**PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Korkmaz Wind Farm Project, Turkey
Version number of the PDD	1.0
Completion date of the PDD	11/09/2015
Project participant(s)	Ayen Enerji A.S. (private entity)
Host Party(ies)	Turkey
Sectoral scope and selected methodology(ies)	**Scope number :** 1 **Sectoral scope :** Energy industries (renewable - / non-renewable sources) **Methodology:** "ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0"
Estimated amount of annual average GHG emission reductions	**39,422** tCO_2-eq

SECTION A. Description of project activity
A.1. Purpose and general description of project activity

Basic Description:

Korkmaz Wind Farm Project, Turkey (Hereafter referred to as "The Project") is a large scale wind farm project located in Seferihisar District, Izmir Province of Turkey. The Project is owned by Ayen Enerji A.S. (Hereafter referred to as "The Project Proponent"), a private entity.

Technical Description:

The installed capacity of the project is 25.2 MWm/24 MWe, and the project involves installation and operation of 12 wind turbines, each having a rated power output of 2.1 MWm/2 MWe. The turbines will be of Suzlon brand, S88 2100kW 50Hz 80m STV GL0304IIa model. The diameter of the area swept by the blades will be 88 meters and the hub height will be 80 meters.[1,2,3] The output voltage of each turbine will be 690 VAC, and this will be stepped up to medium voltage at 33 kV. Then the wind farm will be connected via a feeder to TEIAS 154 kV Urla Havza Substation MV (Medium Voltage) busbar at this 33 kV level. From this point the voltage will be stepped up to 154 kV, and the energy will be fed to the national grid.2[Hata! Yer işareti tanımlanmamış.,4,5,6,7]

The estimated annual net electricity generation of the project will be about 68,920 MWh. The predicted average annual generation amount is specified as 83,005,300 kWh/year in the generation licence of the project activity[7]. This figure is based on technical feasibility studies and approved by Energy Market Regulatory Authority, the official government institution granting the licence. However, this project generation capacity represents the average energy available under ideal conditions, and does not reflect the actual available energy generation capacity. To be in line with the conservativeness principle of the CDM and Gold Standard rules, it was decided to use the firm generation capacity, instead of the project generation capacity indicated in the generation licence under the name of predicted average annual generation amount. To find the firm generation capacity of the project activity, project and firm capacity values of the similar projects in TEIAS Report on 5-Year Generation Capacity Projection of Electrical

[1] Suzlon Main Specification, S88_2100kW_50Hz_80m_STV_GL0304IIa. Main Specification S88, 50 Hz Standard Temperature Version 80 m, Tubular Tower. Turbine Specifications Brochure. Provided by Turbine Supplier (Suzlon). Provided to DOE.

[2] Korkmaz Wind Farm First Provisional Acceptance Protocol. (For 5 turbines numbered T8, T9, T10, T11, T12). Approved by Ministry of Energy and Natural Resources. Dated 15/08/2014. Provided to DOE.

[3] Korkmaz Wind Farm Second Provisional Acceptance Protocol. (For 7 turbines numbered T1, T2, T3, T4, T5, T6, T7). Approved by Ministry of Energy and Natural Resources. Dated 04/09/2014. Provided to DOE.

[4] Korkmaz Wind Power Plant Official Simplified Single One Line Diagram, granted by TEIAS 3. Group Directorate of Transmission Installation and Operation, dated 24/07/2014.

[5] Connection Agreement made between TEIAS (Turkish Electricity Transmisson Company) and the Project Proponent, dated 25 November 2010. Korkmaz Wind Farm First Provisional Acceptance Protocol Annexes, dated 15 August 2014. Annex 4, pp. 17-77. Provided to DOE.

[6] System Usage Agreement made between TEIAS (Turkish Electricity Transmisson Company) and the Project Proponent, dated 2 July 2014. Korkmaz Wind Farm First Provisional Acceptance Protocol Annexes, dated 15 August 2014. Annex 5, pp. 78-93. Provided to DOE.

[7] Korkmaz Wind Farm Generation Licence. Issued by Energy Market Regulatory Authority. Numbered EU/1622-14/1187, Dated 29/05/2008. Latest Amendment, dated 15/01/2013. Provided to DOE.

Energy of Turkey for 2014-2018[8] were used. By "Similar Projects", CDM-VER Wind Projects in Turkey at the end of 2013 were meant. Since firm and project generations of individual power plants could not be found in this reference, the nearest group to the CDM-VER Wind Power Plants, Wind Power Plants with a generating licence (Wind Power Plants belonging to Independent Power Producers) are used as the reference group. Since nearly all the wind power plants belonging to independent power producers are under an emission reduction certificate, this is a reasonable choice. Hence, The Average Expected Annual Electricity Generation Amount that will be used to calculate estimated amount of annual average GHG emission reductions is found by multiplying the project generation of the project activity indicated in the licence by the ratio found by dividing the total firm generations of wind power plants with a generating licence in Turkey by their total project generations for 2013, receiving the data from TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018. The firm energy generation capacity values of the power plants indicated in this report are based on the actual generation amounts of the power plants in year 2013. This method of finding the annual estimated firm energy generation capacity of the project can be assumed as reliable and conservative, since it uses the official value from a government source, and takes all the wind farms similar to the project activity into account for a one-year period, a duration that is generally accepted long enough (minimum) for wind power feasibility studies. The resultant Average Expected Annual Electricity Generation Amount for the project is found to be 68,919,867 kWh/year. The details of this calculation can be found in the Emission Reduction Calculation Spreadsheet, which is an annex to this document. This calculation is also mentioned in sub-section B.5.2. of this document.

This electrical energy will replace electrical energy of the national grid, based mainly on various fossil fuel sources like natural gas and coal. The Combined Margin Emission Factor is found to be $EF_{grid,CM,y}$ = 0.572 tCO_2/MWh in sub-section B.6.3 of this document. Hence, the expected annual emission reduction to be caused by the project will be around 39,422 tonnes of CO_2e. For a 7-year crediting period the expected emission reductions will be about 274,694 tonnes of CO_2e. Since the project activity has been commissioned in two phases, it did not generate electricity in full capacity in the first year. For this reason, the total expected emission reduction for the first 7-year crediting period is not 39,422 * 7 = 275,954 tonnes of CO_2e, as expected if the project had been commissioned at once in a single phase. The details of this calculation can be found in the Emission Reduction Calculation Spreadsheet, which is an annex to this document.

The operation of the project and electricity generation started in 2013 and the expected operational life of the project is 20 years[9]. Design lifetime is indicated as 20 years in turbine specifications given by the turbine provider. Also, in various studies performed by various turbine providers and other researchers, the life cycle assessment of the turbines resulted in a lifetime of 20 years.[10,11,12,13] This is also in line with

[8] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018. Annex 1. Current System (As at the end of 2013). Page 69. Accessed on 31/07/2015.
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.pdf
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.docx

[9] Suzlon Main Specification, S88_2100kW_50Hz_80m_STV_GL0304IIa. Main Specification S88, 50 Hz Standard Temperature Version 80 m, Tubular Tower. Turbine Specifications Brochure. Provided by Turbine Supplier (Suzlon). Table 22. Climate and Site Conditions regarding structural design. Design life time. Page 12.

[10] Life Cycle Assessment of offshore and onshore sited wind farms, Elsam Engineering A/S, 20 October 2004. pp 7, 11, 15, 17, 23, 35, 43, 50, 57, 61, 62, 66.
http://www.vestas.com/~/media/vestas/about/sustainability/pdfs/lca_v80_2004_uk.ashx

[11] Life Cycle Assessment of Electricity Production from an Onshore V100-2.6 MW Wind Plant, p. 12, 15, 25, 30, 33, 66, 67, 90, 91.
http://www.vestas.com/~/media/vestas/about/sustainability/pdfs/lca_v1002_6mw_version_1_1.ashx

the assessment periods given in the CDM Guidelines on the Assessment of Investment Analysis (Version 05)[14] and the Clarification on the Applicability of the "Guidelines on the assessment of investment analysis."[15]

Description of sources and gases included in the project boundary:

Baseline Emission Sources included in the project boundary are the generation mix of the national grid whose CO_2 emissions are displaced due to the project activity. Project Activity Emission Sources included in the project boundary are those sources emitting gases and particulate matters during construction and operation of the project activity. However, these are minor sources with emissions of very small amounts; so their emissions are neglected and they are excluded. Only CO_2 is included as the gas whose emissions and/or emission reductions will be taken into account due to the project activity.

1) The purpose of the project activity:

The purpose of the project activity is to generate renewable electrical energy utilising wind as the primary energy source and deliver this energy to the national grid of Turkey. This energy will help supply Turkey's ever-increasing electricity demand through a clean, sustainable, and reliable technology. The project will displace the same amount of electricity that would otherwise be generated by the fossil fired power plants dominating the national grid.

Being the first operational wind farm in Kayseri Province, the project will help renewable energy become more widespread in Turkey.

1.a. The scenario existing prior to the start of the implementation of the project activity:

The scenario existing prior to the start of the implementation of the project activity was no electricity generation since the project is a greenfield project. Without the implementation of the project, the same amount of energy would be generated by other power plants of the national grid. Considering the general fossil fuel domination in the national grid, a natural gas or coal fired thermal power plant on average would generate this energy. This imaginary power plant would also emit greenhouse gases including CO_2 and particulate matters. Since the project will emit no greenhouse gases within its boundary and no leakage is in question, an emission caused by the net electricity generation displaced by the project activity was produced prior to the implementation of the project.

1.b. The project scenario:

The project scenario involves implementation of a wind farm utilising wind as the primary energy source to generate electrical energy and delivery of the generated electricity to the national grid. 12 wind turbines, a medium voltage overhead transmission line, a switchyard, an administrative and control building and other necessary minor structures will be installed within the proposed project activity.

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[12] V90-1.8/2.0 MW Maximum output at medium-wind and low-wind sites, page 12. http://www.vestas.com/Files/Filer/EN/Brochures/090821_Product-brochure-V90-1.8-2.0MW-06-09-EN.pdf

[13] V100-1.8 MW High energy production for low wind sites, p. 13. http://www.vestas.cz/files/V100-18.pdf

[14] Guidelines on the assessment of investment analysis (Version 05). Paragraph 3. Guidance, page 1. http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

[15] Clarification - Applicability of the "Guidelines on the assessment of investment analysis" Version 01.0, Article 2.1 Determination of the period of assessment, page 2. https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20130604103656275/meth_guid53.pdf

Necessary measures have been and will be taken during both in the constructional and operational phases of the project in order not to cause any harmful impact on environmental, economical and social structure of the region. All the related legislation and regulations are observed. In addition, the project proponent will make contributions to the sustainable development of the region.

1.c. The baseline scenario:

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

2) Greenhouse gas emission reduction mechanism of the proposed project activity:

The project activity will reduce greenhouse gas emissions as reference to the baseline scenario taking into account that it is a zero emission project. No greenhouse gas or particulate matter emission will take place within project boundary and no leakage emissions will occur. Hence, a net emission reduction from the baseline emission level to zero level will result with the energy generated by the project that will displace the energy that would otherwise be generated by the fossil fuel fired power plants in the national grid. Although many harmful gases including the greenhouse gases and particulate matters will be avoided by the emission reduction process, only CO_2 will be considered in the emission reduction.

3) The view of the project participants (The Project Proponent) on the contribution of the project activity to sustainable development:

The project activity will result in many positive impacts on the sustainable development of the region.

Environment:

The electricity produced by the project activity will replace the electricity that would otherwise have been produced by the generation mix of the grid that is mainly composed of fossil fuel fired power plants like natural gas and coal. With the replacement of this energy and resultant avoidance of fossil fuel consumption, not only CO_2 emission will be prevented, but the emission of other greenhouse and various harmful gases and particulate matters will also not occur. As a result, the negative impacts of these pollutants will be reduced.

During constructional phase of the project activity, roads to the project site area and the power plant itself on the project site area will be built. Mainly some few amount of dust emission will take place during the construction. Other emissions are negligible. Maximum effort will be shown to keep this dust emission as low as possible and all the related national regulations will be observed.

Project site area is forest land publicly owned by the state and managed by local forest authorities, and it is not suitable for agriculture. There is no private property right established on the land and necessary permissions shall be obtained according to development process of the project [16]. Landscape arrangements will be made to keep the impact on project site area as low as possible as compared to its original form.

