with the baseline definition of ACM0002 / Version 17.0 where it defines the baseline scenario as the amount of electricity that would be delivered to the grid by the project activity, generated by the operation of existing grid-connected power plants and by the addition new generation sources, as reflected by the combined margin.

Above all, since the only credible alternative is the baseline scenario, as explained in paragraph 105 of the EB55 Annex 1, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.

Step 1b: Consistency with mandatory applicable laws and regulations

The alternative scenario is in compliance with existing laws and regulations which are described above in Section 1.11.

Outcome of Step 1b

The alternatives discussed above are in line with applicable legal and regulatory requirements.

Step 2: Investment Analysis

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

Sub-step 2a: Determine appropriate analysis method

The “Tool for the Demonstration and Assessment of Additionality”, version 07.0.0, lists three possible analysis methods:

- Option I: Simple cost analysis;
- Option II: Investment comparison analysis; and
- Option III: Benchmark analysis.

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

Sub-step 2b: Option III. Apply Benchmark Analysis

For the purpose of benchmark analysis project IRR has been chosen as the indicator. Guidance on the Assessment of Investment Analysis WACC is counted as an appropriate benchmark for a project IRR. Please see below the calculation of WACC.

Calculation of WACC

The second alternative for benchmark is advised to be WACC for project IRR as stated in the referenced tool. The expected return on capital should be higher than the cost of capital for an investment to be worthwhile. The cost of capital is the rate of return that capital could be expected to earn in an alternative investment of equivalent risk. If a project is of similar risk to a company's average

business activities, it is reasonable to use the company's average cost of capital as a basis for the evaluation. A company's securities typically include both debt and equity, one must therefore calculate both the cost of debt and the cost of equity to determine a company's cost of capital.

Calculation of Cost of Equity:

In order to calculate the cost of equity, the approach presented in the paper “Estimating equity Risk Premiums” by Prof. Damodaran is taken. He is a Professor of Finance at the Stern School of Business at New York University and well known as author of several widely used academic and practitioner texts on Valuation, Corporate Finance and Investment Management. Most of the parameter used in calculations is taken from the data presented in his works.¹⁵

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

Expected cost of Equity = Risk free rate (US treasury bond rate) + β *(Equity Risk Premium for USA) + Country Risk Premium

1. Choice of Risk Free Rate

The risk free rate has been used as the US treasury bond rate. Taking into account Annex 5: Guidance on the Assessment of Investment Analysis (version 05), the risk free rate of return is based on the long-term average returns of US treasury bonds and is used as 3%.

2. Choice of Beta

Beta is chosen as 1 in accordance with Annex 5: Guidance on the Assessment of Investment Analysis (version 05).

3. Choice of Country Risk

One of the simplest and most easily accessible measure of the country risk is the rating assigned to a country's debt by a rating agency. These rating measure default risk but they are affected by many of the factors that drive equity risk.

¹⁵<http://pages.stern.nyu.edu/~adamodar/pc/archives/ctryprem15.xls>

Country Default Spreads and Risk Premiums, by Aswath Damodaran¹⁶ which was lastly updated in 2016 is taken as a reference for country risk premium. Aswath Damodaran is a Professor of Finance at the Stern School of Business at New York University and well known as author of several widely used academic and practitioner texts on Valuation, Corporate Finance and Investment Management. The country risk premium for Turkey is taken as 3.46%.

4. Equity Risk Premium

As per Annex 5: Guidance on the Assessment of Investment Analysis (version 05), the value of 6.25% is used for equity risk premium. The equity risk premium is derived from the long-term historical returns on equity in the US market relative to the return of bonds.

The key parameters are presented in Table 5:

Table 6: Key parameters applied in the calculation of expected return on equity

Parameter	Value	Source
Risk Free Rate (US Treasury Bond Rate)	3 %	Guidelines on assessment of investment analysis v5
BETA	1	Guidelines on assessment of investment analysis v5
Country Risk Premium	3.46%	Country Default Spreads and Risk Premiums, 2016, Aswath Damodaran
Equity Risk Premium for USA	6.25%	Guidelines on assessment of investment analysis v5
Expected return on equity	12.71%	Calculated

As a conservative approach, 12.71 % is accepted as the benchmark for the proposed project.

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

The main financial indicators may be seen in Table 6:

Table 7: Main Financial Indicators

Parameter	Unit	Value	Reference
Total investment	\$	87.064.000	Turbine agreement (23.05.2014)

¹⁶ <http://pages.stern.nyu.edu/~adamodar/pc/archives/> (ctryprem15 file for year 2016)

Equity	\$ (%35)	28.392.000	
Loan	\$ (%65)	58.671.800	Bank Loan Agreement
Production expenses	\$/ year average	5.063.909	-
Installed capacity	MWe	50	Generation License
Yearly electricity Generation	MWh/year	165,000	Genretaion Lisencet ¹⁷
Electricity feed in tariff	\$cent/kWh	7.3	Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy
Price with Incentive	\$cent/kWh	7.9 to be used in the IRR for first five year in generation	Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy
Revenue	\$/year average	9.609.469	Calculated ¹⁸
Corporate tax	%	20	-

The key assumptions for the calculation of the equity IRR are as follows:

- All relevant costs and revenues are included in the calculation of the equity IRR of the project activity.
- The investment period has been chosen as 25 years as the lifetime of the project activity has been supposed as also 25 years.¹⁹

¹⁷ Generation License

¹⁸ Yearly electricity generation has multiplied electricity feed in tariff

¹⁹ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf>

- The revenue from yearly electricity generation is based on the guaranteed feed in tariff applicable at the time of the investment decision. According to the Law on Utilization of Renewable Energy Resources, the guaranteed feed in tariff for electricity generated from wind energy is 7.3 \$cent/kWh. However, the renewable energy fund price for Turkish made tower has been also added to have an average electricity price.²⁰
- Only the portion of investment costs which is financed by equity have been considered as the net cash outflow and the portion of the investment cost which is financed by debt have not been considered as a cash outflow.

The Internal Rate of Return (IRR) is calculated as 3.54 %. This is obviously below the financial benchmark of 12.71% and the project activity cannot be considered to be a financially attractive alternative.

Sub-step 2d: Sensitivity Analysis

The objective of the sensitivity analysis is to assess if the conclusion regarding the financial attractiveness is steady to reasonable variations in the critical assumptions. According to the Annex 5 of EB 62 "Guidelines on the assessment of Investment analysis" version 5, only variables including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. The project is realized with 35 % equity.

In accordance with the guidelines, important parameters for the feasibility of the proposed project activity are defined as investment cost, production expenses and revenues. The mentioned parameters have been tested with a range of $\pm 10\%$ for the sensitivity analysis.

The following table demonstrates the results for a $\pm 10\%$ deviation of selected parameters which increase the equity IRR.

Table 8: Sensitivity Analysis of the equity IRR with changes in investment cost, production expenses and revenues

Parameter	Value Applied	Equity IRR	Value Applied	Equity IRR
Investment cost	78,357,600 (-10%)	5.96%	95,770,400 (+10%)	1.99%

²⁰ IRR calculation spreadsheet is available to the DOE.

Production expenses (average)	4,557,518 (-10%)	5.41%	5,570,300 (+10%)	1.78%
Electricity production (yearly)	145.500.000 kWh (-10 %)	0.33%	181.500.000 kWh (+10%)	7.03 %
Electricity price (Average)	0,0503 \$ cent (-10 %)	-1.57 %	0,0705 \$ cent (+10 %)	8.93 %

Outcome of Step 2

The sensitivity analysis shows that the equity IRR of the proposed project does not overcome the financial benchmark despite favourable conditions.

The sensitivity analysis further substantiates that the project activity is not a feasible alternative and so additional.

Step 3: Barrier Analysis

The analysis is not applied.

Step 4: Common Practice Analysis

According to “Tool for the demonstration and assessment of additionality” version 07.0.0, the proposed project activity apply the measures listed in the definitions section of the tool. So, Sub-step 4a is applied.

Sub-step 4a: The proposed VER project activity(ies) applies measure(s) that are listed in the definitions section

EB 69 Report Annex 8, “The Guidelines on Common Practice” version 02.0 is applied for the proposed project activity.

Step 1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

The installed capacity of the proposed project activity is 50 MWe. Therefore, the lower limit of the applicable output range is 25 MWe and upper limit is 75 MWe.

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 Energy Power Projects)
- (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; (25 MW-75 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)

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 *Nall*.

From the list obtained from TEIAS Capacity Projection Report (2013-2017), it has been understood that there are initially 632 projects. When projects registered as VER projects and projects under validation are excluded, the new list entails 547 projects. Satisfying the steps 2 and 3, *Nall* is 1.

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 *Ndiff*.

According to the guidance on common practice, classification of different technologies has been realised taking into account the main criteria “energy source/fuel”, “size of installation (power capacity)” and “Investment climate in the date of investment decision (subsidies or other financial flows, promotional policies and legal regulations)”. The power plants which have different fuel types such as hydro, lignite, natural gas, fuel oil, coal etc., are accepted as different technologies. In addition, the company types of the power plants are considered while defining the different power plants because different company types have different promotional policies, legal regulations, subsidies and other financial flows. As a result, when both the fuel types of the power plants and the company types are taken into account, the number of companies that apply technologies different that the technology applied in the proposed project activity, *Ndiff*, is 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.

The factor F defined in the guideline is calculated with the formula below:

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

$$F = 1 - 0/1$$

$$= 1$$

$N_{all} - N_{diff}$ is 1 and F is 1.

Outcome of Step 4

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 $N_{all} - N_{diff}$ is greater than 3. Since factor F is 1 and also $N_{all} - N_{diff}$ is 1 (not greater than 3), the proposed is not a common practice as per the guidelines. The project activity is not regarded as “common practice”, then the proposed project activity is additional. An Excel sheet is provided for the calculation.

2.6 Methodology Deviations

There are no methodology deviations.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

The baseline emissions have been identified as per the methodology ACM0002 version 17.0.0.

The baseline emissions are the product of electrical energy baseline $EG_{BL, y}$, y expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor:

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

where :

BE_y : Baseline emissions in year y (tCO₂/yr)

$EG_{PJ,y}$	:Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	:Combined margin CO ₂ emission factor for grid connected power generation in year y calculated by using the latest version of the “Tool to calculate the emission factor for an electricity system “(tCO ₂ /MWh)

Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for (a) greenfield plants; (b) retrofits and replacements and; (c) capacity additions. Since the proposed project activity falls under the description green field plants, the following method has been adopted:

Greenfield renewable energy power plants

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

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

Where:

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

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

Calculation of $EF_{grid,CM}$

As referred in ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (version 17.0), $EF_{grid,CM}$ is calculated according to the “Tool to calculate the emission factor for an electricity system” version 06.0.

Please see below the step- wise approach for the calculation of the combined margin (CM) emission factor:

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

Step1. Identify the relevant electric power systems

Since there is no dispatch grid system in Turkey, the project boundary is considered as the National Electricity Grid of Turkey according to applied tool; therefore, the project electricity system is the national grid which includes the project site and all power plants physically connected to the grid. Each power plant can be dispatched without significant transmission constraints from the central grid (Figure.7).

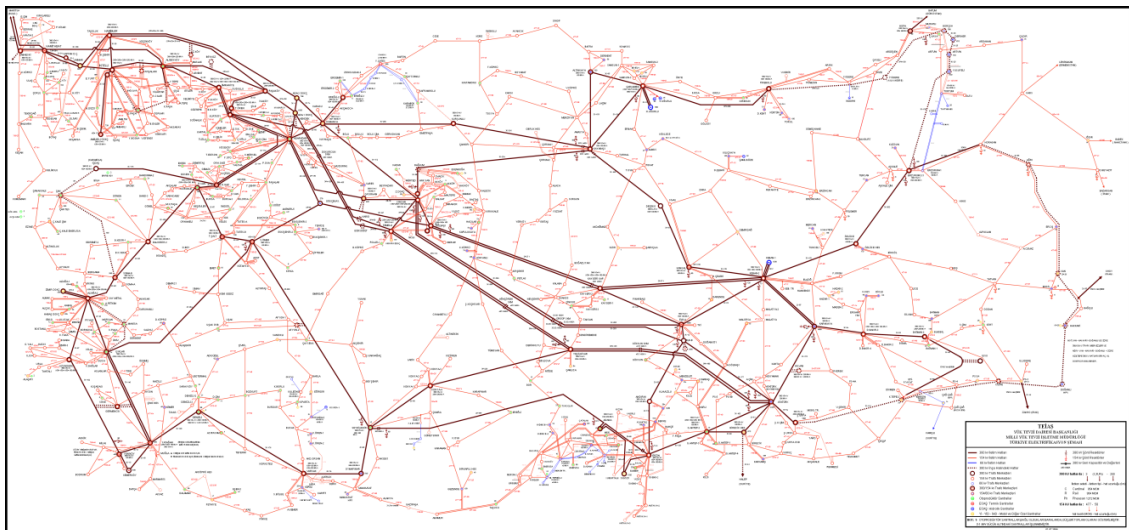


Figure 7. Interconnected national grid of Turkey²¹

There is no electricity import from another power grid within the same host country and electricity exports are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

²¹ http://www.geni.org/globalenergy/library/national_energy_grid/turkey/turkishnationalelectricitygrid.shtml

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

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 in the calculation.