Social development

[16] Korkmaz Wind Farm Environmental Impact Assessment Report. February 2011. Last Revision, 11/03/2011 (Turkish Version). PART II: Location of the Place Selected for the Project. II.1. Distance of the Project Units to the Residential Areas Shown on the Land Utilization Map. Page 16. Sub-Section IV.2.5. Forest Areas (Tree Types and Amounts, Size and Closure of Covered Areas and Their Current and Planned Protection and/or Utilization Purposes, Measures Taken Against Forest Fires), pp. 41-42.

The jobs that will be created by the project activity will be high quality jobs requiring professional skills and training. Furthermore, the personnel to be employed in the project will be trained on subjects like occupational health and safety, first aid and fire protection. As a result, employment quality will be increased in the region as compared to the baseline in which more ordinary jobs not requiring professional skills and training would be produced, if any.

The Project Proponent intends to make a positive contribution to the livelihood of the poor in the region. In this respect, local people and local authorities and representatives were consulted and their related needs and requests were questioned. Some suggestions have been made by some locals, but no final agreement has been reached until the writing of this report. The final decision regarding the contribution of the project proponent to the area in terms of livelihood of the poor and/or other sustainable development indicators will be made after the Stakeholder Feedback Round.

Economical and technological development:

Economically, the main positive effect will be on quantitative employment and income generation. Local people will be given priority when employing new personnel for the wind farm depending on their qualifications and professional skills. This will cause an increase in employment quantity and income in the region as compared to the baseline scenario. Without the project, no jobs at all or jobs with lower quality with lower incomes would be generated in the baseline scenario.

A.2. Location of project activity
A.2.1. Host Party(ies)

The host party is Turkey.

A.2.2. Region/State/Province etc.

Aegean Region / Izmir Province / Seferihisar District

A.2.3. City/Town/Community etc.

Korkmaz Wind Farm is located in Sigacık Town of Seferihisar District of Izmir Province. It will mainly be established in Sigacık – Korkmazdagi – Kilicpinari - Ciftlik Mountain region.

The project site is 30 km away from Izmir City Centre, 10 km away from Urla District Centre, and 10 km away from Seferihisar. District Centre. Access to the project site is possible in every season[17,18].

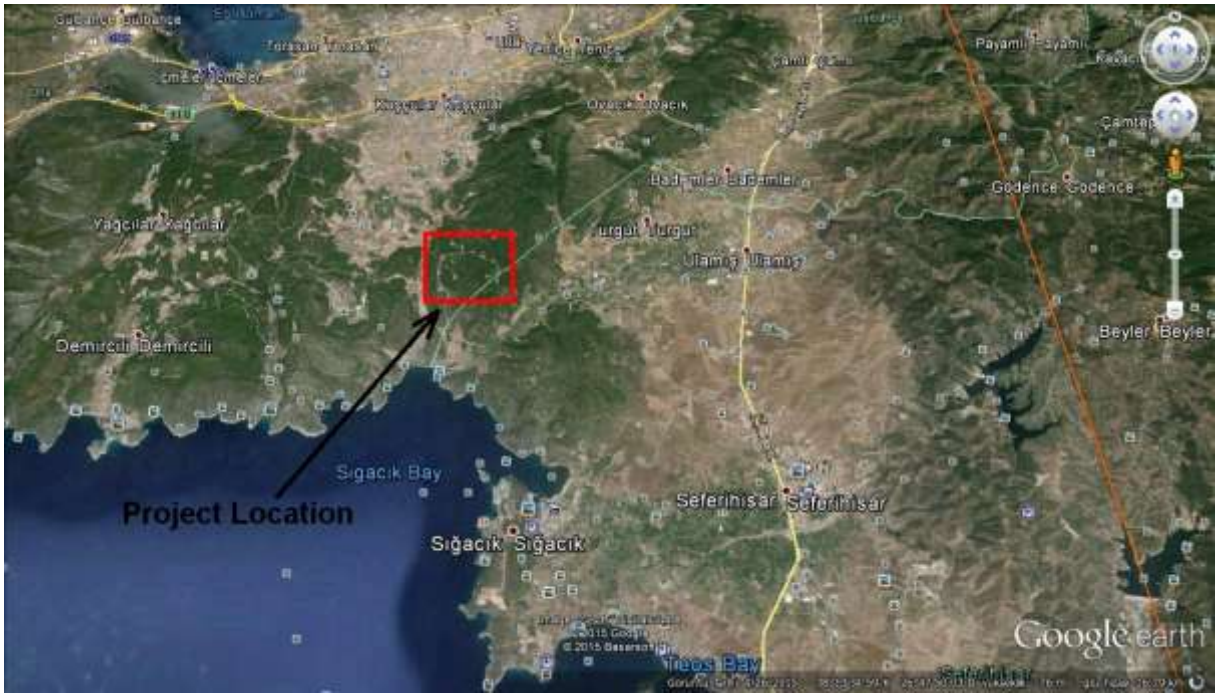
A.2.4. Physical/Geographical location

Location of the project is given in the maps of the following figure including the maps of the project region and the turbine layout and the table giving the final coordinates of the individual turbines.

[17] Korkmaz Wind Farm Environmental Impact Assessment Report. February 2011. Last Revision, 11/03/2011 (Turkish Version). PART II: Location of the Place Selected for the Project. II.1. Distance of the Project Units to the Residential Areas Shown on the Land Utilization Map. Page 15.

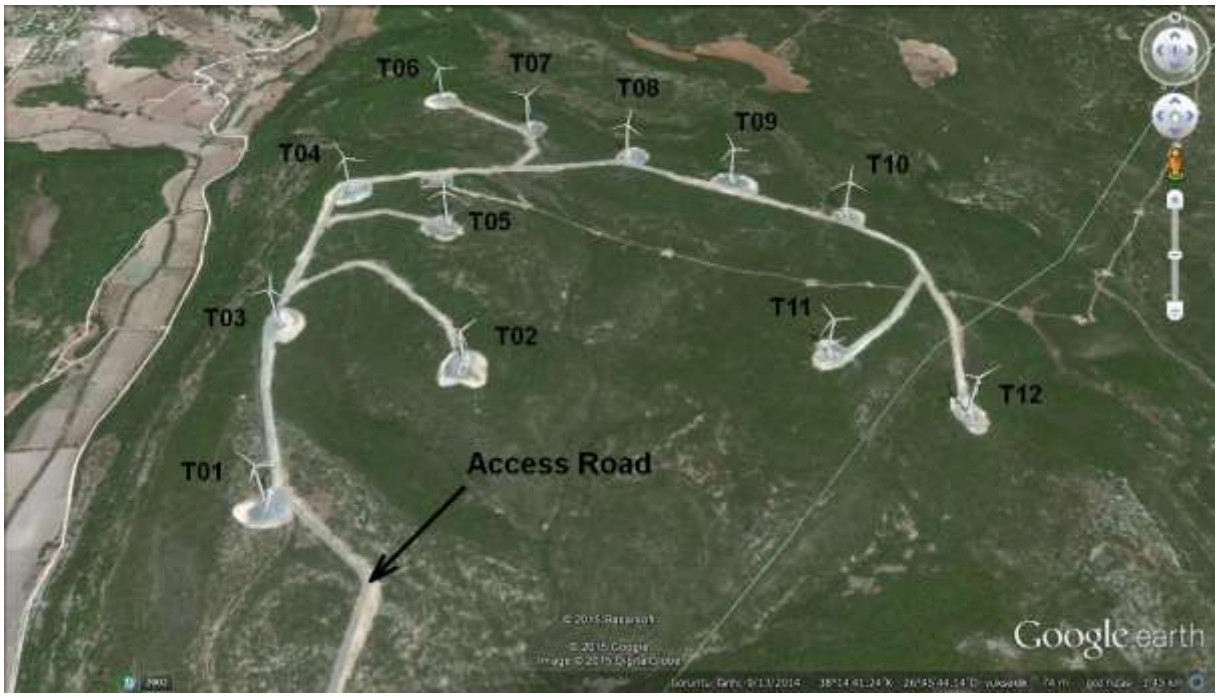

Karadeniz
Gürcistan
Rize
Ermenistan
Yerevan
Zonguldak
Ordu
İstanbul
Tekirdağ
Çorum
Erzincan
Bursa
Ankara
Eskişehir
Van Gölü
Nevşehir
Türkiye
Diyarbakır
Batman
Şırnak
Manisa
İzmir
Niğde
Konya
Mardin
Adana
Gaziantep
Burdur
Antalya
Mersin
Halep
Lazkiye
Project Location
Kıbrıs
Suriye
Google earth

(a)


Payamlı
Çamlık
Gödence
Yağcılar
Beyler
Demircili
Sığacık Bay
Project Location
Seferihisar
Sığacık
Google earth

(b)

(c)



(d)

Figure 1. Maps showing the project location and layout of the turbines. (a) Project location in Turkey. (b) Project location in Izmir Province. (c) Project Location with regard to the nearby villages (d) Layout of the turbines in the project site area.[18,19]

[18] Google Earth Application.

[19] Final Turbine Coordinates Specified in the Energy Generation Licence of the Project granted by the Energy Market Regulatory Authority. Korkmaz Wind Farm Generation Licence. Issued by Energy Market Regulatory

Table 1. Final turbine coordinates of the project[19]

Final Turbine Coordinates of Korkmaz Wind Farm, Turkey		
UTM ED50 Coordinates, UTM Zone: 35S		
Turbine Number	E	N
T01	478,672	4,232,774
T02	478,969	4,233,101
T03	478,588	4,233,226
T04	478,649	4,233,681
T05	478,889	4,233,545
T06	478,813	4,234,096
T07	479,044	4,233,951
T08	479,288	4,233,824
T09	479,523	4,233,685
T10	479,765	4,233,566
T11	479,651	4,233,092
T12	479,876	4,232,945

A.3. Technologies and/or measures

The project activity involves electricity generation from renewable energy sources utilising wind energy as the primary energy source. Wind power is one of the main renewable energy sources used in the world for electricity generation.

Turkey's electricity generation mainly depends on fossil fuel fired power plants. Natural gas and coal are the main fossil fuels used in the power plants.[20] Although the share of power plants using renewable energy sources is increasing in the recent years, most of these are hydro power plants and the wind power plants still constitute a very small percentage of the national installed capacity.[8, 21, 22]

In the absence of the project, the same amount of electricity would be generated by a hypothetical thermal power plant representing the fossil fuel dominated character of the national grid. This power plant would have most probably been a natural gas coal fired plant. This power plant would cause GHG emissions, mainly CO_2 emissions. The project will cause no GHG emissions. Hence, the project will reduce all the emissions that would take place in its absence.

The project is a greenfield project, therefore no other project would be developed in its absence. The baseline scenario and the scenario existing prior to the start of the implementation of the project activity

Authority. Numbered EU/1622-14/1187, Dated 29/05/2008. Latest Amendment, dated 15/01/2013. Page 6. Provided to DOE.

[20] Fuels Consumed in Thermal Power Plants in Turkey by the Electricity Utilities (2006-2013) http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/49.xls

[21] TEIAS Installed Capacity Data of Turkey. Updated Regularly. Installed Capacity at the End of 2013. Accessed on 16 April 2014. http://www.teias.gov.tr/yukdagitim/kuruluguc.xls

[22] Republic of Turkey Ministry of Energy and Natural Resources > Info Bank > Energy > Electricity http://www.enerji.gov.tr/en-US/Pages/Electricity http://www.enerji.gov.tr/tr-TR/Sayfalar/Elektrik

is the same and corresponds to a situation in which the same energy would be generated by the national grid causing GHG emissions.

In the scope of the project, 12 wind turbines each having a 2.1 MWm/2.05 MWe output power will be installed along with auxiliary structures including switchyard, administrative and control buildings, etc. The main components of the turbines include blades, hub, nose cone, nacelle, rotor, gearbox, generator, braking and yaw systems, tower, control systems, etc. among many others. Turbine specifications are summarised in the table below:

Table 2. Specifications of Suzlon S88 2100kW 50Hz 80m STV GL0304IIa wind turbine[1]

Component / Specification	Explanation / Value
Brand	Suzlon
Model	S88 2100kW 50Hz 80m STV GL0304IIa
Class	IEC IIA
Nominal Power	2100 kW
Number of blades	3 (Horizontal axis)
Rotor diameter	88 m
Rotor swept area	6,082 m^2
Hub height	80 m
Generator Stator Voltage	690 V (phase to phase)
Generator Frequency	50 Hz
Cut-in Wind Speed	4 m/s
Cut-out Wind Speed	25 m/s
Recut-in Wind Speed	23 m/s
Design Life Time	20 years[9]

The output voltage of each turbine will be 690 VAC, and this will be stepped up to medium voltage at 33 kV. Then the wind farm will be connected via a feeder to TEIAS 154 kV Urla Havza Substation MV (Medium Voltage) busbar at this 33 kV level. From this point the voltage will be stepped up to 154 kV, and the energy will be fed to the national grid.[2,3,4,5,6,7]

A.4. Parties and project participants

The Project Proponent is the only project participant. The project participant is listed in the following table, and the contact information of the project participant is provided in Annex 1.

Table 3. Parties and Project Participants involved in the Project

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	Ayen Enerji A.S. (private entity)	No

The Project Proponent, **Ayen Enerji A.S.**, is the owner and developer of the project.

The Republic of Turkey is the host country. Turkey ratified the Kyoto Protocol on 28 May 2009 and the protocol entered into force on 26 August 2009. However, Turkey is a party for which Party for which

there is a specific COP and/or CMP decision; and although being an Annex I Country, it has no commitments under Kyoto Protocol. National focal point of Turkey for UNFCCC is the Ministry of Environment and Urban Planning. Regional Environmental Centre Country Office Turkey (REC Turkey) acts as the National Focal Point for UNFCCC Article 6 – Education, Training and Public Awareness.

A.5. Public funding of project activity

No public funding from Parties included in Annex 1 or Official Development Assistance (ODA) is involved for the project activity.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

Project's time of first submission is 24/08/2011, which is the date of submission of the Local Stakeholder Consultation Report to the Gold Standard Registry[23,24]. Hence, the project is subject to Gold Standard Version 2.1 Rules & Requirements[25]. Gold Standard Version 2.1 Requirements[26] and Toolkits[27,28] stipulate that the latest version of the methodology available at the time must be used. On the other hand, UNFCCC CDM Rules on ACM0002 puts forward time restrictions for the version of the methodology to be used depending on the time of submission of requests for registration[29]. As a result, the latest version of the methodology available at the time of the writing of this report, "ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0"[30], and related tools are applied to the project activity.

Tools referenced in this methodology:

1. Tool for the demonstration and assessment of additionality

[23] Gold Standard Version 2.1 Requirements. Chapter 2 Rules. Section II. Definitions. "Time of first submission" definition. Page 27. Accessed on 14/08/2015.
http://www.goldstandard.org/wp-content/uploads/2011/10/GSv2.1_Requirements-11.pdf

[24] Gold Standard Version 2.1 Toolkit. Chapter 2 Design & Report. Section 2.2 Select baseline and monitoring methodology. Paragraph 2. The third (last) sentence. Page 34. Accessed on 14/08/2015.
http://www.goldstandard.org/wp-content/uploads/2011/10/GSv2.1_Toolkit_Clean-11.pdf

[25] GS v2.1 Document Archive. Gold Standard Version 2.1 Explanations, First Paragraph. Accessed on 14/08/2015.
http://www.goldstandard.org/energy/rules-requirements

[26] Gold Standard Version 2.1 Requirements. Chapter 2 Rules. Section III. Project Eligibility Criteria. Sub-Section III.f. Eligible methodologies for project activities. Paragraph III.f.2. VER project activities. Page 31. Accessed on 17/08/2015.
http://www.goldstandard.org/wp-content/uploads/2011/10/GSv2.1_Requirements-11.pdf

[27] Gold Standard Version 2.1 Toolkit. Chapter 2 Design & Report. Section 2.2 Select baseline and monitoring methodology. Paragraph 2. The first and the second sentences. Page 34. Accessed on 17/08/2015.
http://www.goldstandard.org/wp-content/uploads/2011/10/GSv2.1_Toolkit_Clean-11.pdf

[28] Gold Standard Version 2.1 Toolkit. Chapter 3 Validate. Section 3.5 Validation guidelines. Sub-section 3.5.1 Validation framework. Part "Conservative Approach Check of the Baseline Scenario". Article (a). Page 62. Accessed on 17/08/2015.
http://www.goldstandard.org/wp-content/uploads/2011/10/GSv2.1_Toolkit_Clean-11.pdf

[29] UNFCCC > CDM > Methodologies > Approved consolidated methodologies > ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. Explanations and time frames for validity. Accessed on 17/08/2015.
http://cdm.unfccc.int/methodologies/DB/EY2CL7RTEHRC9V6YQHLAR6MJ6VEU83

[30] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Accessed on 17/08/2015.
http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

2. Combined tool to identify the baseline scenario and demonstrate additionality
3. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion
4. Tool to calculate the emission factor for an electricity system
5. Tool to determine the remaining lifetime of equipment
6. Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period

Only two of these tools, "Tool for the demonstration and assessment of additionality (Version 07.0.0)"[31] for the assessment of additionality and "Tool to calculate the emission factor for an electricity system (Version 04.0)"[32] for baseline emission calculation are used.

Since no project emission or leakage is in question regarding the project activity, "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" is not used. "Combined tool to identify the baseline scenario and demonstrate additionality" is also not used since it is not applicable to the project according to the scope and rules defined therein. Since the lifetime of the equipment is clearly defined in the product information given by the turbine manufacturer, "Tool to determine the remaining lifetime of equipment" is not applicable. And lastly, "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" is irrelevant since the project is a new project seeking validation for the first crediting period.

B.2. Applicability of methodology

The choice of methodology ACM0002 and related tools are justified based on the fact that the proposed project activity meets the relevant applicability conditions of the chosen methodology and tools:

- The project is a greenfield project. No power plant or a similar facility had been present in the project site when the project activity began.
- The project is a grid-connected renewable power generation project.
- The project activity does not involve any capacity addition or any retrofit or replacement of an existing power plant.
- The project activity is the installation of a wind power plant.
- There is no project emission or leakage related with the project activity.

B.3. Project boundary

The project utilises wind as the primary energy source to generate electricity. During normal operation when enough wind is present to generate wind, the project activity draws no energy from the grid to meet its auxiliary electricity consumption need. The project meets its auxiliary electricity consumption need from its own generated electricity. When there is not sufficient wind to generate electricity, the project will draw some electricity from the grid to use for auxiliary electricity consumption. There is a backup power generator using diesel fuel to be used only when power cannot be supplied from the grid due to a connection loss, grid maintenance, or a power outage in the grid. Under only very such rare occasions will the backup power generator operate and produce emissions. These emissions are expected to be very low and can be neglected; so assumed to be zero.

[31] Tool for the demonstration and assessment of additionality - Version 07.0.0. UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[32] Tool to calculate the emission factor for an electricity system (Version 04.0). UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

Apart from the backup diesel power generator, there is no equipment or machinery related with the project activity that can produce any emissions.

Table 4. Emission sources and GHGs included or excluded in the project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity generation mix of national grid displaced by project activity	CO_2	Yes	Major GHG emission from the power plants in the fossil-fuel dominated national grid in the absence of the project activity is CO_2. The amount of other gases and pollutants are very low compared to CO_2. So, CO_2 is included in the baseline emission calculation.
		CH_4	No	Although there may be CH_4 or N_2O emissions from the power plants in the grid during electricity generation in the absence of the project activity, these emissions would be very low and trivial as compared to CO_2. As a result, CH_4 or N_2O emissions in the baseline emission calculations are neglected and assumed as zero.
		N_2O	No	
		Other	No	
Project scenario	Activities during constructional and operational phases of the project	CO_2	No	Under normal conditions, no CO_2, CH_4 or N_2O emissions will occur apart from normal domestic activities of the personnel like heating and cooking. And those emissions resulting from these domestic activities will be very low to be taken into account in the calculations. So, these are neglected and not included.
		CH_4	No	
		N_2O	No	
		Other	No	

The flow diagram of the project boundary with its connections to the national grid is shown in the following figure in the next page. The monitoring variable used for emission reduction calculations is the net amount of generated electricity measured by the monitoring system consisting of a main and a backup electricity meter located in the local for each group.

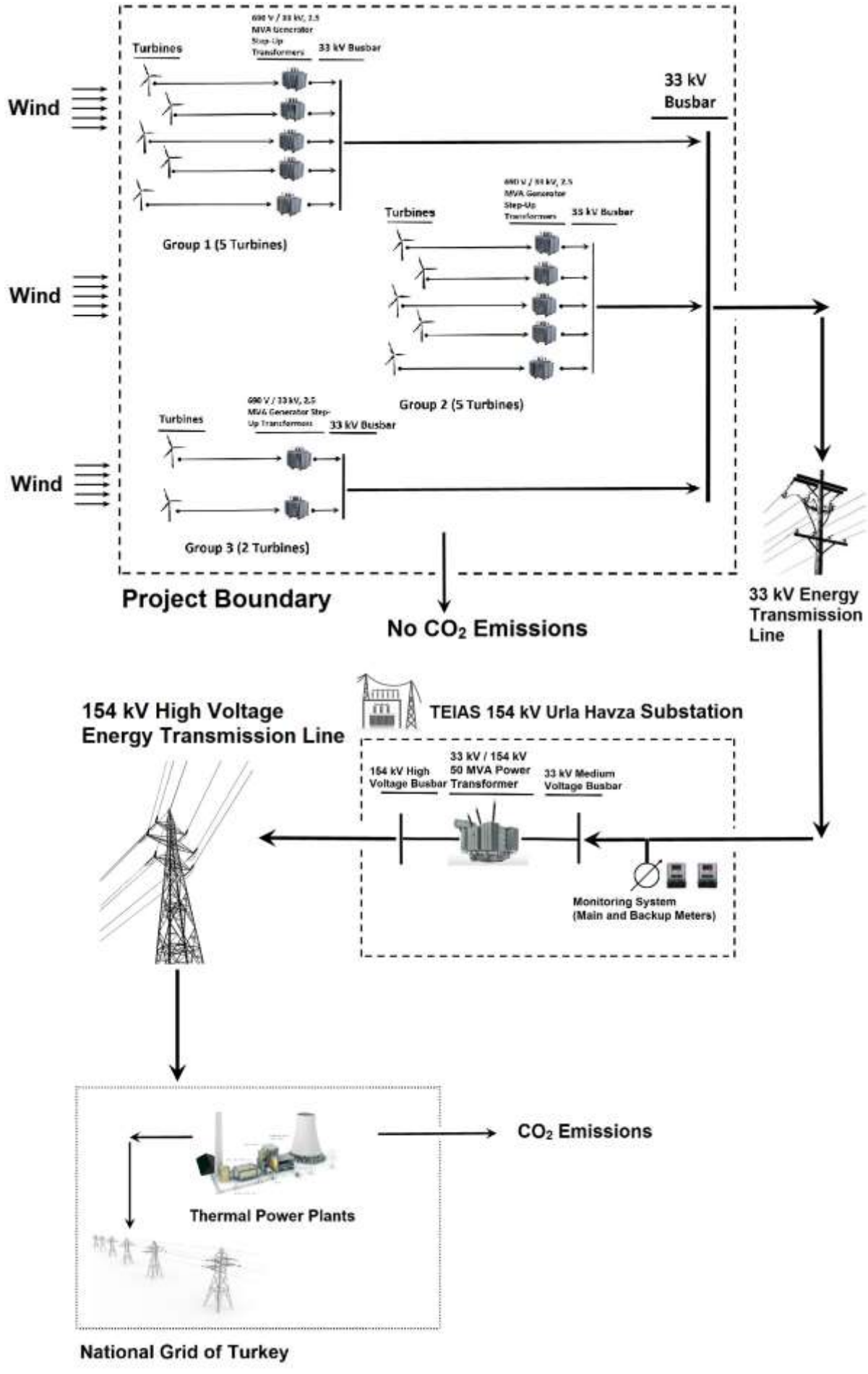

Wind
Wind
Wind
Turbines
690 V / 33 kV, 2.5 MVA Generator Step-Up Transformers
33 kV Busbar
Group 1 (5 Turbines)
Turbines
690 V / 33 kV, 2.5 MVA Generator Step-Up Transformers
33 kV Busbar
Group 2 (5 Turbines)
Turbines
690 V / 33 kV, 2.5 MVA Generator Step-Up Transformers
33 kV Busbar
Group 3 (2 Turbines)
33 kV Busbar
Project Boundary
No CO_2 Emissions
33 kV Energy Transmission Line
154 kV High Voltage Energy Transmission Line
TEIAS 154 kV Urla Havza Substation
154 kV High Voltage Busbar
33 kV / 154 kV 50 MVA Power Transformer
33 kV Medium Voltage Busbar
Monitoring System (Main and Backup Meters)
Thermal Power Plants
CO_2 Emissions
National Grid of Turkey

Figure 2. Schematic diagram showing the flow diagram of the project boundary, its connection to national grid, and emission sources and gases included in the project boundary and monitoring variables. The diagram was prepared by the project proponent by using the information given in the turbine specifications brochure[1], the first and the second commissioning protocols[2,Hata! Yer işareti tanımlanmamış.], the official simplified single line diagram of the project[4], the connection and system usage agreements made between TEIAS and the project proponent[5,5], and the generation licence of the project activity[7].