Option II is applicable in case off-grid power generation is significant in the country and they are operated due to an unreliable and unstable electricity grid. As this is not the case for Turkish grid and there is lack of data for off-grid power plants, 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
- (d) Average OM

The data specific to the power plants connected to the grid, such as the dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour, are not available. Therefore, Simple OM has been selected as the methodology.

The Simple OM method (a) can only be used if low-cost/must run resources constitute less than 50% of total grid generation in:

- 1) average of the five most recent years, or
- 2) based on long-term averages for wind energy production

There is no nuclear plant in Turkey and hydro, wind and geothermal facilities are only renewable sources utilized for electricity. There is no indication that the coal fired power plants are accepted as the low cost /must run. This makes wind power as the only relevant low-cost must run source for electricity. The electricity generation from renewables is 26.0% of the total electricity generation. It can be concluded that wind generation constitutes even less than 26%. Therefore, the requirements for the use of the Simple OM calculations are satisfied.

Table 10 Below shows the share of hydro and renewable resources in generation for the five most recent years (2011-2015) and it is below %50 of the total grid generation

Table 10. Share of primary sources in electricity generation 2011-2015²²

YEAR							
	THERMAL (GWh)	THERMAL Ratio	HYDRO (GWh)	HYDRO Ratio	GEO THERM + WIND + SOLAR (GWh)	GEO THERM + WIND + SOLAR Ratio	TOTAL (GWh)
2011	171638.3	74.8%	52338,6	22.8%	5418,2	2.4%	229395.1
2012	174871.7	73.0%	57865	24.2%	6760,1	2.8%	239496.8
2013	171812.5	71.6%	59420,5	24.7%	8921	3.7%	240154
2014	200416.6	79.5%	40644,7	16.1%	10901,5	4.3%	251962.8
2015	179366.4	68.5%	67145.8	25.6%	15271	5.8%	261783.3

Table 11. Breakdown of shares by sources of the electricity generation from the Turkish grid

Generation Shares							
Years	Coal Total	Liquid Total	Natural Gas	Wastes	Hydro	Geothermal +Wind + Solar	Total (GWh)
2011	28.8%	0.4%	45.4%	0.2%	22.8%	2.4%	229395.1
2012	13.9%	0.7%	43.6%	0.3%	24.2%	2.8%	239496.8
2013	26.6%	0.7%	43.8%	0.5%	24.7%	3.7%	240154
2014	30.2%	0.9%	47.9%	0.6%	16.1%	4.3%	251962.8
2015	29.1%	0.9%	37.9%	0.7%	25.6%	5.8%	261783.3

The Simple OM can be calculated using either of the two following data vintages for year(s) y:

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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.

²² [http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/uretim%20tuketim\(34-64\)/56.xls](http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/uretim%20tuketim(34-64)/56.xls) (Annual Development of Turkey's Gross Electricity Generation by Share of Primary Energy Sources 1970-2015)

- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

Based on the most recent data available, ex- ante option is chosen for this project activity. Data from the period 2013-2015 has been obtained for calculating the three year average. This period is standing for the most recent data available at the time of submission of the PDD to DOE.

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

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2e/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

There are two options calculating the Simple OM emission factor ($EF_{grid,OMsimple,y}$):

Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit; or

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Since the fuel consumption and the average efficiency data for each power plant/unit are not available Option B is used for simple OM calculation.

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y})}{EG_y}$$

Where:

$EF_{grid,OMsimple,y}$: Simple operating margin CO2 emission factor in year y (tCO₂/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(energy content) of fossil fuel type i in year y (GJ/mass or volume unit)

$EF_{CO_2,i,y}$:CO₂ emission factor of fossil fuel type i in year y(tCO₂/MWh)

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 : The relevant year as per the data vintage chosen in Step 3

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

The Build Margin have been calculated for the year 2015.

There are two main information sources for the Turkish electricity system: TEİAŞ (www.teias.com.tr) and Ministry of Energy and Natural Resources (www.etkb.gov.tr).

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

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

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

Project Proponent chooses Option 1 in terms of vintage of data for the proposed project activity.

Data from the period 2013-2015 has been obtained for this calculating. This period is standing for the most recent data available at the time of submission of the PDD to DOE.

Step 6. Calculate the combined margin emissions factor

According to the applicable methodological tool, the calculation of the combined margin (CM) emission factor ($EF_{grid, CM}$) is based on one of the following methods:

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

The Project Proponent chooses option (a), weighted average CM.

The combined margin emissions factor is calculated as follows:

Where:

$EF_{grid, BM, y}$	= Build margin CO ₂ emission factor in year y (t CO ₂ /MWh)
$EF_{grid, OM, y}$	= Operating margin CO ₂ emission factor in year y (t CO ₂ /MWh)
w_{OM}	= Weighting of operating margin emissions factor (per cent)
w_{BM}	= Weighting of build margin emissions factor (per cent)

According to the “Tool to calculate the emission factor for an electricity system” (version 06.0.), the default weights for the operating margin and build margin emission factors for wind power generation is defined as:

- $w_{OM}=0.75$
- $w_{BM}=0.25$

for the second crediting period.

3.2 Project Emissions

No project emissions are relevant for the project activity, since these emissions are occurred as a result of the operation of geothermal power plants and water reservoirs of hydropower plants

3.3 Leakage

No leakage is considered as per the methodology.

As a result;

$$LE_y = 0 \text{ tCO}_2$$

3.4 Net GHG Emission Reductions and Removals

Calculation of Operating Margin Emissions Factor

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). Total CO₂ emission due to electricity generation in Turkey for the years of 2013, 2014 and 2015 are given in:

Table 12: CO₂ emission from electricity production (2013-2015)(tCO₂)

TCO ₂ (tonnes)	2013	2014	2015
Hard Coal+Imported Coal+Asphaltite	25.774.929	31.054.429	35.832.091
Lignite	31.084.353	37.264.883	32.508.012
Fuel Oil	1.845.171	2.353.074	1.725.608
Diesel Oil	414.369	378.432	757.776
Natural Gas	46.206.081	51.754.461	42.970.146
Total CO₂-Emissions	105.324.903	122.805.280	113.793.634

The amount of fuel consumption (FC_{i,y}) is taken from website of TEİAŞ for the calculation of the Simple OM. The fuel consumption values for 2013-2015 may be seen in Table 13:

Table13: Fuel consumption of generation sources connected to the grid (2013-2015)²³

	Units	2013	2014	2015	Total
Natural Gas	1000m3	22,909,746	25,426,014	20,914,868	69,250,628
Lignite	tonnes	47,120,306	57,696,139	49,940,131	154,756,576
Coal	tonnes	12,105,930	14,501,934	16,629,492	43,237,356
Fuel Oil	tonnes	573,534	754,283	516,912	1,844,729
Diesel Oil	tonnes	129,359	119,988	238,388	487,735
Lpg	tonnes	0	0	0	0
Naphta	tonnes	0	0	0	0

Annual heating values for each fuel type are directly related with the fuel consumption and are used to calculate Net Calorific Values (TJ/kt) for each year (Table.8). The annual heating values are converted to TJ and divided by the fossil fuel consumption(kt) for that year.

²³Annual Development of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities
<http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/yakit65-71/67.xls>

Turkish specific net calorific values (NCV_{i,y}) values for fossil fuel types have been calculated, using data from the IPCC Guidelines for National Greenhouse Gas Inventory for the emission factor of the fossil fuel types (EFCO_{2,i,y}).

Table 14: NCV and emission factor of fossil fuel type²⁴

	NCV _i (TJ/kt)			EF _{CO₂,i} (tonnes/TJ) ²⁵
	2013	2014	2015	
Natural Gas	37.14	37.49	37,837	54,3
Lignite	7.26	7.11	7,161	90,9
Hard Coal + Imported Coal	23.79	23.93	24,075	89,5
Fuel Oil	42.61	41.32	44,216	75,5
Diesel Oil	44,12	43.44	43,784	72,6
Lpg	0	0	0,000	61,6
Naphta	0	0	0,000	69,3

The electricity delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units (EG_{gross,y}) is obtained from TEIAS (Turkish Electricity Transmission Company). Table 15 shows the gross electricity production for 2013-2015 produced by fossil fuel power sources:

Table 15: Gross electricity generation by fossil fuel power sources 2013-2015²⁶

	EG _{gross,y} (MWh)			
	2013	2014	2015	Total
Natural Gas	105,116,347	120,576,031	99,218,742	324,911,120
Lignite	30,262,043	36,615,369	31,335,735	98,213,147
Hard Coal + Import Coal	33,524,033	39,647,313	44,829,872	118,001,218
Fuel Oil	1,192,478	1,662,854	980,378	3,835,710
Diesel Oil	546,348	482,435	1,243,561	2,272,344
Lpg	0	0	0	0
Naphta	0	0	0	0

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

²⁴ <http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2015/istatistik2015.htm>

²⁵ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

²⁶ [http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2015/uretim%20tuketim\(34-64\)/48\(2006-2015\).xls](http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2015/uretim%20tuketim(34-64)/48(2006-2015).xls)

Table 16: Relation between net and gross electricity generation 2013-2015²⁷

	2013	2014	2015
Gross generation (MWh)	240,154,000	251,962,800	261.783,3
Net generation (MWh)	228,977,000	239,448,800	249.899,5
Relation	95,35%	95,03%	95,5%

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

Table 17: Net electricity generation fossil fuel power plants and electricity imports 2013- 2015²⁸

	2013	2014	2015	Total
Gross electricity generation (GWh)	170.641	198.984	177.608	547.234
Net electricity generation $EG_{net,y}$ (GWh)	162.699	189.101	169.546	521.346
Electricity imports (GWh)	7.429,4	7.953,3	7.135,5	22.518
Electricity supplied to grid EG_y (GWh)	170.129	197.055	176.681	543.865

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

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

Table 18: Operating Margin

	2012	2013	2014
CO ₂ -Emissions (tCO ₂)	105.324.903	122.805.280	113.793.634
Net Electricity Supplied to Grid by relevant sources (MWh)	170.129	197.055	176.681
$EF_{grid,OMsimple,y}$ (tCO ₂ /MWh)	0,6191	0,6232	0,6441
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ (tCO₂/MWh)	0,6288		

²⁷[http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/uretim%20tuketim\(34-64\)/48\(2006-2015\).xls](http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/uretim%20tuketim(34-64)/48(2006-2015).xls)

²⁸[http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/uretim%20tuketim\(34-64\)/48\(2006-2015\).xls](http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2015/uretim%20tuketim(34-64)/48(2006-2015).xls)

Based on the above values, the simple operating margin CO₂ grid emission factor (EF_{grid,OMsimple,y}) calculated through equation is **0.629 tCO₂/MWh**.

Calculation of the build margin emissions factor

The Build Margin have been calculated for the year 2015.

There are two main information sources for the Turkish electricity system: TEİAŞ (www.teias.com.tr) and Ministry of Energy and Natural Resources (www.etkb.gov.tr).

Step 5.1 Select the option regarding the vintage:

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

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

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

Project Proponent chooses Option 1 in terms of vintage of data for the proposed project activity:

Step 5.2 The Identification of Power Units to Be Used in Calculation of BM

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

The recent added power units (SET_{5 Units}) list can be obtained from the Ministry of Energy and Natural Resources web site²⁹

²⁹<http://www.etkb.gov.tr/tr-TR/AramaSonuclari?k=2015+enerji+yat%u0131r%u0131mlar%u0131&page=2>

Table19: The 5 most recent power plants (accordingly year 2015)(excluding VERs)

Company Name	Plant Name	Place	Fuel Type	Power Capacity MW _e	Temporary Acceptance Date
KARKEY KARADENİZ ELEKTRİK ÜRETİM A.Ş.	UMURLU JES	AYDIN	Geothermal	9,720	30/12/15
AYDINLAR ENERJİ ÜRETİM SANAYİ A.Ş.	HANAK HES	ARDAHAN	Hydro	5,139	29/12/15
ALPERTEKS MENSUCAT SANAYİ VE TİC. A.Ş.	ALPERTEKS SANTRALİ	UŞAK	Natural Gas	4,290	25/12/15
SAF ENERJİ ELEKTRİK ÜRETİM SAN. VE TİC. A.Ş.	KALEKÖY HES	ADIYAMAN	Hydro	2,740	25/12/15
VİRA ELEKTRİK ÜRETİM A.Ş.	TUĞRA REG. VE HES	GİRESUN	Hydro	2,120	25/12/15

Important Note: (The Rationale for Usage of Power Capacities instead of Annual Electricity Production Data)

There is no data available for annual electricity production of each power plant belonging to years 2013, 2014 and 2015. The most recent data available for the annual energy production for specific power station belongs to year 2012. To update the BM to the year 2015, the only data that we can use to estimate the annual production is the power capacity. We can make calculations as if every power plant had operated with full capacity all around the year.