B.4. Establishment and description of baseline scenario

The selected baseline methodology for the development of PDD is "ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0". So, the most plausible baseline scenario is identified in accordance with this methodology.

Baseline methodology procedure explained on page 10 of this methodology proposes three alternatives for identification of the baseline scenario[33]. Since the project activity is the installation of greenfield (a newly installed) grid-connected wind power plant with 12 turbines and is not a capacity addition to an existing renewable energy power plant, or retrofit or rehabilitation or replacement of an existing power plant, the first alternative is the most suitable one for the project for identification of the baseline scenario; which is explained as follows[34]:

"23. If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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"

Since the project activity has nothing to do with a capacity addition or the retrofit or replacement of an existing grid-connected renewable power plant/unit(s) at the project site, the other two alternative scenarios and respective step-wise procedures are not applicable.

This assumption of baseline scenario can also be justified and supported by data, statistics and studies performed by TEIAS (Turkish Electricity Transmission Corporation).

The following two tables summarize the situation of Turkish Electricity Generation sector as at the end of 2013:

[33] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 5. Baseline methodology. Sub-Section 5.2. Identification of the baseline scenario. Page 10. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

[34] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 5. Baseline methodology. Sub-Section 5.2. Identification of the baseline scenario. Article 5.2.1. Baseline scenario for Greenfield power plant. Paragraph 23. Page 10. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

Table 5. Distribution of Total Installed Capacity of Turkey by Fuel / Energy Source Types as at the end of 2013[21]

FUEL TYPES	THE END OF 2013		
	INSTALLED CAPACITY (MW)	CONTRIBUTION (%)	NUMBER OF POWER PLANTS
FUEL-OIL + ASPHALTITE + NAPHTA + DIESEL OIL	708.3	1.1	21
HARD COAL + LIGNITE	8,515.2	13.3	20
IMPORTED COAL	3,912.6	6.1	7
NATURAL GAS + LNG	20,269.9	31.7	218
RENEWABLE + WASTE	236.9	0.4	39
MULTI-FUEL SOLID + LIQUID	675.8	1.1	8
MULTI-FUEL LIQUID + N. GAS	4,365.8	6.8	45
GEOTHERMAL	310.8	0.5	13
HYDRAULIC DAMMED	16,142.5	25.2	74
HYDRAULIC RUN-OF-RIVER	6,146.6	9.6	393
WIND	2,759.6	4.3	72
TOTAL	**64,044.0**	**100.0**	**910**

Table 6. Distribution of Gross Electricity Generation of Turkey by Fuel / Energy Source Types in 2013[20]

THE DISTRIBUTION OF GROSS ELECTRICITY GENERATION BY PRIMARY ENERGY RESOURCES IN TURKEY			
2013			
PRIMARY ENERGY RESOURCES		Energy (GWh)	Share (%)
COAL	Hard coal+Imported Coal+Asphaltite	33,524.0	13.96
	Lignite	30,262.0	12.60
	COAL TOTAL	**63,786.1**	**26.56**
LIQUID FUELS	Fuel Oil	1,192.5	0.50
	Diesel Oil	546.3	0.23
	LPG	0.0	0.00
	Naphtha	0.0	0.00
	LIQUID TOTAL	**1,738.8**	**0.72**
Natural Gas		105,116.3	43.77
Renewables and Wastes		1,171.2	0.488
THERMAL TOTAL		**171,812.5**	**71.54**
HYDRO		59,420.5	24.74
GEOTHERMAL		1,363.5	0.57
WIND		7,557.5	3.15
GENERAL TOTAL		**240,154.0**	**100.00**

TEIAS (Turkish Electricity Transmission Corporation), publishes annual capacity projection reports to forecast the future possible situation of Turkish Electricity Sector based on current available data. The development of total firm energy generation capacity of Turkish grid for a 5 year period (2014 – 2018)

based on two scenarios according to the latest Capacity Projection Report available at the time of writing this report[35] are as follows. These two different scenarios are based on different assumptions about the predicted times of commissioning of power plants in construction and power plants having been granted licences, but not in construction, as explained in the mentioned report.[36]

Table 7. Development of Total Firm Generation Capacity by Energy Resource Types[37]
(Scenario 1)
(Operational, with State Owned Power Plants Under Construction and Private Sector Owned Power Plants Under Construction Granted by Licence and Expected to be in Service on Proposed Date)

(a) Generation (GWh)

YEARS	2013	2014	2015	2016	2017	2018
LİGNITE	32,382	33,596	38,747	40,247	42,169	42,494
HARD COAL + ASPHALTİTE	3,736	4,708	5,801	5,801	5,801	5,801
IMPORTED COAL	26,860	34,530	40,560	41,147	40,778	40,817
NATURAL GAS	169,046	176,811	185,033	192,018	197,931	201,189
GEOTHERMAL	2,206	2,508	2,962	3,279	4,040	4,635
FUEL OIL	6,874	7,279	10,049	10,049	10,049	10,049
DIESEL OIL	148	148	148	148	148	148
NUCLEAR	0	0	0	0	0	0
OTHERS	1,332	1,332	1,332	1,332	1,332	1,332
THERMAL TOTAL	242,583	260,910	284,631	294,019	302,246	306,464
BIOGAS + WASTE	1,508	1,619	1,736	1,768	1,792	1,792
HYDRAULIC	60,596	64,038	55,313	59,016	61,232	62,167
WIND	8,019	8,779	9,770	11,019	12,279	12,435
TOTAL	**312,706**	**335,346**	**351,449**	**365,822**	**377,549**	**382,857**

[35] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018. Accessed on 24/08/2015.
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.pdf
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.docx

[36] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018. Section V. Assumptions Used in the Preparation of Generation Capacity Projection. Sub-Section V.3. Power Plants in Construction with Licences Granted and Expected to Become Operational in Predicted Times, and Power Plants with Licences Granted and with Indefinite Times of Becoming Operational. Explanations on Scenarios and Assumptions Made in the Scenarios. Pages 23-24.
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.pdf
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.docx

[37] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018. Section V. Assumptions Used in the Preparation of Generation Capacity Projection. Sub-Section V.3. Power Plants in Construction with Licences Granted and Expected to Become Operational in Predicted Times, and Power Plants with Licences Granted and with Indefinite Times of Becoming Operational. Table 22. Page 37.
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.pdf
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.docx

(b) Percentage (%)

YEARS	2013	2014	2015	2016	2017	2018
LİGNITE	10.4	10.0	11.0	11.0	11.2	11.1
HARD COAL + ASPHALTİTE	1.2	1.4	1.7	1.6	1.5	1.5
IMPORTED COAL	8.6	10.3	11.5	11.2	10.8	10.7
NATURAL GAS	54.1	52.7	52.6	52.5	52.4	52.5
GEOTHERMAL	0.7	0.7	0.8	0.9	1.1	1.2
FUEL OIL	2.2	2.2	2.9	2.7	2.7	2.6
DIESEL OIL	0.0	0.0	0.0	0.0	0.0	0.0
NUCLEAR	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.4	0.4	0.4	0.4	0.4	0.3
BIOGAS + WASTE	0.5	0.5	0.5	0.5	0.5	0.5
HYDRAULIC	19.4	19.1	15.7	16.1	16.2	16.2
WIND	2.6	2.6	2.8	3.0	3.3	3.2
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

Table 8. Development of Total Firm Generation Capacity by Energy Resource Types [38]
(Scenario 2)
(Operational, with State Owned Power Plants Under Construction and Private Sector Owned Power Plants Under Construction Granted by Licence and Expected to be in Service on Proposed Date)

(a) Generation (GWh)

YEARS	2013	2014	2015	2016	2017	2018
LİGNITE	32,382	32,583	36,722	39,235	41,844	41,844
HARD COAL + ASPHALTİTE	3,736	4,708	5,801	5,801	5,801	5,801
IMPORTED COAL	26,860	30,270	32,040	32,627	36,518	40,817
NATURAL GAS	169,046	176,598	184,755	187,100	188,226	191,485
GEOTHERMAL	2,206	2,508	2,962	3,279	4,040	4,635
FUEL OIL	6,874	7,279	10,049	10,049	10,049	10,049
DIESEL OIL	148	148	148	148	148	148
NUCLEAR	0	0	0	0	0	0
OTHERS	1,332	1,332	1,332	1,332	1,332	1,332
THERMAL TOTAL	242,583	255,425	273,808	279,569	287,956	296,110

[38] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018. Section V. Assumptions Used in the Preparation of Generation Capacity Projection. Sub-Section V.3. Power Plants in Construction with Licences Granted and Expected to Become Operational in Predicted Times, and Power Plants with Licences Granted and with Indefinite Times of Becoming Operational. Table 25. Page 44.
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.pdf
http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2014.docx

BIOGAS + WASTE	1,508	1,610	1,727	1,768	1,792	1,792
HYDRAULIC	60,596	62,517	52,837	57,489	59,988	60,821
WIND	8,019	8,779	9,762	10,647	11,551	11,708
TOTAL	**312,706**	**328,331**	**338,133**	**349,473**	**361,287**	**370,430**

(b) Percentage (%)

YEARS	2013	2014	2015	2016	2017	2018
LİGNITE	10.4	9.9	10.9	11.2	11.6	11.3
HARD COAL + ASPHALTİTE	1.2	1.4	1.7	1.7	1.6	1.6
IMPORTED COAL	8.6	9.2	9.5	9.3	10.1	11.0
NATURAL GAS	54.1	53.8	54.6	53.5	52.1	51.7
GEOTHERMAL	0.7	0.8	0.9	0.9	1.1	1.3
FUEL OIL	2.2	2.2	3.0	2.9	2.8	2.7
DIESEL OIL	0.0	0.0	0.0	0.0	0.0	0.0
NUCLEAR	0.0	0.0	0.0	0.0	0.0	0.0
OTHERS	0.4	0.4	0.4	0.4	0.4	0.4
BIOGAS + WASTE	0.5	0.5	0.5	0.5	0.5	0.5
HYDRAULIC	19.4	19.0	15.6	16.5	16.6	16.4
WIND	2.6	2.7	2.9	3.0	3.2	3.2
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

As can be seen from the data depicted in the tables, the current thermal dominated nature of Turkish Electricity Generation Sector is not expected to change within the next five years significantly. This conclusion justifies the assumption that the baseline scenario is the case in which the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of newly added grid-connected power plants and would correspond to the continuation of current energy resource distribution situation of the national grid.

Although a special feed-in-tariff and incentives are given to power plants using renewable energy sources according to Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy[39] (Law No: 5346, Issuance Date: 18.05.2005), this supportive mechanism does not seem to change the future probable situation of electricity generation sector in a distinguishable way. So, the assumption of baseline scenario is still valid in the presence of the feed-in-tariff and incentives included in this law.

B.5. Demonstration of additionality

B.5.1. Implementation Timeline of the Project Activity

An overview of Implementation timeline of the project activity can be found in the table below:

Table 9. Implementation timeline of the project activity

[39] http://www.enerji.gov.tr/mevzuat/5346/5346_Sayili_Yenilenebilir_Enerji_Kaynaklarinin_Elektrik_Enerjisi_Uretimi_Amacli_Kullanimina_Iliskin_Kanun.pdf
http://www.epdk.gov.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_Yek_Kanun.doc

Activity	Date
EMRA (Energy Market Regulatory Authority) decision for the approval of the issuance of generation licence (Decision Date 25/10/2007, Decision Reference 1352/12)[40]	25/10/2007
Board Decision regarding Verified Emission Reductions[41]	12/03/2008
Initial Issuance of the Generation Licence[42,43]	29/05/2008
EIA not required certificate (exemption decision)[44]	01/08/2008
Term Sheet for Supply Agreement of S88 Turbines for Seferihisar & Mordogan Projects between Ayen Energy Co. & Suzlon Wind Energy AS (Export Contract)[45].	20/08/2009
Turbine purchase and service agreements with turbine supplier (Suzlon).[46,47,48,49].	03/09/2009

[40] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms, Company: AYEN ENERJI A.S., Notice Type: Material Event Disclosures. Notice No: 50. Date and Hour: November 9, 2007 12:52:05 PM. Subject Type: 5/h-16(2) Other (Content in Turkish). Subject: EMRA (Energy Market Regulatory Authority) decision for the approval of the issuance of generation licence for Korkmaz WPP. Decision Date: 25/10/2007, Decision Reference: 1352/12. Notification Letter Date: 05/11/2007 Reference: 25865. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=46037
http://kap.gov.tr/api/download.aspx?tip=bildirimek&id=13723&bildirimid=46037
http://kap.gov.tr/en/search/notice-results.aspx?id=46037

[41] Ayen Enerji A.S. Board Decision that Verified Emission Reductions have been taken into account for the development of Mordogan and Korkmaz Wind Farm Projects. Meeting No: 159, Meeting Date: 12/03/2008. Provided to DOE.

[42] Korkmaz Wind Farm Generation Licence. Issued by Energy Market Regulatory Authority. Numbered EU/1622-14/1187, Dated 29/05/2008. Latest Amendment, dated 15/01/2013. Page 1 (Cover Page). Provided to DOE.

[43] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms, Company: AYEN ENERJI A.S., Notice Type: Material Event Disclosures. Notice No: 64. Date and Hour: June 16, 2008 10:21:47 AM. Subject Type: 5/c-9 (7) Official Authorisation for Activity (Content in Turkish). Subject: Issuance of generation licence for Korkmaz WPP by EMRA (Energy Market Regulatory Authority). Decision Date: 29/05/2008, Decision Reference: 1622/14. Notification Letter Date: 12/06/2008. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=53880
http://kap.gov.tr/api/download.aspx?tip=bildirimek&id=17933&bildirimid=53880
http://kap.gov.tr/en/search/notice-results.aspx?id=53880

[44] Certificate granted by Governorate of Izmir Province, Provincial Direcorate of Environment and Forestry, Decision Date: 01/08/2008, Ref No: B.18.4.İÇO.4.35.00.03/1550-6034, Decision No: 540. Korkmaz Wind Farm First Provisional Acceptance Protocol Annexes, dated 15 August 2014. Annex 19, Letters Related with EIA (Governorate of Izmir). pp. 213-215. Provided to DOE.

[45] Term Sheet for Supply Agreement of S88 Turbines for Seferihisar & Mordogan Projects between Ayen Energy Co. & Suzlon Wind Energy AS (Export Contract). Dated 20/08/2009. Provided to DOE.

[46] Supply and Installation Agreement for Korkmaz Wind Farm, made by and between Suzlon Wind Energy A/S (SWEAS) and Suzlon Wind Enerji Sanayi ve Ticaret Limited Sirketi (Suzlon Turkey) and Ayen Enerji A.S.. Dated 03/09/2009. Provided to DOE.

[47] Warranty, Maintenance and Service Agreement for Korkmaz Wind Farm, made by and between Suzlon Wind Energy A/S (SWEAS) and Suzlon Wind Enerji Sanayi ve Ticaret Limited Sirketi (Suzlon Turkey) and Ayen Enerji A.S.. Dated 03/09/2009. Provided to DOE.

[48] Operation, Service and Maintenance Agreement for Korkmaz Wind Farm, made by and between Suzlon Wind Energy A/S (SWEAS) and Suzlon Wind Enerji Sanayi ve Ticaret Limited Sirketi (Suzlon Turkey) and Ayen Enerji A.S.. Dated 03/09/2009. Provided to DOE.

[49] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms, Company: AYEN ENERJI A.S., Notice Type: Material Event Disclosures. Notice No: 74. Date and Hour:

The First Amendment in the Generation Licence[50]. The subject of the amendment is the extension of construction and facility completion periods.	23/11/2009
The Second Amendment in the Generation Licence[50]. The subject of the amendment is the change in the interconnection point to the system and voltage levels.	10/02/2010
Issuance of Investment Incentive Certificate for Korkmaz Wind Farm by Undersecretariat of Treasury of Prime Ministry of Turkey. Certificate Date 15/02/2010 and Reference 95524.[51]	15/02/2010
Completion and Submission of Financial Feasibility Report to creditor bank (Commerzbank)[52].	22/04/2010
Connection Agreement with TEIAS (Turkish Electricity Transmisson Company)[5]	25/11/2010
Local Stakeholder Meeting[53]	18/03/2011
Credit Agreement with Creditor Bank (Commerzbank)[54,55]. This date is also accepted as the investment decision date, since this is the date of the financial closure, and the order and the delivery of the electromechanical equipment, the main component of which are the wind turbines, are strictly dependent on this agreement.	29/03/2011
The time of first submission (The date of upload of the Local Stakeholder Consultation Report to Gold Standard Registry)[56,57]	24/08/2011

September 8, 2009 01:22:08 PM. Subject Type: Material Event Disclosure (General) (Content in Turkish). Subject: Explanation regarding the execution of turbine purchase and service agreements for Mordogan and Korkmaz Wind Farms with turbine supplier (Suzlon), and about the commencement of the credit negotiations. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=93334
http://kap.gov.tr/en/search/notice-results.aspx?id=93334

[50] Korkmaz Wind Farm Generation Licence. Issued by Energy Market Regulatory Authority. Numbered EU/1622-14/1187, Dated 29/05/2008. Latest Amendment, dated 15/01/2013. Special Clauses. Section 6-Amendments Made in the Licence. Page 7. Provided to DOE.

[51] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms , Company: AYEN ENERJI A.S., Notice Type: Material Event Disclosures. Notice No: 77. Date and Hour: February 16, 2010 02:26:57 PM. Subject Type: Material Event Disclosure (General) (Content in Turkish). Subject: Issuance of Investment Incentive Certificate for Korkmaz Wind Farm by Undersecretariat of Treasury of Prime Ministry of Turkey. Certificate Date: 15/02/2010 Reference: 95524. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=105173
http://kap.gov.tr/en/search/notice-results.aspx?id=105173

[52] Financial Feasibility Report submitted to the Creditor Bank (Commerzbank). Dated 22/04/2010. Provided to DOE.

[53] All the material evidence indicated in the Local Stakeholder Consultation Report.

[54] Loan Agreement between Ayen Enerji A.S. and Commerzbank Aktiengesellschaft. EUR 50,000,000 ECA covered Facility. Dated 29/03/2011. Provided to DOE.

[55] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms , Company: AYEN ENERJI A.S., Notice Type: Material Event Disclosures. Notice No: 97. Date and Hour: February 16, 2010 02:26:57 PM March 30, 2011 11:58:30 AM. Subject Type: Material Event Disclosure (General) (Content in Turkish). Subject: Signing of the Credit Agreement Between Ayen Enerji A.S. and Commerzbank for the Establishment of Korkmaz and Mordogan Wind Farms on 29/03/2011. Amount of the total debt and some basic conditions are also mentioned. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=148355
http://kap.gov.tr/en/search/notice-results.aspx?id=148355

[56] Information accessible at Gold Standard Markit Environmental Registry Records.

[57] Screenshot provided to the Validator DOE.

Validation agreement signed between the Project Proponent and the Validator DOE.[58]	30/11/2011
The Third Amendment in the Generation Licence[50]. The subject of the amendment is the change of some turbine coordinates.	27/12/2011
The Fourth Amendment in the Generation Licence[50]. The subject of the amendment is the extension of construction and facility completion periods.	27/12/2011
Commercial Enterprise Pledge Agreement[59]	30/05/2012
Project Site Delivery to the Project Proponent by State Forest Authorities (Local Forest Chiefdoms of Urla and Seferihisar) for the Purpose of Access Road Construction and Drilling.[60]	03/12/2012
Project Site Delivery to the Contractor Construction Company (Aydiner Insaat A.S.) by Project Proponent[61]. Although the actual constructional works started later, this is the earliest date that can be documented as the construction beginning date. Hence, the date the start of constructional works has been accepted as this date. This is also the Start Date of the Project Activity.	04/12/2012
The Fifth and the Last Amendment in the Generation Licence[50]. The subject of the amendment is the extension of construction and facility completion periods.	15/01/2013
Project Site Delivery to the Project Proponent by State Forest Authorities (Local Forest Chiefdoms of Urla and Seferihisar) for the Purpose of Access Road Construction and Turbine Installation.[62] This is the construction start date of the main prıoject site area where the power plant itself including turbines, administrative building and switchyard was begun to be constructed.	18/03/2014
System Usage Agreement with TEIAS (Turkish Electricity Transmisson Company)[6]	02/07/2014
First Partial Commissioning (5 Turbines) (Turbines No. 8, 9, 10, 11, 12)[2,63,64]	15/08/2014

[58] Contract on Validation, signed between the TÜV Rheinland Japan, Ltd. and Ayen Enerji A.S., on 30 November 2011, for Korkmaz Wind Farm Project.

[59] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms, Company: AYEN ENERJI A.S. , Notice Type: Material Event Disclosures. Notice No: 130. Date and Hour: May 31, 2012 10:12:29 AM. Subject Type: Material Event Disclosure (General) (Content in Turkish). Subject: Commercial Enterprise Pledge Agreement in an amount of 150,000,000 TRY signed on 30/05/2012 for the Credit Agreement made between the Project Proponent and the Creditor Bank (Commerzbank) for the establishment of Korkmaz and Mordogan Wind Farms, on 29/03/2011. Accessed on 28/08/2015. http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=206880 http://kap.gov.tr/en/search/notice-results.aspx?id=206880

[60] Delivery-Receipt Report signed between Ayen Enerji A.S. (Project Proponent) and Forest Chiefdoms of Urla and Seferihisar. Date: 03/12/2012. Provided to DOE.

[61] Final Progress Payment Document for the Korkmaz WPP Project Construction, dated 02/10/2014. Provided to DOE.

[62] Delivery-Receipt Report signed between Ayen Enerji A.S. (Project Proponent) and Forest Chiefdoms of Urla and Seferihisar. Date: 18/03/2014. Korkmaz Wind Farm First Provisional Acceptance Protocol Annexes, dated 15 August 2014. Annex 11, pp. 148-150. Provided to DOE.

[63] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms, Company: AYEN ENERJI A.S. , Notice Type: Material Event Disclosures. Notice No: 179. Date and Hour: August 15, 2014 01:10:27 PM. Subject Type: Material Event Disclosure (General) (Content in Turkish). Subject: Partial Commissioning of the first group of turbines of Korkmaz Wind Farm consisting of 5 turbines with an

Second Partial Commissioning (7 Turbines) (Turbines No. 1, 2, 3, 4, 5, 6, 7)[Hata! Yer işareti tanımlanmamış.,64,65]	04/09/2014
Start of the two-month Stakeholder Feedback Round Period with the upload of the relevant documents to the Gold Standard Registry.[66]. The same documents were also published on the project proponent's web site.	To be determined.
End of the two-month Stakeholder Feedback Round Period.	To be determined.

As can be seen from the implementation timeline of the project, the revenues from VER credits had been taken into account before electromechanical equipment order agreement and credit agreement. VER revenues are considered in the financial analysis performed for investment. Financial Feasibility Report submitted to the creditor bank for credit assessment included VER revenues and the creditor bank took VER revenues into account when giving the credit. Environmental Impact Assessment Report also mentioned VER revenues[67].