The usage of capacity is a CDM Executive Board approved deviation from the methodology AM005 for a similar situation³⁰. According to the board-approved deviation, as the annual production data is absent, we will “use of weights estimated using installed capacity in place of annual electricity generation” (cited from the link given in footnote²¹).

The CDM registered projects are excluded from the five power plants given in Table 6. The sum of power capacities of these plants is 24.01 MW. AEG_{SET 5 Units}: 24.01 MW * year.

³⁰http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

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

Total capacity at the end of the year 2015 is 73146.7MW³¹ (which is AEG_{Total}). The 20 percent of total capacity is 14629.3 MW so AEG_{SET≥20 per cent} > AEG_{SET 5 Units}.

(c.) Selection of The SET_{sample}

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

SET_{sample} (AEG_{SET≥20 per cent})

The 20 percent of total power is 14629 MW.

Table 10: SET-Sample Periods

Period	Capacity Addition (MW)	CDM Registered (MW)	Addition (Excluding CMD Projects) (MW)	Thermal (MW)
13.02.2013 – 31.12.2013	6689,773	830,453	5859,320	3565,569
2014	6305,2	570,435	5734,7	3882,31
2015	4287,571	1252,299	3035,27	930,836
Total	17282,544	2653,187	14629,29	8378,715

The sum of 2015 and 2014 projects (excluding VER registered) is 8,769.97 MW. We need to include more projects from 2013 to exceed 14,629 MW (5859 MW). As we include the projects between dates 13.02.2013 and 31.12.2013, we sum up to 14629 MW. Here we get the SET_{Sample}.

SET_{Sample} List

You can find the list of SET_{Sample} below in Table 21, yellow rows indicate that the project is VER registered and they are excluded from the SET.

Table 11: SET-Sample List

1	YAKIT CİNSİ	İLAVE KURULU GÜÇ MWe	GEÇİCİ KABUL TARİHİ
İÇDAŞ BİGA RES	RES	12,800	31/12/15
UMURLU JES	JEOTERMAL	9,720	30/12/15

³¹ <http://www.teias.gov.tr/YayinRapor/apk/projeksiyon/KAPASITEPROJEKSİYONU2015.pdf>

ITC-KA ELAZIĞ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2,830	30/12/15
HANAK HES	HES	5,139	29/12/15
ALPERTEKS SANTRALİ	DG	4,290	25/12/15
KALEKÖY HES	HES	2,740	25/12/15
BANDIRMA RES	RES	15,000	25/12/15
FUATRES RES	RES	16,500	25/12/15
TUĞRA REG. VE HES	HES	2,120	25/12/15
YAHYALI RES	RES	18,900	25/12/15
SİLOPİ TERMİK SANTRALİ	YERLİ ASFALTİT	135,000	22/12/15
BAĞBAŞI REG. VE HES	HES	13,600	19/12/15
İSKENDERUN ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2,830	18/12/15
ATAKÖY HES	HES	5,000	17/12/15
ŞANLIURFA BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3,120	17/12/15
SÖKE RES	RES	45,000	14/12/15
TÜPRAŞ İZMİT RAFİNERİSİ TERMİK KOJENERASYON SANTRALİ	DG	41,280	11/12/15
ARTVİN BARAJI VE HES	HES	166,090	10/12/15
HASANLAR HES	HES	0,000	09/12/15
SARES RES	RES	2,750	04/12/15
TUFANBEYLİ ÜRETİM TESİSİ	LİNYİT	300,000	02/12/15
İÇDAŞ BİGA RES	RES	22,400	02/12/15
FLORANCE NIGHTINGALE HASTANESİ KOJENERASYON SANTRALİ	DG	0,800	02/12/15
İNCESU RES	RES	3,200	26/11/15
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	4,240	26/11/15
KANGAL RES	RES	14,000	26/11/15
YAHYALI RES	RES	7,200	20/11/15
ŞANLIURFA OSB ENERJİ SANTRALİ	DG	18,310	18/11/15
KOÇAK REG. VE HES	HES	1,344	17/11/15
KANDİL REG. VE HES	HES	6,192	16/11/15
OSB ÜRETİM SANTRALİ	DG	21,750	13/11/15
SÜLOĞLU RES	RES	24,000	13/11/15
KANİJE RES	RES	3,200	13/11/15
AKBÜK RES	RES	4,800	12/11/15
KIYIKÖY RES	RES	11,000	12/11/15
ASLAN ÇİMENTO ATIK ISIDAN ENERJİ ÜRETİM TESİSİ	ATIK ISI	7,500	06/11/15
DÜZOVA RES	RES	1,500	06/11/15

TEPEKİŞLA BARAJI VE HES	HES	32,993	05/11/15
ÇİLEHANE HES	HES	1,536	02/11/15
ŞANLIURFA BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	3,120	31/10/15
UMURLU JES	JEOTERMAL	2,280	31/10/15
KANGAL RES	RES	20,000	30/10/15
PAMUKÖREN JES 2	JEOTERMAL	22,510	29/10/15
HIZIR REGÜLATÖRÜ VE HES	HES	1,955	29/10/15
KANDİL REG. VE HES	HES	2,616	29/10/15
BAĞARASI RES	RES	24,400	29/10/15
HAYMEANA I-II HES (HAYMEANA I HES)	HES	3,200	29/10/15
KARAMAN BİYOGAZ TESİSİ	BİYOKÜTLE	1,414	29/10/15
ÇAY REGÜLATÖRÜ VE HES	HES	4,143	28/10/15
OVACIK BİYOGAZ ENERJİ SANTRALİ	BİYOKÜTLE	4,800	28/10/15
FUATRES RES	RES	3,300	28/10/15
KANİJE RES	RES	3,200	28/10/15
PAKMİL BİYOKÜTLE SANTRALİ	BİYOKÜTLE	1,763	27/10/15
AKBÜK RES	RES	2,400	27/10/15
KARAKAYA REG. VE HES	HES	9,010	26/10/15
KARADUVAR ATIKSU ARITMA TESİSİ BİYOGAZ SANTRALİ	BİYOKÜTLE	1,900	26/10/15
TRABZON RİZE ÇÖP GAZI SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	2,826	25/10/15
PAŞALI REGÜLATÖRÜ VE HES	HES	3,500	25/10/15
BABADERE JES	JEOTERMAL	8,000	24/10/15
DİLOVASI ÇÖP BİYOGAZ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,063	24/10/15
SERHAT REGÜLATÖRÜ VE HES	HES	8,840	24/10/15
SİVAS BİYOKÜTLEDEN (ÇÖP GAZI) ELEKTRİK ENERJİSİ ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,410	24/10/15
SEBİL REG. VE HES	HES	22,636	24/10/15
POYRAZGÖLÜ RES	RES	14,000	24/10/15
HİLAL-2 RES	RES	7,000	23/10/15
KIYIKÖY RES	RES	12,000	23/10/15
YAHYALI RES	RES	9,600	23/10/15
ATAKÖY HES	HES	2,500	22/10/15
ADA 2 RES	RES	3,200	21/10/15
GÜNAYŞE REG. VE HES	HES	0,800	19/10/15
ANGUTLU HES	HES	14,400	19/10/15
DEMİRCİ REG. VE HES	HES	12,600	17/10/15
AKBÜK RES	RES	2,400	16/10/15
İÇDAŞ BİGA RES	RES	16,000	16/10/15
EGE RES	RES	7,000	16/10/15

ARPACIK REGÜLATÖRÜ VE HES	HES	3,770	15/10/15
ÇİLEKLİTEPE HES	HES	23,625	15/10/15
SÜLOĞLU RES	RES	18,000	11/10/15
TERMİK-KOJENERASYON SANTRALİ	DG	4,000	10/10/15
ADARES RES	RES	10,000	10/10/15
GERES RES	RES	0,000	03/10/15
KÖPRÜBAŞI HES	HES	7,949	02/10/15
GÖKTAŞ HES (GÖKTAŞ-2 HES)	HES	153,400	02/10/15
BAĞARASI RES	RES	21,600	29/09/15
POYRAZGÖLÜ RES	RES	16,000	18/09/15
KARACABEY-2 BİYOGAZ TESİSİ	BİYOKÜTLE	1,067	18/09/15
SÜLOĞLU RES	RES	18,000	18/09/15
HANAK HES	HES	3,690	17/09/15
KEN KİPAŞ JES	JEOTERMAL	24,000	17/09/15
KIYIKÖY RES	RES	9,000	17/09/15
İZNİK DEREKÖY HES	HES	0,715	15/09/15
DİLEK RES	RES	9,600	15/09/15
KUYUCAK RES	RES	15,100	12/09/15
ALAŞEHİR JES	JEOTERMAL	33,730	12/09/15
ORİON ÜRETİM SANTRALİ	DG	1,200	11/09/15
TERMİK-KOJENERASYON SANTRALİ	DG	2,000	10/09/15
TERMİK-KOJENERASYON SANTRALİ	DG	1,200	09/09/15
TEPEKİŞLA BARAJI VE HES	HES	32,993	04/09/15
EĞERCİ REGÜLATÖRÜ VE HES	HES	1,3436	03/09/15
AYVALI (ÇORUH) BARAJI VE HES	HES	121,654	03/09/15
TERMİK-KOJENERASYON SANTRALİ	DG	4,044	02/09/15
KOCADAĞ 2 RES	RES	2,500	02/09/15
DİLEK RES	RES	7,200	27/08/15
SEKİYAKA II HES	HES	1,090	27/08/15
EFELER JES	JEOTERMAL	47,400	26/08/15
SUÇATI-I HES	HES	8,316	20/08/15
TEPEKİŞLA BARAJI VE HES	HES	3,641	13/08/15
KIYIKÖY RES	RES	12,000	13/08/15
PAMUKÖREN JES	JEOTERMAL	16,006	07/08/15
AKÇAKOYUN HES	HES	6,790	06/08/15
ZİYARET RES	RES	1,000	04/08/15
MUT RES	RES	0,500	31/07/15
AKINCI (KAYABEYİ) HES	HES	10,175	30/07/15
GÖKSU HES	HES	17,177	25/07/15
DİLEK RES	RES	7,200	24/07/15
PAMUKÖREN JES	JEOTERMAL	6,504	21/07/15

BOLU-GÖYNÜK ENERJİ SANTRALİ	LİNYİT	135,000	15/07/15
DOĞU HES	HES	5,985	08/07/15
KARAKUZ BARAJI VE HES	HES	76,000	08/07/15
MANAHOZ HES	HES	1,120	05/07/15
TELLİ 1-2 HES	HES	0,000	03/07/15
EFELER JES	JEOTERMAL	22,500	03/07/15
AVANOS REGÜLATÖRÜ VE CEMEL HES	HES	6,000	03/07/15
ALÇE HES	HES	5,140	02/07/15
SOMA RES	RES	8,000	26/06/15
SÖĞÜTLÜ HES	HES	9,160	26/06/15
MANAHOZ HES	HES	5,960	25/06/15
ÖDEMİŞ RES	RES	8,000	25/06/15
ÇEŞME RES	RES	7,000	20/06/15
MUT RES	RES	13,200	19/06/15
TOSUNLAR-1 JES	JEOTERMAL	3,807	12/06/15
ÇAYKARA HES	HES	10,560	11/06/15
BOLU ÇİMENTO ATIK ISIDAN ENERJİ ÜRETME TESİSİ	ATIK ISI	6,000	05/06/15
MUT RES	RES	16,500	05/06/15
HAVVA HES	HES	4,780	04/06/15
ÖDEMİŞ RES	RES	12,000	29/05/15
EKOTEN TEKSTİL SAN. VE TİC. A.Ş. KOJEN. SANTRALİ	DG	0,008	29/05/15
SEBENOBA RES	RES	9,000	28/05/15
BEYHAN I BARAJI VE HES	HES	31,600	26/05/15
ANGUTLU 2 HES	HES	8,898	25/05/15
EDİNCİK RES	RES	26,400	23/05/15
KORU RES	RES	10,400	22/05/15
MUT RES	RES	19,800	22/05/15
POLATLI BES	BİYOKÜTLE	0,637	22/05/15
ÇEŞME RES	RES	9,000	22/05/15
GÜNEYAKA HES	HES	6,630	21/05/15
SEMA REGÜLATÖRÜ VE HES	HES	17,000	21/05/15
KARGI (KIZILIRMAK) HES	HES	101,720	20/05/15
AKSARAY OSB BİYOGAZ SANTRALİ	BİYOKÜTLE	1,067	15/05/15
YALNIZARDIÇ HES	HES	0,530	08/05/15
KORU RES	RES	19,800	08/05/15
ORTAMANDIRA RES	RES	10,000	08/05/15
SİLOPİ TERMİK SANTRALİ	YERLİ ASFALTİT	135,000	08/05/15
ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	3,978	07/05/15
HARMANLIK RES	RES	10,400	06/05/15