B.5.2. Assessment and Demonstration of Additionality

The selected baseline methodology for the development of PDD, "ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0" refers to the latest version of the "Tool for the demonstration and assessment of additionality - Version 07.0.0"[31] (referred to as "The Tool" hereafter in this section) for the demonstration and assessment of the additionality[68]. The methodology procedure of this tool defines a step-wise approach to be applied for the project activity. The application of this step-wise approach to the proposed project activity is as follows[69]:

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

installed capacity of 10 MW, on 15/08/2014. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=379002
http://kap.gov.tr/en/search/notice-results.aspx?id=379002

[64] Republic of Turkey Ministry of Energy and Natural Resources > Info Bank > Publications > EIGM (General Directorate of Energy Affairs) Reports > Year 2014 Energy Investments. Accessed on 28/08/2015.
http://www.enerji.gov.tr/File/?path=ROOT%2f1%2fDocuments%2fE%c4%b0GM+Ana+Rapor%2f2014+Y%c4%b1l%c4%b1+Enerji+Yat%c4%b1r%c4%b1mlar%c4%b1.xlsx

[65] Public Disclosure Platform. Company Notifications. Company Type: Borsa Istanbul Companies and Investment Firms, Company: AYEN ENERJI A.S. , Notice Type: Material Event Disclosures. Notice No: 180. Date and Hour: September 4, 2014 12:35:53 PM. Subject Type: Material Event Disclosure (General) (Content in Turkish). Subject: Partial Commissioning of the second group of turbines of Korkmaz Wind Farm consisting of 7 turbines with an installed capacity of 14 MW, on 04/09/2014. Accessed on 28/08/2015.
http://kap.gov.tr/bildirim-sorgulari/bildirim-detayi.aspx?id=382843
http://kap.gov.tr/en/search/notice-results.aspx?id=382843

[66] Korkmaz Wind Farm Markit Environmental Registry Public View.
https://mer.markit.com/br-reg/public/project.jsp?project_id=103000000001912

[67] Korkmaz Wind Farm Environmental Impact Assessment Report. February 2011. Last Revision, 11/03/2011 (Turkish Version). PART III: Economic and Social Aspects of the Project III.3. Cost - Benefit Analysis of the Project. Annual Incomes. Page 18.

[68] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 3. Normative references. Paragraph 14. Page 7.
http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

[69] Tool for the demonstration and assessment of additionality - Version 07.0.0. UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. Section 4. Methodology Procedure. pp. 7-14.
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

This step is optional. Since the project activity is not first-of-its-kind, whether this step is applied or not does not change the result, and automatically we proceed to Step 1.

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

Realistic and credible alternatives to the project activity are defined through the following sub-steps as per the Tool:

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

Probable realistic and credible alternatives that may be available to the Project Proponent are assessed in the following alternate scenarios:

a) The proposed project activity undertaken without being registered as a CDM (GS VER) project activity

This alternative would be realistic and credible if the project proponent had found the project financially feasible as a result of investment analysis. But the investment analysis showed that the project is not financially feasible without the incentive coming from the GS VER revenues. So, the project is not considered as credible and feasible by the project proponent although it may be realistic without being registered as a CDM (GS VER) project activity.

(b) Other realistic and credible alternative scenario(s) to the proposed CDM project activity scenario that deliver outputs services (e.g., cement) or services (e.g. electricity, heat) with comparable quality, properties and application areas, taking into account, where relevant, examples of scenarios identified in the underlying methodology;

The project activity is a power plant using renewable energy sources to generate electricity without emitting any greenhouse gases. So, any other realistic and credible alternative scenario to the proposed project activity scenario that delivers services (electricity) with comparable quality would be another power plant utilising another renewable energy source to generate electricity without emitting any greenhouse gases.

But, in the project area there are no other available renewable or non-renewable energy sources to be used for electricity generation. Hence, there are no other realistic and credible alternative scenarios to the proposed project activity that delivers electricity with comparable quality. Therefore, this alternative is not realistic or credible.

(c) If applicable, continuation of the current situation (no project activity or other alternatives undertaken).

The investment decision for the project activity depends on financial feasibility analysis and risk assessment performed by the project proponent. If the financial feasibility analysis and risk assessment had not been positive, the project would not have been realized. Hence, this scenario in which there would be no project activity is a realistic and credible alternative scenario.

This scenario is the continuation of the current situation and corresponds to the case in which the same amount of electricity would be generated by the existing national grid which is composed of a generation mix largely depending on fossil fuels. This alternative is the same as baseline scenario in which the same amount of electricity that would be delivered to the national grid by the project activity would have otherwise been generated by the power plants connected to the national grid whose current composition is mainly dependent on fossil fuels.

Outcome of Step 1a: As a result, the above alternatives (a) and (c) are identified as realistic alternative scenarios, but only alternative (c) is found to be the credible alternative scenario to the project activity.

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

Both the above identified alternatives, whether they are realistic and credible or not are in compliance with all mandatory applicable legal and regulatory requirements, among which the following are the most important ones:

Table 10. Important mandatory laws and regulations that the project is consistent with[70,71]

(a) Legislation about electricity generation and marketing[72,73]:

Law / Regulation / Communiqué / Protocol	Number / Enforcement Date
Electricity Market Law	4628 / 03.03.2001
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy	5346 / 18.05.2005
Energy Efficiency Law	5627 / 02.05.2007
Electricity Market Licence Regulation	- / 04.08.2002
Electricity Market Grid Regulation	- / 22.01.2003
Electricity Market Distribution Regulation	- / 19.02.2003
Regulation on Procedures and Principles as to Giving Renewable Energy Source Certificate	- / 04.10.2005
Regulation on Certification and Support of Renewable Energy Sources	- / 21.07.2011
Electricity Transmission System Supply Reliability and Quality Regulation	- / 10.11.2004
Electrical Installations Project Regulation	- / 16.12.2009
Regulation on Technical Evaluation of Licence Applications based on Wind Energy	- / 09.11.2008
Competition Regulation as to Licence Applications to Install Generation Facility Based On Wind Energy	- / 22.09.2010
Protocol as to Establishment of Permission Procedures about Effects of Wind Energy Power Plant Installation on Communication, Navigation and Radar Systems	- / 27.12.2010
Regulation on Domestic Manufacturing of the Equipment Used in Facilities Generating Electrical Energy from Renewable Energy	- / 19.06.2011

[70] Republic of Turkey Prime Ministry General Directorate of Legislation Development and Publication Legislation Information System – E-Legislation. Accessed on 28/08/2015.
http://mevzuat.basbakanlik.gov.tr/ http://www.mevzuat.gov.tr/
[71] Republic of Turkey Official Gazette. Accessed on 28/08/2015.
http://www.resmigazete.gov.tr/default.aspx
[72] Republic of Turkey – Energy Market Regulatory Authority - Electricity Market Legislation. Accessed on 28/08/2015.
http://www.epdk.org.tr/index.php/elektrik-piyasasi/mevzuat
http://www.emra.org.tr/index.php/electricity-market/legislation
[73] Republic of Turkey Ministry of Energy and Natural Resources Official Web Site. Ministry / Legislations. Accessed on 28/08/2015.
http://www.enerji.gov.tr/en-US/Legislations

Sources	
Regulation on Electrical Energy Demand Forecasts	- / 04.04.2006
Electricity Market Balancing and Settlement Regulation	
Electricity Market Tariffs Regulation	
Electricity Market Import and Export Regulation	- / 25.09.2002
Electricity Market Customer Services Regulation	- / 25.09.2002
Electricity Market Eligible Consumer Regulation	- / 04.09.2002
Electricity Market Ancillary Services Regulation	- / 27.12.2008
Communiqué on Connection to Transmission and Distribution Systems and System Usage in the Electricity Market	- / 27.03.2003
Communiqué on Arrangement of Retail Contract in the Electricity Market	- / 31.08.2003
Communiqué on Meters to be used in the Electricity Market	- / 22.03.2003
Communiqué on Wind and Solar Measurements	- / 11.10.2002
Communiqué on Procedures and Principles of Making Financial Settlement in the Electricity Market	- / 30.03.2003

(b) Legislation about environment, forestry, labour and social security[74,75,76,77]:

Law / Regulation / Communiqué / Protocol	Number / Enforcement Date
Environmental Law	2872 / 11.08.1983
Forestry Law	6831 / 08.09.1956
Labour Law	4857 / 22.05.2003
Construction Law	3194 / 09.05.1985
Law on Soil Conservation and Land Use	5403 / 19.07.2005
National Parks Law	2873 / 11.08.1983
Cultural and Natural Heritage Preservation Law	2863 / 23.07.1983
Animal Protection Law	5199 / 01.07.2004
Environmental Impact Assessment Regulation	- / 17.07.2008
Regulation on Environmental Planning	- / 11.11.2008
Regulation on Permissions and Licences that have to be taken according to Environmental Law	- / 29.04.2009
Air Quality Assessment and Management Regulation	- / 06.06.2008
Environmental Auditing Regulation	- / 22.09.2010
Regulation on Environmental Agents and Environmental Consulting Firms	- / 12.11.2010
Regulation on Assessment and Management of Environmental Noise	- / 04.06.2010
Regulation on Control of Waste Oils	- / 30.07.2008
Regulation on Amendment in the Regulation on Control of Waste	- / 30.03.2010

[74] Republic of Turkey – Ministry of Environment and Urban Planning – General Directorate of Environmental Management – Legislation. Accessed on 28/08/2015.
http://www.csb.gov.tr/gm/cygm/#
[75] Republic of Turkey – Ministry of Environment and Urban Planning – General Directorate of Environmental Impact Assessment, Permit and Control – Legislation. Accessed on 28/08/2015.
http://www.csb.gov.tr/gm/ced/index.php?Sayfa=sayfa&Tur=webmenu&Id=167
[76] Republic of Turkey – Ministry of Forestry and Water Affairs – Legislation. Accessed on 28/08/2015.
http://www.ormansu.gov.tr/osb/osb/mevzuat1.aspx?sflang=tr
[77] Republic of Turkey – Ministry of Labour and Social Security – Legislation. Accessed on 28/08/2015.
http://www.csgb.gov.tr/csgbPortal/csgb.portal#

Oils	
Regulation on diggings that will be done where it is not possible to construct a sewage course	- / 19.03.1971
Regulation on Occupational Health and Safety	- / 09.12.2003
Noise Regulation	- / 23.12.2003
Vibration Regulation	- / 23.12.2003
Regulation on Machine Safety	- / 05.06.2002

Outcome of Step 1b: All the alternatives to the project whether they are realistic and credible or not are in compliance with all mandatory applicable and regulatory requirements.

Step 2: Investment analysis

The purpose of investment analysis is to determine whether the proposed project activity is not

(a) The most economically or financially attractive; or

(b) Economically or financially feasible, without the revenue from the sale of emission reductions[78].

To conduct the investment analysis, "Guidelines on the assessment of investment analysis - Version 05.0"[79,80] (referred to as "The Guidelines" hereafter in this section) has also been used apart from The Tool.

To conduct the investment analysis, stepwise approach of the Tool has been used.

Sub-step 2a: Determine appropriate analysis method

The Tool offers three alternative methods to conduct the investment analysis:

Option I : Simple Cost Analysis
Option II : Investment Comparison Analysis
Option III : Benchmark Analysis

Since the project activity and the alternatives identified in Step 1 generate financial or economic benefits by electricity sales, Option I (Simple Cost Analysis) cannot be applied.

To decide between Option II (Investment Comparison Analysis) and Option III (Benchmark Analysis), Paragraph 19 of the Guidance (page 5) has been used. According to this clause, since the alternative to the project activity is the supply of the electricity from the existing grid, Benchmark Analysis (Option III) is considered appropriate.

[78] Tool for the demonstration and assessment of additionality (Version 07.0.0). UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. Section 4. Methodology Procedure. Sub-Section 4.3. Step 2: Investment analysis. Paragraph 29. Page 9.
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[79] Tool for the demonstration and assessment of additionality - Version 07.0.0. Section 4. UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. Methodology procedure. Sub-section 4.3. Step 2: Investment analysis. Paragraph 30. Page 9.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[80] Guidelines on the assessment of investment analysis - Version 05.0. UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Guidelines.
https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150817153801600/Reg_guid03.pdf

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

IRR (Internal Rate of Return) is identified as the most suitable financial/economic indicator for the demonstration and assessment of additionality.

Equity IRR is selected as the IRR type to be used in the benchmark analysis. According to the Guidelines, Required/expected returns on equity are appropriate benchmarks for an equity IRR. When applying the benchmark analysis, the parameters that are standard in the market are used, according to the Paragraph 37 of the Tool[81].

Both the Equity IRR and the Benchmark Rate used as the reference are considered and calculated on a pre-tax approach.