KIZILÇAM REGÜLATÖRÜ VE HES	HES	1,320	05/05/15
AKINCI (KAYABEYİ) HES	HES	74,506	03/05/15
KİPAŞ KAĞIT SANAYİ İŞLETMELERİ A.Ş. TERMİK-KOJENERASYON SANTRALİ	KÖMÜR	7,600	01/05/15
YANBOLU HES	HES	6,21	30/04/15
DURKAR 1 TERMİK-KOJENERASYON SANTRALİ	DG	2,433	30/04/15
STS-1 HES	HES	11,243	30/04/15
YUNUSLAR HES	HES	7,960	28/04/15
HARMANLIK RES	RES	13,200	24/04/15
KORU RES	RES	19,800	22/04/15
BARAN REGÜLATÖRÜ VE HES (BARAN-I)	HES	8,865	17/04/15
BOREAS I ENEZ RES	RES	2,500	17/04/15
BEYHAN I BARAJI VE HES	HES	183,500	17/04/15
YANBOLU HES	HES	2,870	16/04/15
GARZAN BARAJI VE HES	HES	3,210	15/04/15
HARMANLIK RES	RES	26,400	11/04/15
İNCEBEL HES	HES	6,930	09/04/15
SOMA RES	RES	12,000	09/04/15
YALNIZARDIÇ HES	HES	15,930	08/04/15
SEYİTALİ RES	RES	2,000	07/04/15
BAĞIŞTAŞ I BARAJI VE HES	HES	89,540	03/04/15
ÇAKMAK REGÜLATÖRÜ VE HES	HES	8,630	03/04/15
ONUR REGÜLATÖRÜ VE HES	HES	19,568	02/04/15
BEYHAN I BARAJI VE HES	HES	183,500	29/03/15
ÇERÇİKAYA RES	RES	11,15795	20/03/15
SOMA RES	RES	18,000	20/03/15
SÜTLÜCE HES VE REGÜLATÖRÜ	HES	5,640	19/03/15
YALNIZARDIÇ HES	HES	15,930	19/03/15
ALAKÖPRÜ BARAJI VE HES	HES	28,890	18/03/15
PEMBELİK BARAJI VE HES	HES	63,670	13/03/15
KIYIKÖY RES	RES	3,000	13/03/15
MODERN ENERJİ TERMİK SANTRALİ	DG+ORMAN ÜRÜN.	27,600	12/03/15
BEYHAN I BARAJI VE HES	HES	183,500	12/03/15
SÖĞÜTLÜ HES	HES	9,160	12/03/15
ÇAKMAK REGÜLATÖRÜ VE HES	HES	18,750	10/03/15
EFELER JES	JEOTERMAL	22,500	06/03/15
BÜYÜKBAHÇE REGÜLATÖRÜ VE HES	HES	11,700	06/03/15
BANDIRMA RES	RES	0,600	27/02/15
TÜPRAŞ İZMİT RAFİNERİSİ TERMİK KOJENERASYON SANTRALİ	DG	79,080	27/02/15

BAĞIŞTAŞ I BARAJI VE HES	HES	51,090	27/02/15
ÇERÇİKAYA RES	RES	13,94735	19/02/15
YAMANLI II HES	HES	11,222	19/02/15
PEMBELİK BARAJI VE HES	HES	63,670	18/02/15
SEBENOBA RES	RES	8,000	13/02/15
SİNCAN ÇADIRTEPE BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	5,664	13/02/15
MEREK REGÜLATÖRÜ VE HES	HES	9,180	12/02/15
DEMİREK KOJENERASYON TESİSİ	DG	2,476	11/02/15
PİTANE RES	RES	4,800	09/02/15
KADAHOR REGÜLATÖRÜ VE HES	HES	9,362	07/02/2015
SOMA RES	RES	6,000	07/02/2015
KOCADAĞ 2 RES	RES	7,500	06/02/2015
KÖPRÜYANI REGÜLATÖRÜ VE HES	HES	11,900	04/02/2015
YAMANLI II HES	HES	11,222	31/01/2015
ADIGÜZEL II HES	HES	30,09	24/01/2015
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	1,125	23/01/2015
MMK METALURJİ SAN. TİC. VE LİMAN İŞLETMECİLİĞİ A.Ş. KOJENERASYON TESİSİ	DG	15,000	17/01/2015
HAYAT BİYOKÜTLE PROJESİ	BİYOKÜTLE	0,955	16/01/2015
ÇAYKARA HES	HES	15,360	16/01/2015
KARDEMİR KARABÜK DEMİR ÇELİK SAN. VE TİC. A.Ş. TERMİK-KOJENERASYON SANTRALİ	KÖMÜR+DİĞ ER	15,000	10/01/2015
ÇERÇİKAYA RES	RES	27,8947	10/01/2015
BUCAKKIŞLA HES	HES	41,000	08/01/2015

SANTRAL ADI	YAKIT CİNSİ	İLAVE KURULU GÜÇ MW _e	GEÇİCİ KABUL TARİHİ
PET CİPS RESİN VE KOJ. TESİSİ	DG	8,600	31/12/2014
M.KEMALPAŞA-SUUÇTU HES	HES	2,304	31/12/2014
TEKİRDAĞ ENERJİ ÜRETİM SANTRALİ	DG	13,075	31/12/2014
HAMZABEY HES	HES	8,820	31/12/2014
TERMİK KOJENERASYON SANTRALİ	LİNYİT	1,640	31/12/2014
TEKSMAK TERMİK KOJENERASYON SANTRALİ	DG	2,677	30/12/2014
YEŞİLKÖY REG. VE HES	HES	3,720	30/12/2014
GÜNAYDIN RES	RES	2,500	26/12/2014
YAZILI I-II-III HES	HES	6,620	25/12/2014
SOMA RES	RES	24,000	25/12/2014
SEBENOBA RES	RES	13,000	20/12/2014

GÜNAYDIN RES	RES	5,000	20/12/2014
ÇAĞLAYAN REGÜLATÖRÜ VE HES	HES	7,956	19/12/2014
ATLAS TERMİK SANTRALİ	İTHAL KÖMÜR	600,000	19/12/2014
BANDIRMA RES	RES	26,400	14/12/2014
ARAKLI 3 HES	HES	0,631	12/12/2014
ŞADILLI RES	RES	11,000	06/12/2014
CENGİZ 240MW DGKÇS	DG	208,670	05/12/2014
EREN HES	HES	35,186	04/12/2014
MURAT HES	HES	11,089	01/12/2014
BİLECİK DOĞALGAZ ÇEVİRİM SANTRALİ	DG	13,050	28/11/2014
MENTAŞ HES	HES	9,600	28/11/2014
SOMA RES	RES	32,000	26/11/2014
KELTEPE RES	RES	0,000	21/11/2014
EKİNCİK HES	HES	7,520	20/11/2014
YAKINCA REGÜLATÖRÜ VE HES	HES	11,700	14/11/2014
YÜCE HES	HES	5,283	14/11/2014
PİRİNÇLİK HES	HES	21,315	14/11/2014
GÖNEN BİYOGAZ TESİSİ PROJESİ	BİYOKÜTLE	1,487	14/11/2014
ŞADILLI RES	RES	13,750	14/11/2014
ÜÇGEN HES	HES	3,388	07/11/2014
MERNİS HALI KOJENERASYON SANTRALİ	DG	9,730	01/11/2014
BEYPAZARI BİYOGAZ TESİSİ BİYOKÜTLE PROJESİ	BİYOKÜTLE	0,7936	31/10/2014
CANAN TEKSTİL KOJENERASYON SANTRALİ	DG	2,000	31/10/2014
GÖKBOYUN REGÜLATÖRÜ VE HES	HES	5,000	29/10/2014
AMASYA ÇÖP GAZ ELEKTRİK ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,200	29/10/2014
TUĞRA REGÜLATÖRÜ VE HES	HES	11,480	28/10/2014
ŞADILLI RES	RES	8,250	26/10/2014
TERMİK-KOJENERASYON SANTRALİ	DG	15,000	25/10/2014
KOCABEY-2 BİYOGAZ SANTRALİ	BİYOKÜTLE	2,134	25/10/2014
AFYON BİYOGAZ ENERJİ SANTRALİ BİYOKÜTLE PROJESİ	BİYOKÜTLE	4,017	24/10/2014
TURKOL OTEL SANTRALİ (TERMİK KOJENERASYON)	DG	1,000	24/10/2014
ADANA DOĞU ATIKSU SANTRALİ	BİYOKÜTLE	0,800	24/10/2014
TUANA HES	HES	3,695	24/10/2014
ALBE-1 BİYOGAZ SANTRALİ	BİYOKÜTLE	1,813	24/10/2014

POLATLI BES	BİYOKÜTLE	0,834	24/10/2014
CENGİZ 240MW DGKÇS	DG	401,330	22/10/2014
İNCESU RES	RES	10,000	22/10/2014
SİGMA SULUOVA BİYOGAZ TESİSİ	BİYOKÜTLE	1,000	20/10/2014
ZEKERE HES	HES	3,978	17/10/2014
BURDUR ŞEKER FABRİKASI ÜRETİM TESİSİ (TERMİK KOJENERASYON)	DG/FO/LİNYİT	4,750	17/10/2014
KEREM JES	JEOTERMAL	24,000	16/10/2014
GÜRGEN REGÜLATÖRÜ VE HES	HES	2,360	15/10/2014
ALİAĞA RES	RES	2,400	10/10/2014
EFELER JES	JEOTERMAL	22,500	01/10/2014
PİRO REGÜLATÖRÜ VE HES	HES	4,060	01/10/2014
MODERN BİYOKÜTLE ENERJİ SANTRALİ	BİYOKÜTLE	6,000	30/09/2014
UMURLAR RES	RES	10,000	30/09/2014
SAMSUN AVDAN BİYOGAZ TESİSİ BİYOKÜTLE PROJESİ	BİYOKÜTLE (ÇÖP GAZI)	2,400	27/09/2014
KOJEN	DG	1,189	26/09/2014
ALAŞEHİR JES	JEOTERMAL	24,000	25/09/2014
KAVAKLI RES	RES	13,700	25/09/2014
ASLANCIK HES	HES	46,500	19/09/2014
GARZAN HES	HES	5,420	19/09/2014
SİLİVRİ RES	RES	7,500	19/09/2014
DORUK HES	HES	28,278	19/09/2014
AYVASIL REGÜLATÖRÜ VE HES	HES	2,976	19/09/2014
KANGAL RES	RES	2,000	19/09/2014
SERAP HES	HES	28,960	19/09/2014
ALİAĞA RES	RES	7,200	12/09/2014
DOĞANÇAY HES	HES	20,160	12/09/2014
HAYAT KİMYA KOJENERASYON SANTRALİ	DG	15,040	12/09/2014
KAYSERİ KATI ATIK DEPONİ SAHASI ELEKTRİK ÜRETİM SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,560	11/09/2014
ATIK RES	RES	2,000	09/09/2014
KANGAL RES	RES	42,000	05/09/2014
KORKMAZ RES	RES	14,000	04/09/2014
SİLİVRİ RES	RES	12,500	03/09/2014
DOĞANÇAY HES	HES	10,080	29/08/2014
KÖRFEZ ENERJİ SAN. VE TİC. A.Ş. TERMİK KOJENERASYON SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	2,830	29/08/2014
AK NIŞASTA SAN. VE TİC. A.Ş. KOJENERASYON SANTRALİ	DG	2,000	22/08/2014

DİNAR RES	RES	36,800	22/08/2014
KAVAKLI RES	RES	36,300	21/08/2014
SİLİVRİ RES	RES	25,000	20/08/2014
ALADEREÇAM HES	HES	7,350	19/08/2014
SAMURLU RES	RES	4,500	16/08/2014
KORKMAZ RES	RES	10,000	15/08/2014
GÖKRES-2 RES	RES	24,000	15/08/2014
TERMİK-AKIŞKAN YATAKLI KOJENERASYON SANTRALİ	LİNYİT	5,500	15/08/2014
KIYIKÖY RES	RES	24,000	15/08/2014
ŞENKÖY RES	RES	9,000	15/08/2014
GENERAL REGÜLATÖRÜ VE HES	HES	5,950	08/08/2014
ATLAS TERMİK SANTRALİ	İTHAL KÖMÜR	600,000	08/08/2014
ÇANTA RES	RES	12,500	24/07/2014
ÜÇGEN 2 REGÜLATÖRÜ VE HES	HES	10,319	17/07/2014
SARAY REGÜLATÖRÜ VE HES	HES	13,500	16/07/2014
PANER KOJENERASYON SANTRALİ	DG	2,800	16/07/2014
AKDERE HES	HES	7,480	12/07/2014
HASANBEYLİ RES	RES	7,500	11/07/2014
BALABANLI RES	RES	16,100	11/07/2014
AŞKALE ÇİMENTO TERMİK KOJENERASYON SANTRALİ	ATIK ISI	5,500	10/07/2014
KOÇLU HES	HES	36,260	10/07/2014
BEKİRLİ TERMİK SANTRALİ	İTHAL KÖMÜR	600,000	10/07/2014
KARADERE RES	RES	4,800	04/07/2014
UŞAK RES	RES	28,500	04/07/2014
ÇANTA RES	RES	20,000	28/06/2014
SUSURLUK RES	RES	15,000	28/06/2014
ALTINSU TEKSTİL KOJENERASYON TESİSİ	DG	1,189	27/06/2014
GÜNAYDIN RES	RES	2,500	27/06/2014
HASANBEYLİ RES	RES	7,500	26/06/2014
KARADERE RES	RES	11,200	21/06/2014
GÖKRES 2 RES	RES	11,000	20/06/2014
KÖROĞLU HES	HES	9,060	20/06/2014
BERKE REGÜLATÖRÜ VE HES	HES	3,127	20/06/2014
ITC AKSARAY ÜRETİM TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	1,415	17/06/2014
KAVŞAK BENDİ HES	HES	5,430	17/06/2014

BÜKOR II HES	HES	12,597	13/06/2014
SENTETİK-2 KOJENERASYON TESİSİ	DG	3,349	13/06/2014
GÖKBEL I-II HES	HES	4,282	13/06/2014
EDİNCİK BES	BİYOĞAZ	2,126	12/06/2014
ARKUN BARAJI VE HES	HES	88,819	12/06/2014
TOKMADİN HES	HES	3,430	12/06/2014
SALMAN RES	RES	2,000	06/06/2014
ÇİNE HES	HES	46,600	06/06/2014
ERZİN DGKÇS	DG	319,820	05/06/2014
DORA 3 JES	JEOTERMAL	17,000	03/06/2014
ZİYARET RES	RES	10,000	31/05/2014
DERHAN TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	1,189	31/05/2014
ÇANTA RES	RES	15,000	31/05/2014
ARKUN BARAJI VE HES	HES	156,010	30/05/2014
SALMAN RES	RES	6,000	30/05/2014
HASANBEYLİ RES	RES	7,500	29/05/2014
GÜLLE TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	4,300	27/05/2014
ŞENBÜK RES	RES	13,940	25/05/2014
BALABANLI RES	RES	23,000	17/05/2014
UŞAK RES	RES	25,500	17/05/2014
ZALA REGÜLATÖRÜ VE HES	HES	5,422	16/05/2014
KİRAZLIK REGÜLATÖRÜ VE HES	HES	2,500	16/05/2014
SALMAN RES	RES	12,000	14/05/2014
TUANA HES	HES	3,695	13/05/2014
PROKOM PİROLİTİK YAĞ VE GAZ TAKITLI ELEKTRİK ÜRETİM TESİSİ	PİROLİTİK YAĞ	7,040	11/05/2014
GÜVEN GIDA TETMİK KOJENERASYON SANTRALİ	DG	2,006	10/05/2014
TONYA I-II HES	HES	2,500	09/05/2014
ASLANCIK HES	HES	12,800	09/05/2014
HASANBEYLİ RES	RES	10,000	09/05/2014
KAYAKÖPRÜ HES	HES	14,200	08/05/2014
GERES RES	RES	27,500	08/05/2014
EROĞLU GİYİM TERMİK KOJENERASYON SANTRALİ	DG	1,165	08/05/2014
ÇAMLICA II HES	HES	17,580	02/05/2014
AYVASIL REGÜLATÖRÜ VE HES	HES	1,466	30/04/2014
ERZİN DGKÇS	DG	292,090	28/04/2014

CANAN TEKSTİL TERMİK KOJENERASYON SANTRALİ	DG	2,000	27/04/2014
KALEALTI II HES	HES	9,977	26/04/2014
BOYAR KİMYA TERMİK KOJENERASYON SANTRALİ	DG	2,000	26/04/2014
DÜZCE-AKSU HES	HES	46,200	25/04/2014
SÖLPEREN REGÜLATÖRÜ VE HES	HES	9,762	25/04/2014
HAVVA HES	HES	2,390	22/04/2014
YEŞİLYURT ENERJİ SAMSUN DGKÇ SANTRALİ	DG	18,321	18/04/2014
GEYCEK RES	RES	14,000	18/04/2014
GÖKBEL 2 HES	HES	14,504	18/04/2014
MELİKE İPLİK TERMİK KOJENERASYON SANTRALİ	DG	9,730	18/04/2014
UZUNDERE II REGÜLATÖRÜ VE HES	HES	7,020	18/04/2014
SİNCİK RES	RES	2,500	17/04/2014
ERZİN DGKÇS	DG	292,090	12/04/2014
ARSAN DOKUMA TERMİK KOJENERASYON SANTRALİ	DG	4,300	12/04/2014
KAMER REGÜLATÖRÜ VE HES	HES	3,750	11/04/2014
DAĞBAŞI HES	HES	10,433	11/04/2014
MANYAS BARAJI VE HES	HES	20,250	08/04/2014
POLAT ENERJİ KÜTAHYA TERMİK SANTRALİ	LİNYİT	51,000	05/04/2014
İZDEMİR ENERJİ ELEKTRİK ÜRETİM TESİSİ	İTHAL KÖMÜR	350,000	04/04/2014
GÜMÜŞKÖY JES	JEOTERMAL	6,600	04/04/2014
BALABANLI RES	RES	11,500	04/04/2014
KALEALTI II HES	HES	3,837	04/04/2014
KALE HES	HES	17,100	28/03/2014
GEYCEK RES	RES	14,000	28/03/2014
KOJENERASYON SANTRALİ	DG	2,000	26/03/2014
DÜZOVA RES	RES	10,000	21/03/2014
AKSU REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	5,770	21/03/2014
BOĞAZKÖY HES	HES	10,000	19/03/2014
KOJENERASYON SANTRALİ	ATIK ISI	9,560	14/03/2014
KİRAZLIK REGÜLATÖRÜ VE HES	HES	14,537	14/03/2014
DEĞİRMEN REGÜLATÖRÜ HE HİDROELEKTRİK SANTRALİ	HES	6,840	13/03/2014
SARES RES	RES	2,250	08/03/2014

ASLANCIK BARAJI VE HES	HES	46,500	07/03/2014
EKİNÖZÜ 1-2 HES	HES	5,660	06/03/2014
KOZBEYLİ RES	RES	4,200	28/02/2014
HASANBEYLİ RES	RES	7,500	28/02/2014
SAF I HES	HES	7,490	28/02/2014
ITC-KA BİYOKÜTLE GAZLAŞTIRMA TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	5,425	27/02/2014
BARAN REGÜLATÖRÜ VE HES (BARAN-I)	HES	12,410	27/02/2014
AÇMA REGÜLATÖRÜ VE HES	HES	2,400	27/02/2014
GÖNEN BİYOGAZ SANTRALİ	BİYOKÜTLE	2,134	26/02/2014
ZİYARET RES	RES	7,500	22/02/2014
BİFA BİSKÜVİ VE GIDA SAN. A.Ş. KOJENERASYON SANTRALİ	DG	2,145	21/02/2014
UMUT REGÜLATÖRÜ VE HES	HES	24,450	21/02/2014
KAVŞAK BENDİ HES	HES	61,950	20/02/2014
ARISU HES	HES	3,821	17/02/2014
ATİK RES	RES	12,000	15/02/2014
KOJENERASYON SANTRALİ	DG	2,145	14/02/2014
GEYCEK RES	RES	23,000	14/02/2014
KOJENERASYON SANTRALİ	DG	4,300	14/02/2014
KIY HİDROELEKTRİK SANTRALİ	HES	11,900	13/02/2014
BERKE REGÜLATÖRÜ VE HES	HES	6,254	08/02/2014
İNTEPE RES	RES	0,000	07/02/2014
ÖZLÜCE HES	HES	18,190	07/02/2014
SIRIMTAŞ HİDROELEKTRİK SANTRALİ	HES	13,617	31/01/2014
DİYOBAN HES	HES	10,520	31/01/2014
KORES KOCADAĞ RÜZGAR ENERJİ SANTRALİ	RES	2,500	31/01/2014
ÇORAKLI HİDROELEKTRİK SANTRALİ	HES	2,600	30/01/2014
YUNTDAĞ RES	RES	2,500	29/01/2014
YAHYABEY HES	HES	0,310	24/01/14
SİNCİK RES	RES	25,000	24/01/2014
HASANBEYLİ RES	RES	10,000	24/01/2014
KANDİL BARAJI VE HES	HES	4,720	24/01/2014
KAVŞAK BENDİ HES	HES	61,950	24/01/2014
KIY HİDROELEKTRİK SANTRALİ	HES	11,900	23/01/2014
GEYCEK RES	RES	16,000	17/01/2014
ALKUMRU BARAJI VE HES	HES	14,250	17/01/2014

SEKİYAKA II HES	HES	2,300	17/01/2014
KİRAZLIK REGÜLATÖRÜ VE HES	HES	14,537	15/01/2014
ZAFER TEKSTİL SAN. VE TİC. A.Ş. KOJENERASYON SANTRALİ	DG	1,450	10/01/2014
DERELİ REGÜLATÖRÜ VE HES	HES	49,200	10/01/2014
MAKYOL ETİLER TİCARET MERKEZİ KOJENERASYON SANTRALİ	DG	0,6000	10/01/2014
MERCEDES BENZ TÜRK KOJENERASYON TESİSİ	DG	2,020	10/01/2014
KOJENERASYON	DG/FO	9,800	09/01/2014
AĞAOĞLU DGKÇS	DG	12,900	08/01/2014
ORDU HES	HES	21,000	04/01/2014

ÖZLÜCE HES	HES	18,190	27/12/13
KOJENERASYON	DG	2,022	27/12/13
UZUNDERE II HES	HES	7,020	27/12/13
GEYCEK RES	RES	12,000	27/12/13
KOJENERASYON	ATIK ISI	12,930	26/12/13
YEŞİLYURT DGKÇS	DG	11,396	26/12/13
BURÇAK HES 2. KADEME	HES	26,260	26/12/13
SAYALAR RES	RES	20,000	25/12/13
MİDİLLİ HES	HES	11,577	24/12/13
YENİ ELEKTRİK ÜRETİM A.Ş. DGKÇS	DG	575,909	20/12/13
KALECİK I HES	HES	7,757	20/12/13
ÇAMBAŞI REGÜLATÖRÜ VE HES	HES	44,100	20/12/13
ÇİĞDEM REGÜLATÖRÜ VE HES	HES	17,700	20/12/13
KAVŞAK BENDİ HES	HES	61,950	19/12/13
SUKENARI REGÜLATÖRÜ VE HES	HES	8,566	19/12/13
BOZTEPE HES	HES	18,150	17/12/13
ADACAMI HİDROELEKTRİK SANTRALİ	HES	14,652	16/12/13
SARIGÜZEL BARAJI HES	HES	3,660	14/12/13
TATAR HİDROELEKTRİK SANTRALİ	HES	64,110	13/12/13
ORDU HES	HES	21,000	13/12/13
AKBAŞ HİDROELEKTRİK SANTRALİ	HES	12,502	12/12/13
ÇERMİKLER BARAJI VE HES	HES	22,000	12/12/13
KAYA BELEK TERMİK KOJENERASYON SANTRALİ	DG	1,286	08/12/13
SIRIMTAŞ HİDROELEKTRİK SANTRALİ	HES	13,617	07/12/13
ORTADOĞU RULMAN SANAYİ TERMİK KOJENERASYON SANTRALİ	DG	7,744	06/12/13