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):

The discounted cash flow model is used in the investment analysis. This model uses published financial parameters or accounting data as inputs. Historical financial parameters, income statements and balance sheets are used to derive certain critical financial ratios. Those historical ratios are used as a starting point in making predictions for the same ratios in future years. In this approach, the first step in projecting future cash flow is to understand the past. This means looking at historical financial parameters of the market or historical data from the company's income statements, balance sheets, and cash-flow statements for a certain period of the past[82,83,84].

When calculating the financial indicators, a 5-year period was selected as the reference period, and the 5-year annual average is taken as the basis to calculate the relevant indicators. Using a single year would be misleading, and a 5-year period is an accepted and widely used duration to calculate the financial indicators, historical trends and future forecasts. [85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101]

[81] Tool for the demonstration and assessment of additionality (Version 07.0.0). UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. Section 4. Methodology Procedure. Sub-section 4.3.4. Sub-step 2b: Option III. Apply benchmark analysis. Paragraph 37. pp 9-10. https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[82] Discounted Cash Flow Methodology. Bear Sterns. Discounted Cash Flow Overview, pp. 1-6. Accessed on 08/06/2015. http://www.grahamanddoddsville.net/wordpress/Files/SecurityAnalysis/Valuation/7239393-Discounted-Cash-Flow.pdf

[83] Cashflow, Free Cashflow, and Proforma Forecasting. Proforma Forecasting Models. p. 1. Accessed on 08/06/2015. http://www2.hmc.edu/~evans/pdvcash.pdf

[84] An analysis of discounted cash flow (DCF) approach to business valuation in Sri Lanka. By Thavamani Thevy Arumugam. Matriculation Number: 8029. Dissertation submitted to St Clements University as a requirement for the award of the degree of Doctor of Philosophy in Financial Management. September 2007. Accessed on 08/06/2015. http://www.stclements.edu/grad/gradarum.pdf

[85] Statements on Management Accounting - Business Valuation - Published by Institute of Management Accountants. Copyright © 2009 in the United States of America by Institute of Management Accountants. PART IV. VALUATION ANALYSIS - Historical financial analysis p. 4, EXHIBIT 1. REVENUE RULING 59-60 - Sec. 4. Factors To Consider. – Article.02/(d). Page 33. Accessed on 08/06/2015. http://www.imanet.org/docs/default-source/research/sma/sma_businessvaluation_2012.pdf

[86] A Tutorial on the Discounted Cash Flow Model for Valuation of Companies-L. Peter Jennergren. Ninth revision, December 13, 2011. SSE/EFI Working Paper Series in Business Administration No. 1998:1 - (Stockholm School of Economics, Box 6501, S - 11383 Stockholm, Sweden)-Part 3. Historical financial statements and the calculation

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http://swoba.hhs.se/hastba/papers/hastba0001.pdf

[87] Valuation of Philip Morris ČR a.s. - M.Sc. in Economics and Business Administration Specialisation: Accounting, Strategy and Control. Master's thesis - Department of Accounting and Auditing - Copenhagen Business School, 2010 - Author: Martin Cingroš - Hand in: August 2, 2010. Page 14, Last Paragraph. Page 81, Third Paragraph. Page 96, First Paragraph. Accessed on 08/06/2015.
http://studenttheses.cbs.dk/bitstream/handle/10417/2385/martin_cingros.pdf

[88] FUNDAMENTAL EQUITY VALUATION Stock Selection Based on Discounted Cash Flow. By Pascal S. FROIDEVAUX. Thesis Presented to the Faculty of Economics and Social Sciences of the University of Fribourg (Switzerland) in fulfillment of the requirements for the degree of Doctor of Economics and Social Sciences. Accepted by the Faculty's Council on 1 July 2004. Section 4.2 Determining the Nominator: Cash Flow, Cash Flow Growth and the Growth Duration. Pages 28-34. Accessed on 08/06/2015.
https://doc.rero.ch/record/2901/files/FroidevauxP.pdf

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[91] Appropriate Period of Historical Financial Analysis. Blog Entry by Chris Mercer, CEO of Mercer Capital, an independent business appraisal firm. Various references and explanation on the appropriateness of the historical five-year period for financial analysis. Accessed on 08/06/2015.
http://valuationspeak.com/business-appraisal-review/appropriate-period-of-historical-financial-analysis/

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[98] European Bank for Reconstruction and Development (EBRD)-2012 Financial Report-Key financial indicators: 2008 – 12. Accessed on 07/06/2015.
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http://www.kitchener.ca/en/insidecityhall/resources/FP_Monthly_Financial_Indicators_2013_11.pdf

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http://www.toyota-global.com/investors/financial_data/

A) Benchmark Rate Calculation

The investment decision date is 29/03/2011, the signing date of the Credit Agreement with Creditor Bank (Commerzbank)[54,55]. Hence, for the purposes of investment analysis, this date is accepted as the reference date. The data available at this specific date is considered for the investment analysis. Hence, the five year period of [2006-2010] is accepted as the reference period for the investment analysis. For most of the parameters, the average value for this period is taken as the reference value.

To find the benchmark rate, option (a) of the Paragraph 38 of the Tool is used[102]:

"38. Discount rates and benchmarks shall be derived from:

(a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert or documented by official publicly available financial data;"

The benchmark rate is specified as the expected returns on equity (expected return on the capital asset / cost of equity); and calculated using the Capital Asset Pricing Model (CAPM), as follows[103,104,105,106,107]:

$$E(R) = R_f + \beta(ERP_m) + CRP$$

where:

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[101] Turkish Statistical Institute. Economic Indicators 2013. Reference to the annual data of the last five years. Page 4. Accessed on 07/06/2015.
http://www.turkstat.gov.tr/IcerikGetir.do?istab_id=241

[102] Tool for the demonstration and assessment of additionality (Version 07.0.0). UNFCCC > CDM > Rules and Reference (Reference / Documentation) > Tools. Section 4. Methodology Procedure. Sub-section 4.3.4. Sub-step 2b: Option III. Apply benchmark analysis. Paragraph 38. Page 10.
https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

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http://www.uff.br/mbaeconomia/sites/default/files/Damodaran-2003.pdf

[104] Estimating the country risk premium in emerging markets: the case of the Republic of Macedonia. By Aleksandar Naumoski, MSc. Ss. Cyril and Methodius University Skopje, Faculty of Economics, Department of Management, Blvd. Goce Delcev 9, 1000 Skopje, R. Macedonia. Published in FINANCIAL THEORY AND PRACTICE 36 (4) 413-434 (2012). p 418.
http://www.fintp.hr/upload/files/ftp/2012/4/naumoski.pdf

[105] Universidade Católica Portuguesa - Católica Lisbon School of Business & Economics - Banco Popular Equity Research – prepared by João Miguel Martins Gonçalves, 152110322. Published on 02/02/2012. Section 2.4. Cost of equity. pp 10-14.
http://repositorio.ucp.pt/bitstream/10400.14/11525/1/Tese%20equity%20valuation%20152110322%20Banco%20Popular%20research.pdf

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http://gcg.universia.net/pdfs_revistas/articulo_104_1227718800862.pdf

[107] Country Risk and the Cost of Equity. A case prepared by Professor Wei Li. January, 2002. University of Virginia Darden School Foundation, Charlottesville, VA. p. 2.
http://faculty.virginia.edu/wei_li/em/country-beta.pdf

$E(R)$: Expected returns on equity (Cost of Equity)
R_f : Risk Free Return Rate in the Market (e.g. government bond yield)
β : Beta Coefficient – Sensitivity of the Expected Returns to Market Returns
ERP_m : Equity Risk Premium for Mature Equity Market
CRP : Country Risk Premium

The assumptions and references for the calculation of the rates and coefficients above are explained below:

i) Risk Free Rate (R_f)

As the representative of the risk free rate, long-term average returns of US treasury bond with a maturity of 20 years is chosen. U.S. Department of the Treasury data [108] has been used to calculate this rate. The 5-year period of [2006-2010] was assumed as the reference period. The arithmetic average of the annual averages for these years was accepted as the government bond yield rate; hence the risk free rate. This value was calculated as 4.48 %.

ii) Beta Coefficient (β)

As with the other financial indicators, the historical period for beta evaluation is also specified as the past five years, according to the generally accepted principles and procedures widely used in the market[109,110,111,112,113,114].

Beta Coefficient is taken from the data included in the studies of Aswoth Damodaran, a well-known independent researcher and an academician at the Stern School of Business at New York University.[115].

[108] U.S. Department of the Treasury, Resource Centre, Interest Rate Statistics, Daily Treasury Yield Curve Rates. http://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=yield

[109] Discounted Cash Flow Methodology. Bear Sterns. Calculating the Cost of Equity Capital, page 8. Information on the calculation of Beta. Accessed on 08/06/2015. http://www.grahamanddoddsville.net/wordpress/Files/SecurityAnalysis/Valuation/7239393-Discounted-Cash-Flow.pdf

[110] KPMG Corporate Finance Valuation Practices Survey 2013. Beta Calculation, page 15. Accessed on 08/06/2015. https://www.kpmg.com/AU/en/IssuesAndInsights/ArticlesPublications/valuation-practices-survey/Documents/valuation-practices-survey-2013-v3.pdf

[111] University of North Carolina – Wilmington Cameron School of Business Economics and Finance. Dr. Joseph A. Farinella. Associate Professor of Finance. Handout for Income Approach. Beta Measurement Characteristics of Common Financial Reporting Services, page 9. Accessed on 08/06/2015. http://www.csb.uncw.edu/people/farinellaj/classes/msa540/handouts/Income%20Approach%20posted.doc

[112] Betas Used by Professors: A Survey with 2500 Answers. By Pablo Fernandez. Working Paper WP-822, September 2009. IESE Business School, University of Navarra. Various references on the usage of past five year period for historical beta calculation. Accessed on 08/06/2015. http://www.iese.edu/research/pdfs/DI-0822-E.pdf

[113] Beta: A Statistical Analysis of a Stock's Volatility. Courtney Wahlstrom. Iowa State University, Master of School Mathematics. Creative Component. Fall 2008. Various references on the usage of past five year period for beta calculation. Accessed on 08/06/2015. http://www.math.iastate.edu/thesisarchive/MSM/WahlstromMSMF08.pdf

[114] Forecasting β: An Evaluation of the Bloomberg Heuristic. By Edward. J. Lusk (State University of New York, USA), Henrieta Koulayan (Otto-von-Guericke University, Germany). Investment Management and Financial Innovations, Volume 4, Issue 1, 2007. Pp. 56-60. References to the usage of past five years for beta calculation. Accessed on 08/06/2015. http://businessperspectives.org/journals_free/imfi/2007/imfi_en_2007_01_Lusk.pdf

Since US Market is assumed to be a mature market in the studies of Prof. Damodaran[116], and the historical data for Implied Equity Risk Premiums for US Market is taken as the reference for the Equity Risk Premium, the related beta for the US Market is taken, and the arithmetic average of the annual values is accepted as the Beta Coefficient. The project activity is a power generating project, and the project proponent is in the sector of power industry. Hence, the average levered beta values for power industry in US for the reference period is considered to calculate the beta coefficient value[117]. The value of the Beta Coefficient was found to be 1.70.

iii) Equity Risk Premium (ERP_m)

To assess the equity risk premium, US market is assumed to be a mature market, as stated in Prof Damodaran's article[103], and Implied Equity Risk Premiums for US Market is taken for the reference period of [2006-2010], and the arithmetic average of the annual values for this period is accepted as the equity risk premium[118]. The resultant value for Equity Risk premium is found to be 4.90 %.

iv) Country Risk Premium (*CRP*)

Country Risk Premiums for Turkey for the same 5-year reference period above ([2006-2010]) are also taken from the data included in the studies of Aswoth Damodaran[119], and their arithmetic average is accepted as the country risk premium of Turkey as at the end of 2010. The country risk premium value is found to be 5.25 %.

v) Expected Returns on Equity (Cost of Equity) ($E(R_i)$)

The expected returns on equity (cost of equity), the benchmark rate that is be used, is found, using the calculations above, as:

$$E(R) = R_f + \beta(ERP_m) + CRP = 4.48\% + 1.70 * 4.90\% + 5.25\% = 18.09\%$$

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[115] The Data Page of Personal Homepage of Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University. Accessed on 08/06/2015.
http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html

[116] Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2013 Edition. Aswath Damodaran. New York University - Stern School of Business. March 23, 2013. Accessed on 08/06/2015.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2238064

[117] Levered and Unlevered Betas by Industry, Archived Historical Data from the Personal Homepage of Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University. Accessed on 08/06/2015.
http://pages.stern.nyu.edu/~adamodar/New_Home_Page/data.html

[118] Implied Equity Risk Premiums for US Market, Archived Historical Data from the Personal Homepage of Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University. Accessed on 08/06/2015.
http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/implpr.html
http://www.stern.nyu.edu/~adamodar/pc/datasets/histimpl.xls

[119] Risk Premiums for Other Markets, Historical Data from the Personal Homepage of Aswath Damodaran, Professor of Finance at the Stern School of Business at New York University. Accessed on 08/06/2015.
http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html
http://www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls

So, the benchmark discount rate to be used in the investment analysis is 18.09%. This rate can be assumed as reliable and conservative since it takes a period long enough (a five year period of [2006-2010]) as the reference and the beta coefficient takes all the companies in the power (electricity generation and trading sector) in US.