YENİ ELEKTRİK ÜRETİM A.Ş. DGKÇS	DG	289,091	06/12/13
GEYCEK RES	RES	33,000	05/12/13
KİRAZLIK REGÜLATÖRÜ VE HES	HES	14,537	05/12/13
DARAN HİDROELEKTRİK SANTRALİ	HES	23,870	05/12/13
DURU REGÜLATÖRÜ VE HES	HES	1,630	04/12/13
OYLAT HES	HES	1,900	03/12/13
DİNAR RES	RES	0,000	29/11/20 13
ISPARTA MENSUCAT SAN. VE TİC. A.Ş. KOJENERASYON SANTRALİ	DG	0,000	29/11/13
KARAKÖY HİDROELEKTRİK SANTRALİ	HES	3,000	28/11/13
ADASU HİDROELEKTRİK SANTRALİ	HES	9,600	28/11/13
AĞKOLU HES	HES	4,380	28/11/13
PAŞALIMANI RES	RES	0,800	25/11/20 13
EREM HİDROELEKTRİK SANTRALİ	HES	3,050	23/11/13
YAZYURDU REGÜLATÖRÜ VE HES	HES	14,900	22/11/13
AKKENT ÇALKUYUCAK HES	HES	13,813	22/11/13
AMBARLI TERMİK SANTRALİ	DG	516,000	21/11/13
SOĞUKPINAR HİDROELEKTRİK SANTRALİ	HES	8,900	15/11/13
H.G. ENERJİ GEDİZ SANTRALİ	DG	5,350	15/11/13
TATAR HİDROELEKTRİK SANTRALİ	HES	64,11	14/11/13
KÖPRÜBAŞI HİDROELEKTRİK SANTRALİ	HES	14,660	08/11/20 13
LUTUF MENSUCAT KOJENERASYON SANTRALİ	DG	2,000	08/11/13
KIZILDERE II JES	JEOTERMA L	20,000	31/10/20 13
SENKRON EFELER BİYOGAZ SANTRALİ	BİYOGAZ	2,400	31/10/20 13
PAMUKÖREN JES	JEOTERMA L	45,020	31/10/20 13
ORTAÇAĞ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	12,944	24/10/20 13
ÇERMİKLER BARAJI VE HES	HES	3,000	24/10/20 13
ODAŞ I DOĞALGAZ KOMBİNE ÇEVİRİM SANTRALİ	DG	12,000	23/10/20 13
BATIÇİM BATI ANADOLU ÇİMENTO SANAYİİ A.Ş. TERMİK KOJENERASYON SANTRALİ	ATIK ISI	9,000	12/10/20 13
NAKSAN ENERJİ SANTRALİ 2	DG	1,100	11/10/20

			13
GEYCEK RÜZGAR ENERJİ SANTRALİ	RES	12,000	11/10/2013
KANDİL BARAJI VE HES	HES	203,200	10/10/2013
PİRİNÇLİ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	9,340	10/10/2013
İPEKSAN ELEKTRİK ÜRETİM A.Ş. TERMİK KOJENERASYON SANTRALİ	DG	8,600	10/10/2013
AVANOS REGÜLATÖRÜ VE CEMEL HİDROELEKTRİK SANTRALİ	HES	7,200	04/10/2013
GOREN-2 TERMİK KOJENERASYON SANTRALİ	DG	48,650	04/10/2013
DERİNER HİDROELEKTRİK SANTRALİ	HES	167,500	02/10/2013
KALECİK HES	HES	3,075	30/09/2013
ÜÇHANLAR REGÜLATÖRÜ VE HES	HES	11,939	27/09/2013
MORDOĞAN RES	RES	30,750	27/09/2013
BİYOKÜTLE (ÇÖP GAZI) ENERJİ ÜRETİM SANTRALİ	BİYOGAZ	1,200	27/09/2013
SARAY RES	RES	4,000	27/09/2013
DARIVEREN HES	HES	3,065	20/09/2013
SARIGÜZEL HES	HES	98,880	20/09/2013
KUŞAKLI REGÜLATÖRÜ VE HES	HES	20,000	20/09/2013
KONYA ATIKSU ARITMA TESİSİ ELEKTRİK SANTRALİ	BİYOGAZ	2,436	19/09/2013
GÜMÜŞKÖY JES	JEOTERMAL	6,600	15/09/2013
ATİK RES	RES	4,000	13/09/2013
TONYA I-II HES	HES	1,250	13/09/2013
GEYCEK RES	RES	26,000	13/09/2013
SUSURLUK RÜZGAR ENERJİ SANTRALİ	RES	0,000	13/09/2013
SAF I HES	HES	8,600	06/09/2013

KARABURUN RES	RES	12,000	06/09/2013
YAYLA REGÜLATÖRÜ VE HES	HES	4,670	06/09/2013
YAPRAK HES	HES	8,970	05/09/2013
KIZILDERE II JEOTERMAL SANTRALİ	JEOTERMA L	60,000	30/08/2013
KESKİNKILIÇ GIDA TERMİK KOJENERASYON SANTRALİ	DG	10,000	30/08/2013
DEVECİKONAĞI BARAJI VE HES	HES	23,000	30/08/2013
DOKUBOY OTOPRODÜKTÖR SANTRALİ	DG	4,300	30/08/2013
GÖZELOLUK REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	13,580	29/08/2013
AKSARAY OSB BİYOGAZ SANTRALİ	BİYOKÜTL E	2,134	28/08/2013
ŞİMŞEK BİSKÜVİ TERMİK KOJENERASYON SANTRALİ	DG	1,560	23/08/2013
AKSA SANTRALİ	DG	0,000	23/08/2013
İSTANBUL - KEMERBURGAZ - ODAYERİ ÇÖP BİYOGAZ PROJESİ	BİYOGAZ (ÇÖP GAZI)	2,830	23/08/2013
İSTANBUL - ŞİLE - KÖMÜRCÜODA ÇÖP BİYOGAZ PROJESİ	BİYOGAZ (ÇÖP GAZI)	5,660	22/08/2013
SENA HES	HES	21,436	19/08/2013
DORA-3 JEOTERMAL ENERJİ SANTRALİ	JEOTERMA L	17,000	16/08/2013
KARABURUN RES	RES	27,000	16/08/2013
KALECİK HES	HES	3,075	06/08/2013
GEÇÜR HİDROELEKTRİK SANTRALİ	HES	3,098	05/08/2013
DERİNER BARAJI VE HES	HES	335,000	02/08/2013
YEŞİLYURT ENERJİ SAMSUN MERKEZ OSB DOĞALGAZ KOMBİNE ÇEVİRİM SANTRALİ	DG	128,247	02/08/2013
ARAKLI-4 REGÜLATÖRÜ VE HES	HES	8,911	02/08/2013
FRITO LAY GIDA SAN. VE TİC. A.Ş. TERMİK KOJENERASYON TESİSİ	BİYOGAZ/D G	0,660	02/08/2013

ADACAMI HİDROELEKTRİK SANTRALİ	HES	14,652	02/08/2013
KEMERÇAYIR REGÜLATÖRÜ VE HES	HES	15,498	01/08/2013
IRMAK HES	HES	5,740	01/08/2013
BOSSA TİCARET VE SANAYİ İŞLETMELERİ T.A.Ş. TERMİK KOJENERASYON SANTRALİ	DG	6,698	31/07/2013
MADRANBABA RES	RES	19,500	30/07/2013
DOĞALGAZ YAKITLI KOJENERASYON SANTRALİ	DG	1,200	29/07/2013
BATISÖKE ATIK ISI OTOPRODÜKTÖR SANTRALİ	ATIK ISI	5,335	27/07/2013
DEĞİRMEN HES	HES	13,000	26/07/2013
İSKUR TEKSTİL ENERJİ TİC. VE SAN. A.Ş. OTOPRODÜKTÖR SANTRALİ	DG	8,600	26/07/2013
KARABURUN RES	RES	21,000	26/07/2013
BELEN RES	RES	0,000	26/07/2013
GÜLSAN SENTETİK DOKUMA SAN. VE TİC. A.Ş. TERMİK KOJENERASYON TESİSİ	DG	36,642	20/07/2013
EDİNCİK RES	RES	30,000	19/07/2013
DİNAR RES	RES	1,700	19/07/2013
MEREKLER REGÜLATÖRÜ VE ALGÖLÜ HES	HES	11,157	18/07/2013
PİRİNÇLİ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	9,340	16/07/2013
SUSURLUK RES	RES	0,000	16/07/2013
ÖZDİLEK EV TEKSTİL SAN. VE TİC. A.Ş. OTOPRODÜKTÖR SANTRALİ	DG	4,300	12/07/2013
DERİNER BARAJI VE HES	HES	167,500	05/07/2013
KAYSERİ KATI ATIK DEPONİ SAHASI EN. ÜR. TESİSİ BİYOKÜTLE (ÇÖP GAZI) SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,357	05/07/2013
ANADOLU İPLİK VE TEKSTİL SAN. A.Ş. TERMİK KOJENERASYON SANTRALİ	DG	8,600	05/07/2013
MOR-2 HİDROELEKTRİK SANTRALİ	HES	6,630	03/07/2013

GÜNEŞLİ II HİDROELEKTRİK SANTRALİ	HES	12,380	03/07/2013
ŞENBÜK RES	RES	3,000	30/06/2013
AVANOS REG. VE CEMEL HES (CEMEL I)	HES	7,200	27/06/2013
ŞENBÜK RES	RES	24,000	27/06/2013
RWE&TURCAS GÜNEY DENİZLİ DGKÇS	DG	797,400	21/06/2013
AREL ENERJİ MANAVGAT BİYOKÜTLE TESİSİ	BİYOKÜTLE (ÇÖP GAZI)	2,400	21/06/2013
ZEYTİNELİ RES	RES	12,000	21/06/2013
OMW SAMSUN DGKÇS	DG	886,920	20/06/2013
HASIRCI TEKSTİL SAN. VE TİC. TERMİK KOJENERASYON SANTRALİ	DG	2,300	15/06/2013
GELİNKAYA HES	HES	6,866	14/06/2013
EĞLENCE-I HES	HES	42,650	13/06/2013
ESKİKÖY REGÜLATÖRÜ VE HES	HES	2,630	13/06/2013
ARSAN DOKUMA TERMİK KOJENERASYON SANTRALİ	DG	4,300	08/06/2013
AKKAYA REGÜLATÖRÜ VE HES	HES	4,400	02/06/2013
KAPIDAĞ RES	RES	8,000	01/06/2013
SAMURLU RES	RES	2,000	31/05/2013
YÜCE HİDROELEKTRİK SANTRALİ	HES	5,283	31/05/2013
BİYOKÜTLEDEN ENERJİ ÜRETİM SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	8,496	31/05/2013
KÜÇÜKBAY YAĞ VE DETERJAN SAN. A.Ş. TERMİK KOJENERASYON SANTRALİ	DG	1,605	30/05/2013
RENAISSANCE ISTANBUL BOSPHORUS HOTEL KOJENERASYON SANTRALİ	DG	0,501	30/05/2013
ZEYTİNELİ RES	RES	37,500	30/05/2013
KARABURUN RÜZGAR ENERJİ SANTRALİ	RES	22,000	29/05/2013

AGE DENİZLİ DOĞALGAZ KOMBİNE ÇEVİRİM SANTRALİ	DG	64,500	25/05/2013
ŞAH RES	RES	0,000	25/05/2013
GAZİANTEP ÖZEL SAĞLIK HASTANESİ A.Ş. KOJENERASYON SANTRALİ	DG	1,188	24/05/2013
HASANKALE REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	5,290	22/05/2013
DARAN-I HİDROELEKTRİK SANTRALİ	HES	23,870	21/05/2013
YEŞİLVADI HES	HES	9,980	18/05/2013
FLORANCE NIGHTINGALE HASTANESİ KOJENERASYON SANTRALİ	DG	2,000	17/05/2013
TOROS HES	HES	49,990	17/05/2013
DÜZOVA RÜZGAR ENERJİ SANTRALİ	RES	0,000	16/05/2013
BAĞIŞTAŞ-II HİDROELEKTRİK SANTRALİ	HES	16,200	16/05/2013
AKKÖY-ESPIYE HİDROELEKTRİK SANTRALİ	HES	4,456	10/05/2013
DAĞDELEN REGÜLATÖRÜ VE HES	HES	8,000	10/05/2013
KARABURUN RÜZGAR ENERJİ SANTRALİ	RES	12,000	03/05/2013
POYRAZ RES	RES	4,900	03/05/2013
DOĞALGAZ KOMBİNE ÇEVİRİM SANTRALİ	DG	13,000	27/04/2013
ÇIRAKDAMI REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	24,550	26/04/2013
KÖPRÜ BARAJI VE HES	HES	77,240	26/04/2013
KIRIKKALE ÇÖP GAZI (BİYOKÜTLE) SANTRALİ	BİYOKÜTLE (ÇÖP GAZI)	1,003	23/04/2013
NAKSAN ENERJİ SANTRALİ -2	DG	19,460	19/04/2013
TUZLAKÖY-SERGE REGÜLATÖRÜ VE HES - II	HES	9,520	19/04/2013
ÇİFTEKÖPRÜ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	7,770	18/04/2013
DURU 1 REGÜLATÖRÜ VE HES	HES	4,000	18/04/2013

OTOPRODÜKTÖR SANTRALİ	DG/MOTOR İN	24,580	12/04/20 13
ACARSOY DENİZLİ DOĞALGAZ KOMBİNE ÇEVİRİM SANTRALİ	DG	13,000	12/04/20 13
ARAKLI 1 HES	HES	1,844	11/04/20 13
KARABURUN RÜZGAR ENERJİ SANTRALİ	RES	12,000	10/04/20 13
EĞLENCE 2 HES	HES	26,000	10/04/20 13
KAYAKÖPRÜ HİDROELEKTRİK SANTRALİ	HES	14,200	05/04/20 13
KOJENERASYON SANTRALİ	DG	5,538	30/03/20 13
KAVAKÇALI HİDROELEKTRİK SANTRALİ	HES	11,143	29/03/20 13
ALABALIK REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	2,480	29/03/20 13
DİNAR RÜZGAR ENERJİ SANTRALİ	RES	16,100	22/03/20 13
YEŞİLIRMAK-I HİDROELEKTRİK SANTRALİ	HES	14,250	22/03/20 13
MAVİ REGÜLATÖRÜ VE HES	HES	11,390	21/03/20 13
BEYBO KOJENERASYON TESİSİ	DG	2,022	15/03/20 13
KARABURUN RÜZGAR ENERJİ SANTRALİ	RES	14,000	15/03/20 13
DİYOBAN HİDROELEKTRİK SANTRALİ	HES	8,520	15/03/20 13
KÖPRÜ BARAJI VE HİDROELEKTRİK SANTRALİ	HES	77,924	08/03/20 13
BURÇAK HİDROELEKTRİK SANTRALİ (BURÇAK I)	HES	33,400	07/03/20 13
KÖPRÜBAŞI HES	HES	74,000	05/03/20 13
KALECİK HES (KALECİK 3. KADEME 2. ÜNİTE)	HES	2,602	04/03/20 13
AKÇANSA TERMİK-KOJENERASYON SANTRALİ	ATIK ISI	15,200	01/03/20 13
BUCAKKÖY HİDROELEKTRİK SANTRALİ	HES	2,900	01/03/20 13
FRİTO LAY KOJENERASYON SANTRALİ	BİYOGAZ/D G	0,305	01/03/20 13
KALE HİDROELEKTRİK SANTRALİ	HES	29,250	01/03/20 13

KOÇAK REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	HES	24,108	01/03/2013
BALIKESİR RES	RES	13,250	27/02/2013
GEBZE KOJENERASYON TESİSİ	DG	7,960	27/02/2013
KOZBEYLİ RÜZGAR ENERJİ SANTRALİ	RES	8,000	22/02/2013
GÖZEDE II HES	HES	4,000	22/02/2013
FINDIK REGÜLATÖRÜ VE HES	HES	8,500	22/02/2013
BURÇAK HİDROELEKTRİK SANTRALİ (BURÇAK I)	HES	6,630	18/02/2013
KARMA-1 BES	BİYOKÜTLE	1,487	16/02/2013
OSMANCIK HES	HES	9,030	15/02/2013
MERSİN RÜZGAR ENERJİ SANTRALİ	RES	1,000	14/02/2013
ÇELTİKDERE HİDROELEKTRİK SANTRALİ	HES	2,150	14/02/2013
CEVİZLİDERE HİDROELEKTRİK SANTRALİ	HES	3,400	13/02/2013
REMSU HİDROELEKTRİK SANTRALİ	HES	1,958	13/02/2013
TERMİK-KOMBİNE ÇEVİRİM SANTRALİ (STG3)	DG	28,000	13/02/2013

Step 5.3 The Calculation of Build Margin Emission Factor

The TOOL Formula for BM Calculation

TOOL07 Methodological tool: (Tool to calculate the emission factor for an electricity system Version 06.0)³² gives the following formula for BM emission factor calculation.

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

Where:

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

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

³² <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf>

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

According to, “Tool to calculate the emission factor for an electricity system” (version 06.0.)³³, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance from the tool in step 4 for simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, where m is the power units included in the build margin.

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

$$EF_{EL,m,y} = \frac{EF_{CO_2,m,i,y} \times 3.6}{\eta_{m,y}}$$

Where:

$EF_{EL,m,y}$ = CO₂ emission factor of the power unit m in year y (tCO₂/MWh)
 $EF_{CO_2,m,i,y}$ = Average CO₂ emission factor of fuel type i used in power unit m in year y (tCO₂/GJ)
 $\eta_{m,y}$ = Average net energy conversion efficiency of power unit m in year y (ratio)
M = All power units serving the grid in year y except low-cost/must-run power units
Y = The relevant year as per the data vintage chosen in Step 3

Where several fuel types are used in the power unit, the lowest CO₂ emission factor for $EF_{CO_2,m,i,y}$ has been used.

(a) Identification of Average CO₂ Emission Factor of Fuel Type i in Power Unit m in Year y ($EF_{CO_2,m,i,y}$)

The fuel types used in **Set Sample** are

- Natural Gas
- Import Coal
- Lignite
-

Table 12: EF-CO2 Values of Fuels Used in Set Sample

Fuels Used in SET Sample	EF _{CO2} Values (t CO2/GJ)
Natural Gas	0.0543
Import Coal	0.0895
Lignite	0.0909

³³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf>

EF_{CO2} values are taken from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, Chapter 1 Introduction, Table 9³⁴. It is noted that EF_{CO2} values for hydro, geothermal, wind, biogas and renew. + wastes are given as zero so they are taken into calculation.

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

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

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

Table 13: Efficiency Ratios for Fuels and Used in Set Sample

Fuels Used in SET Sample	η Values (Ratio)
Natural Gas	0.60
Import Coal	0.39
Lignite	0.39

Efficiency values are taken from Tool to calculate the emission factors for an electricity system , Annex 1: Default efficiency factors for power plants³⁵.

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

Using the above formula we obtain EF_{EL} values for the different fuel types.

Table 14: EF_{EL} Values for Fuel Types in Set Sample

Fuels Used in SET Sample	EF _{EL} (t CO ₂ MWh)
Natural Gas	0.3258
Import Coal	0.8262
Lignite	0.8391

(d) Calculation of CO₂ Build Margin emission factor (t CO₂/MWh)

Table 25: Total Capacities and Emission Contributions by Fuel Type:

	Total NG Capacity	Emission Addition of NG (MW * tCO ₂ /MWh)	Total Import Coal Capacity	Emission Addition of Coal (MW * tCO ₂ /MWh)	Total Lignite Capacity	Emission Addition of Lignite (MW * tCO ₂ /MWh)	Total Emission Coefficient (MW * tCO ₂ /MWh)

³⁴ http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

³⁵ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf>

	Addition (MWe)		y Addition (MWe)		Addition (MWe)	tCO ₂ /MWh)	tCO ₂ /MWh)
2015	203,24	66,21	292,600	241,73	435,00	365,00	672,95
2014	1674,17	545,44	2150	1776,23	58,14	48,78	2370,46
2013	3565,57	1161,66	0	0,00	0,00	0,00	1161,66
Total	5442,98	1773,32	2442,6	2017,96	493,14	413,78	4205,07

Table 15: Net - Gross Electricity Production Ratios

	2015
Gross Electricity Production (GWh)	261.783,3
Net Electricity Production (GWh)	249.899,5
Net/Gross	0,955

By using the below formula

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

We don't have the exact annual electricity production values for each power plant. Thus we assume production of each power plant is proportional to its capacity. Each production value will be then capacity multiplied by 365 days * 24 hours. Since 365 days * 24 hours will be at both the Numerator and Denominator of the formula, we just don't add up to the formula.

We also do correction to reflect Gross/Net Electricity Generation difference so we multiply the total capacity by 0.955. Calculation becomes

$$EF_{BM,2015} = \frac{5442.98MW \times 0.3258^{tCO_2/MWh} + 2442.6MW \times 0.8262^{tCO_2/MWh} + 493.4MW \times 0.8391^{tCO_2/MWh}}{14629,29 MW * 0.955}$$

$$EF_{BM,2015} = 0,3019 \text{ t CO}_2/\text{MWh}$$

The build margin emission factor $EF_{grid,BM,y}$ calculated through equation is **0.3019 tCO₂/MWh**.

Calculating the combined margin emission factor

The combined margin emission factor $EF_{grid,CM,y}$ calculated through equation is

$$EF_{grid,CM,y} = 0.75 * 0.629 + 0.25 * 0.3019 = 0.5471 \text{ tCO}_2/\text{MWh}.$$

Emission reduction (ER_y) by the proposed project activity

Table 27. Estimated Emissions and Removals

Years	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
05.12.2016-31.12.2016	6,430	0	0	6,430
2017	90,271	0	0	90,271
2018	90,271	0	0	90,271
2019	90,271	0	0	90,271
2020	90,271	0	0	90,271
2021	90,271	0	0	90,271
2022	90,271	0	0	90,271
2023	90,271	0	0	90,271
2024	90,271	0	0	90,271
2025	90,271	0	0	90,271
01.01.2026-04.12.2026	83,841	0	0	83,841
Total	902,710	0	0	902,710

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	EGgross,
Data unit	MWh
Description	Gross electricity production by fossil fuel power sources (2013-2015)
Source of data	TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr . The distribution of gross electricity generation by primary energy resources and the electricity utilities in Turkey (2013, 2014, 2015).
Value applied:	Please see calculations of emission factor (Section 3.1)
Justification of choice of data or description of measurement methods and procedures	TEIAS, the Turkish Electricity Transmission Company is the official source for the related data, thus providing the most up-to-date and accurate information available.

applied	
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	FC _{i, y}
Data unit	ton (m ³ for Natural Gas)
Description	Amount of fossil fuel type <i>i</i> consumed in the project electricity system by generation sources in year <i>y</i> (2013-2015)
Source of data	TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr . Fuels consumed in thermal power plants in Turkey by the electricity utilities (2013-2015)
Value applied:	Please see calculations of emission factor (Section 3.1)
Justification of choice of data or description of measurement methods and procedures applied	TEIAS, Turkish Electricity Transmission Company is the official source for the related data, hence providing the most up-to-date and accurate information available
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	NCV _{i, y}
Data unit	TJ/kt (10 ⁶ m ³ for gaseous fuels)
Description	Net calorific value (energy content) of fossil fuel type <i>i</i> in year <i>y</i>
Source of data	Calculated based on TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr . Heating values of fuels consumed in thermal plants in Turkey by the electricity utilities (2013-2015)
Value applied:	Please see calculations of emission factor (Section 3.1)
Justification of choice of data or description of measurement methods and procedures applied	TEIAS (Turkish Electricity Transmission Company) is the official source for this data, providing the most up-to-date and accurate information available.
Purpose of Data	Calculation of baseline emissions

Comments	-
Data / Parameter	EF _{CO₂,i, y}
Data unit	tCO ₂ /TJ
Description	CO ₂ emission factor of fossil fuel type <i>i</i> used in power unit <i>m</i> in year <i>y</i>
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm
Value applied:	Please see calculations of emission factor (Section 3.1)
Justification of choice of data or description of measurement methods and procedures applied	There is no information on the fuel specific default emission factor in Turkey, hence, IPCC values has been used as referred in the “Tool to calculate the emission factor for an electricity system”.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data Unit / Parameter:	EG _{m,y}
Data unit:	MWh
Description:	Net electricity generated by power plant/unit <i>m</i>
Source of data:	TEIAS (Turkish Electricity Transmission Company) www.teias.gov.tr . Generation units put into operation in 2013, 2014, 2015
Value applied:	Please see section 3.1 Summary of GHG Emission Reductions and Removals
Justification of choice of data or description of measurement methods and procedures applied:	Once for each crediting period using the most recent three historical years for which the data is available at the time of submission of the PDD to the DOE for validation.
Purpose of Data	Calculation of baseline emissions

Comments	
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Data Unit / Parameter:	$\eta_{m,y}$
Data unit:	%
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data:	"Appendix 1, Default efficiency factors for power plants" of "Tool to calculate the emission factor for an electricity system" version 05.0.0.
Value applied:	See calculations of emission factor (Section 3.1)
Justification of choice of data or description of measurement methods and procedures applied:	The average values of thermal plants in Turkey are taken from Tool to calculate the emission factor for an electricity system" version 06.0.
Purpose of data	Calculation of baseline emissions
Comments	-

Parameters available during validation are not to be monitored during the 1st crediting period because of the chosen data are ex-ante.

4.2 Data and Parameters Monitored

Data / Parameter	EGfacility,y
Data unit	MWh/y
Description	Quantity of net electricity supplied to the grid in year y
Source of data	Monthly meter readings records (Remote automatic meter reading system-OSOS)
Description of measurement methods and procedures to be applied	The net electricity generation supplied to the grid will be measured continuously by TEAIS meters (both main and spare) and recorded monthly. (Remote automatic meter reading system-OSOS)
Frequency of monitoring/recording	The produced and consumed electricity is continuously measured by the meters attached to the power plant. This continuous measurement is recorded on a monthly basis.

	As a result, net electricity supplied to the grid is calculated.																				
Value applied:	165,000																				
Monitoring equipment	Continuous measurement and at least monthly recording. (Remote automatic meter reading system-OSOS) Information of the meters are listed as followed: <table><tr><td></td><td>Electricity Meter (Primary)</td><td>Electricity Meter (Secondary)</td></tr><tr><td>Manufacturer</td><td>ITRON</td><td>ITRON</td></tr><tr><td>Model</td><td>SL7000</td><td>SL7000</td></tr><tr><td>Serial number</td><td>73055353</td><td>73055354</td></tr><tr><td>Date of installation</td><td>27.10.2016</td><td>27.10.2016</td></tr><tr><td>Date of initial calibration</td><td>29/06/2016</td><td>29/06/2016</td></tr></table> The accuracy of meters is given as 0.2 class.				Electricity Meter (Primary)	Electricity Meter (Secondary)	Manufacturer	ITRON	ITRON	Model	SL7000	SL7000	Serial number	73055353	73055354	Date of installation	27.10.2016	27.10.2016	Date of initial calibration	29/06/2016	29/06/2016
	Electricity Meter (Primary)	Electricity Meter (Secondary)																			
Manufacturer	ITRON	ITRON																			
Model	SL7000	SL7000																			
Serial number	73055353	73055354																			
Date of installation	27.10.2016	27.10.2016																			
Date of initial calibration	29/06/2016	29/06/2016																			
QA/QC procedures to be applied	- Measurements are undertaken using energy meters. - Concerning metering system accuracy, project participants have to comply with relevant national legislation According to b) paragraph of the 9th Article of the Regulation of Metering and Testing of Metering Systems “periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.”³⁶ - The net electricity export/supplied to a grid is the difference between the measured quantities of the grid electricity export and the import. Data measured by meters will be crosschecked with the PMUM records.																				
Purpose of data	Calculation of baseline emissions																				
Comments	-																				

³⁶ <http://www.sanayi.gov.tr/ServiceDetails.aspx?dataID=187&catID=305&lng=tr>

4.3 Monitoring Plan

The Project Owner will be responsible to implement the monitoring report according to the UNFCCC rules and procedures. The manager of the plant will provide the necessary documents during verification.

According to the Turkish Law and Regulations, the methods of monitoring the net electricity fed to the grid and quality control and assures are explained below:

- Monitoring data is collected in accordance with the agreement done between the project owner and Turkish Electricity Transmission Company (TEIAS) which provides the infrastructure for the connection to the national grid. The metering system is defined in the agreement as two groups: main meter and spare meter. The design of the metering system is checked and approved by TEIAS before commissioning of the plant. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA) requires all meters to be in line with either Turkish Standards Institution or International Electrotechnical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of the both parties. This prevents any intervention and assures the accuracy and quality of the measurements. Concerning metering system accuracy, project participants have to comply with relevant national legislation According to b) paragraph of the 9th Article of the Regulation of Metering and Testing of Metering Systems “periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done every 10 years.”³⁷

Data will be stored electronically, during the crediting period and at least two years after the last issuance of credits for the wind farm project activity in the concerning crediting period. The Project Participant will be responsible for storage of data received from the measuring devices.

The main and spare meter readings are recorded monthly-remote automatic meter reading system and cross-checked whether calibration is required. The capacity of the transmission line connected is medium voltage busbar of 154 kVA, the accuracy class for power meters have been defined in the Communiqué for Power Meters as 0.2S class. The calibration will be implemented in accordance with the

³⁷ <http://www.sanayi.gov.tr/ServiceDetails.aspx?dataID=187&catID=305&lng=tr>

related standard procedures. The periodical maintenance is under the responsibility of TEIAS and has been fixed as once in 10 years as mentioned above.

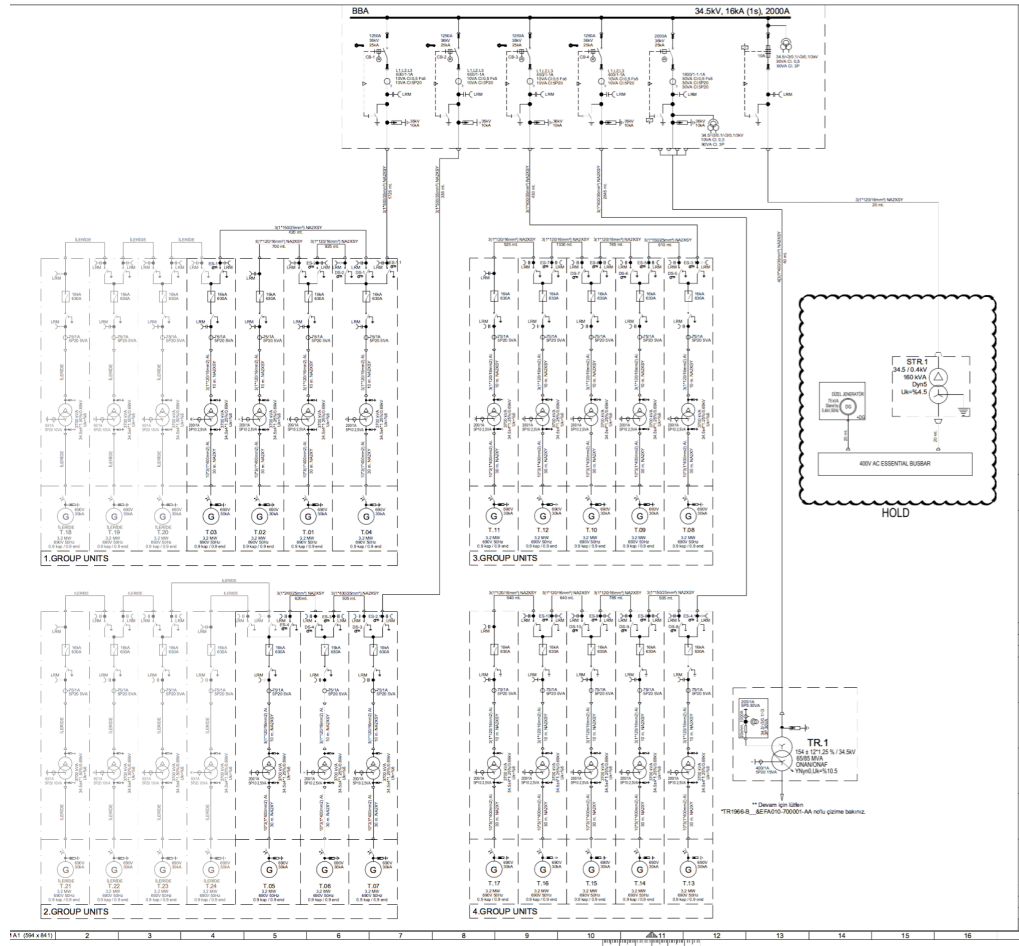


Figure 8. Single Line Diagram

The Project aims to create local employment opportunities in the project region in a sustainable way. The Project proponent prefers to prioritize personnel from the project region. The proposed project provides employment both during the construction and operational phases. Project owner provides 13 or 15 permanent employee's during the operation of the plant. Roles and responsibilities have been summarized in the following chart.

Figure 9: Organization Diagram

*Another one local people work as cook.

5 SAFEGUARDS

5.1 No Net Harm

Kinik 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

As parallel with the requirements of “Regulation on Environmental Impact Assessment”, the proposed project has been exempted from performing an Environmental Impact Assessment. According to the Environmental Impact Assessment (EIA) Regulation (Official Gazette; Date: July 17, 2008, No: 26939), Kinik Wind Power Plant (WPP) Project with an installed capacity of $20 \times 2.5 \text{ MW} = 50 \text{ MW}$ is considered within Annex-II of the Regulation. In line with the provisions of the EIA Regulation, a “Project Description File (PDF)” was prepared for Kinik WPP Project in December of 2011 outlining project characteristics, location, potential impacts and mitigation measures, as well as alternatives to the project and its location. The PDF was submitted to the Izmir Provincial Directorate of Environment and Urbanization. An “Environmental Impact Assessment Not Required Decision” was granted by the Provincial Directorate of Environment and Urbanization on 15/02/2012, stating that the mitigation measures which were put forward within the scope of the PDF to prevent and/or minimize environmental impacts of the project were evaluated to be substantial. Additionally, the Production License for the Kinik WPP Project valid for the next 49 years was also obtained from the Turkish Energy Market Regulatory Authority (EMRA) on 8/03/2012, with the Decision numbered 3721-8. Also a detailed monitoring of impact of the Kurtkayasi WPP on the bird migration routes and breeding grounds for first year of operation as determined under the assessment of Ministry of Forestry “Environment Protection and National Parks Directorate”. Briefly, it has been monitored by third party. According this ornithology report there is no negative effect on bird.

In the Project Site and immediate surrounding area;

- There is not any National Parks, Natural Parks, Natural Reserve Areas or Natural Monuments defined in Article 2 of National Parks Law No 2873 and specified in accordance with Article 3 of same law,

- There is not any Wild Animals Accommodation Area or Wildlife Development Area determined by the Ministry of Environment and Forestry in accordance with the Land Hunting Law No 4915,
- There are not any areas of Cultural Property, Natural Property, Site and Protection Areas and Registered areas as per Article 2 of Law on Conservation of Culture and Natural Property numbered 2863,
- There is not any aquaculture production and reproduction field that is within the scope of Aquaculture Law No 1380,
- There is not any area determined and declared as SPEA (Specially Protected Environment Area) by the Council of Ministers in accordance with the article 9 of Environmental Law No 2872.
- There is not any area specified in the Mining Law No 3213 (5177).
- There is not any Biogenetic Reserve Area or Geothermal Field.
- There is not any area that is a living environment for the species that are of importance for the scientific researches and/or are or likely to be in danger of extinction and the species that are endemic for our country, biosphere reserve, biotope, biogenetic reserve area, areas with the unique Geological and Geomorphologic Formations.

5.3 Local Stakeholder Consultation

The stakeholders from all categories invited to the meeting. Generally the preferred means for invitation was through e-mails. Most of the stakeholders were invited through emails, letters and phone calls followed by the emails and letters where possible.

Also, Mayor of Kinik Town was invited face-to-face and phone call to the meeting. Apart from this kind of invitation other stakeholders were invited by local announcements such as announcement done on town coffeehouse. After sending letters to stakeholder, telephone calls were done to confirm receipt of invitation letters. The meeting was also announced on a local newspaper which name is Yeni Asir on 01/06/2014.

Local Stakeholder Consultation meeting was held on 21/06/2014 in Kinik District of İzmir province and project owner and consultant had given to the villager so many information about project details, renewable energy, energy situation of

Turkey. 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. 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 Kinik town besides project developers, there were four representatives from local governmental institutions and many participants from the Kinik town. During the meeting, representative of local governmental institutions and villagers expressed their support for renewable energy project of Kinik WPP.

5.4 Public Comments

Local stakeholders were encouraged to give feedback about the project. During the meeting some questions were raised by participants, which were answered by project participant and consultant. **There were no concerns on the impact of this project activity to sustainable development and environmental.** Briefly, the meeting was closed by a general support from participants.

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 Kinik 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 negative impact of the project on environment and surroundings.
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.
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APPENDIX 1: THE GENERATION LICENSE



APPENDIX 2: EIA IS NOT REQUIRED DOCUMENT

T.C.
İZMİR VALİLİĞİ
ÇEVRE VE ŞEHİRCİLİK İL MÜDÜRLÜĞÜ

Karar Tarihi : 15.02/2012
Karar No : 1094

ÇEVRESEL ETKİ DEĞERLENDİRME BELGESİ

17 Temmuz 2008 tarih ve 26939 sayılı Resmi Gazete’de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliği’nin Ek-II Listesinde yer alan “ **Kınık Rüzgar Enerji Santrali (20*2,5MW=50MW)** ” 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.

Halkın TUNCSE
Vali a.
Vali Yardımcısı

Proje Sahibi : Esinti Enerji Üretim Tic. ve San. A.Ş.

Projenin Yeri : İzmir ili, Kınık ilçesi, Kızıldede tepesi, Boztepe, Akçaoğlan tepe, Kekikli tepe, Beşiktaş tepesi, Küçükçizil tepe, Moruklubüyük tepe, Nevruz tepesi ve Çamlıbel tepesi mevkiileri, tapunun Balıkesir J18-c3, J18-c4, İzmir K18-b1 nolu paftaları