A) Equity IRR Calculation for the Project

The following assumptions were made in calculating the Equity IRR for the project:

1) Carbon Credit (VER) revenues were excluded in the IRR calculation used for benchmark analysis. But they are kept in the spreadsheet for information purposes and included in the sensitivity analysis. The VER revenues were calculated assuming a GS-VER credit unit price of 11.20 USD/tCO_2-eq, the average market value indicated for Turkey in the Ecosystem Marketplace State of the Voluntary Carbon Markets 2011 Report[120].

2) Equity IRR is calculated using Before-Tax (Pre-tax) Method approach. This approach was chosen since it is a more reliable and a more widely used method in the investment analysis in the financial world[121,122]. But After-Tax (Post-tax) values were kept in the investment analysis spreadsheet for the sake of informational completeness. Benchmark values are also selected as pre-tax values, hence Equity IRR is compatible and consistent with the Benchmark Rate.

3) The Energy Sales Unit Price was accepted as the guaranteed feed-in-tariff specified in the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346, Issuance Date: 18.05.2005)[123], which is 5.5 Eurocent/kWh, the valid price at the date of loan agreement. This price can be accepted as conservative, since it represents the minimum guaranteed price for electricity originating from hydropower projects. The price in the free electricity trade market is generally higher than that.

4) EUR/TRY and USD/TRY Exchange Rates, as well as the EUR/USD Exchange Cross Rate, which are used to convert currencies of Turkish Lira, US Dollars and Euro to each other, are calculated using the Turkish Central Bank data[124]. This can be accepted as reliable and conservative since it assumes a period long enough (a five year period of [2006-2010]) as the reference.

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[120] Ecosystem Marketplace State of the Voluntary Carbon Markets 2011 Report, page 26. Accessed on 08/06/2015.
http://www.forest-trends.org/documents/files/doc_2828.pdf

[121] Investopedia. Definiton of the term "Pretax Rate of Return". Accessed on 08/06/2015.
http://www.investopedia.com/terms/p/pretax-rate-of-return.asp

[122] UK Government Web Site. Guidance Note: The Use of Internal Rates of Return in PFI Projects. Accessed on 08/06/2015.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/225363/02_pfi_internalratesguidance1_210307.pdf

[123] Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346, Issuance Date: 18.05.2005)
http://www.epdk.gov.tr/documents/elektrik/mevzuat/kanun/Elk_Kanun_Yek_Kanun.doc

[124] Central Bank of the Republic of Turkey. Exchange Rates (Daily). Accessed on 23/06/2015.
http://evds.tcmb.gov.tr/cgi-bin/famecgi?cgi=$ozetweb&DIL=UK&ARAVERIGRUP=bie_dkdovizgn.db

5) The Average Expected Annual Electricity Generation Amount is calculated by multiplying the project generation of the project activity indicated in the licence by the ratio found by dividing the total firm generations of CDM-VER Wind Projects in Turkey by their total project generations for 2013, receiving the data from 2014 Capacity Projection Report of TEIAS[8]. The firm energy generation capacity values in this report are based on actual generations of the power plants. By this way, the annual estimated firm energy generation capacity for the project is found. This can also be assumed as reliable and conservative, since it uses the official value from a government source, and takes all the wind farms similar to the project activity into account for a one-year period, a duration that is generally accepted long enough (minimum) for wind power feasibility studies.

6) To find the net amount of electricity generated by the project activity, the electricity drawn from the grid by the project should also be taken into account and subtracted from the amount of electricity fed into the grid. However, no reliable and official data could be found regarding the energy drawn from the grid by power plants. Hence, this estimated amount of energy drawn from the grid is simply ignored. This can also be assumed as acceptable since this drawn energy is small enough to be included in the error range of estimated energy fed into the grid.

7) Since the credit agreement uses EURIBOR as the basis for interest rate of credit reimbursement[54], EURIBOR values are included in the investment analysis. EURIBOR values used in the calculation for loan repayment and interests in the investment analysis were also received from a reliable source[125], and calculated for the same 5-year reference period ([2006-2010]), as in the other parameters.

8) The project and investment cost values are taken from the figures in the agreements and realized figures as soon as possible, bearing their validity and plausibility at the date of loan agreement. For this reason they are cross checked with the values in the Financial Feasibility submitted to the creditor bank before the loan agreement.

9) The values for credit are taken from the Credit Loan Agreement made between the Creditor Bank and the Project Proponent.

10) The project lifetime period is accepted as 20 years, as explained in Section A.1. Hence, the investment analysis is also done for a 20-year period, considering both the project lifetime, and also as explained in "Guidelines on the assessment of investment analysis (Version 05.0.0)"[126] and in "Clarification - Applicability of the "Guidelines on the assessment of investment analysis" (Version 01.0)"[127].

11) The evaluation of the fair value of the project activity assets at the end of the assessment period is made according to the relevant guidelines and clarifications[126,127], the depreciation period for the civil works is accepted as 49 years, the licence period, and the depreciation period for the electromechanical equipment is assumed to be equal to the project lifetime, i.e,, 20 years.

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[125] European Central Bank (ECB) Statistical Data Warehouse
http://sdw.ecb.europa.eu/quickview.do?SERIES_KEY=143.FM.A.U2.EUR.RT.MM.EURIBOR6MD_.HSTA

[126] Guidelines on the assessment of investment analysis (Version 05.0.0)
http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

[127] Clarification - Applicability of the "Guidelines on the assessment of investment analysis" (Version 01.0)
https://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20130604103656275/meth_guid53.pdf

A summary of the benchmark analysis and the relevant parameters can be found in the following table:

Table 9. Summary of Benchmark Analysis and Financial Data

Parameter	Unit	Value	Reference / Source / Justification
Installed Capacity	MWe	24	Project Activity Electricity Generation Licence
Expected Annual Firm Energy Generation	MWh	68,920	Project Activity Electricity Generation Licence, and calculations based on the TEIAS firm energy values for CDM Wind Farms.
Carbon Credit Unit Price	USD/tCO_2-eq	11.20	Ecosystem Marketplace State of the Voluntary Carbon Markets 2011 Report
Energy Unit Price	EURcent/kWh	5.50	Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346, Issuance Date: 18.05.2005)
Emission Factor	tCO_2/MWh	0.572	Emission Factor Calculation, made according to "Tool to calculate the emission factor for an electricity system (Version 04.0)"[32]
Risk Free Rate (R_f)	%	4.48	U.S. Department of the Treasury, Resource Centre, US Treasury Bond Rates with maturity of 20 years for the period of [2006-2010].
Beta Coefficient (β)	-	1.70	Data for US Power Industry for the 5-year period of [2006-2010] from Studies of Prof. Aswath Damodaran.
Equity Risk Premium (ERP_m))	%	4.90	Data for US Market, accepted as a mature equity market, from Studies of Prof. Aswath Damodaran.
Country Risk Premium	%	5.25	Data for Turkey for the 5-year period of [2006-2010] from Studies of Prof. Aswath Damodaran.
Benchmark Discount Rate (Expected Returns on Equity)	%	18.09	Calculated using the relevant parameters according to the Capital Asset Pricing Model (CAPM).
EUR/TRY Exchange Rate	-	1.9228	Turkish Central Bank Data for the 5-year period of [2006-2010]
USD/TRY Exchange Rate	-	1.4145	Turkish Central Bank Data for the 5-year period of [2006-2010]
EUR/USD Exchange Cross Rate	-	1.3644	Turkish Central Bank Data for the 5-year period of [2006-2010]
Total Investment Cost	EUR	31,071,140	Investment Analysis
Total Operation and Maintenance Costs	EUR	13,338,695	Investment Analysis
Equity / Total Investment Cost Ratio	%	22	Investment Analysis
Debt / Total Investment Cost Ratio	%	78	Investment Analysis
Project Lifetime	Years	20	Turbine specifications given by the provider

			company. Studies performed by the turbine provider and other researchers.
Investment Analysis Period	Years	20	Project lifetime and CDM Guidelines and Clarifications
Equity IRR (Before Tax)	%	7.22	Investment Analysis Cash Flow (VER Revenues ignored)

Comparison results of financial indicators can be summarized and depicted in the table below:

Table 10. Comparison results of financial indicators

Indicator	Value
Benchmark Discount Rate	18.09 %
Equity IRR (Before Tax, without Carbon Revenues)	7.22%

The results of the comparison show that without the extra income of carbon revenues, the Equity IRR of the project activity is equal to 7.22% and lower than the benchmark discount rate, which is 18.09 %. This clearly indicates that the project activity cannot be considered as financially attractive.

The Equity IRR of the project is low as compared to other similar projects. There are mainly two reasons for this case. In the first place, the installed capacity of the project (24 MW) is low. As a result, the predicted average annual generaton is low. This reduces the expected Equity IRR. And the other and more important reason why the IRR is lower than normal is the fact that the construction and the commissioning of the project have been delayed due to the inadequacy of the regional transmission system and the absence of a transformer centre to which it was to be connected. Consequently, the termination of the transformer centre construction had been waited to start the construction of the main project site including the turbines. So, the credit repayments began well before the commissioning of the project. This delay also greatly reduced the IRR.

Equity IRR is most sensitive to Project Costs, and to a lesser extent, Electrical Energy Generation Amount and Electrical Energy Price. But the impact of these parameters are effective only in the extreme variations of more than ± %20.

With carbon revenues, Equity IRR value is 9.57%, which is also lower than the benchmark discount rate of 18.09 %. But carbon revenues give extra financial support to the project development and alleviate the financial hardships. Taking the VER Carbon Revenues into account brings some extra co-benefits to the project developer like fulfilling the Social Corporate Responsibility in an environment-friendly way, helping promote the image of the project developer, and increasing the chance of getting future incentives. Most importantly, additional financial income, extra detailed financial and environmental feasibility and documentation studies, and extra care taken in by developing the project as a CDM-VER Project greatly increases the probability of finding debt from a credit institution.

Sub-step 2d: Sensitivity analysis (only applicable to Options II and III)

A Sensitivity Analysis was made in order to show whether the conclusion regarding the financial/economic attractiveness is robust to reasonable variations in the critical assumptions. For this purpose, the sensitivity analysis is applied to following parameters:

1) Total Project Cost

2) Operational, Service and Maintenance Costs
3) Electrical Energy Generation
4) Electrical Energy Sales Price

The sensitivity analysis was applied to these parameters for two cases, one with carbon revenues, and the other without carbon revenues; and for a range of ± 20 %, with increments of 5 %. The results are summarized in the table below:

Table 13. Parameters and Variances Used in Sensitivity Analysis

Variable	**Total Project Cost**								
Variance	**-20%**	**-15%**	**-10%**	**-5%**	**0%**	**5%**	**10%**	**15%**	**20%**
Amount (EUR)	23,419,222	24,882,923	26,346,625	27,810,326	**29,274,027**	30,737,729	32,201,430	33,665,132	35,128,833
IRR (with VER Revenues)	17.66%	14.65%	12.50%	10.86%	**9.57%**	8.52%	7.64%	6.90%	6.26%
IRR (without VER Revenues)	13.64%	11.28%	9.57%	8.26%	**7.22%**	6.37%	5.66%	5.06%	4.54%
Variable	**Operational, Service & Maintenance Costs**								
Variance	**-20%**	**-15%**	**-10%**	**-5%**	**0%**	**5%**	**10%**	**15%**	**20%**
Total Amount (EUR)	10,670,956	11,337,891	12,004,826	12,671,760	**13,338,695**	14,005,630	14,672,565	15,339,499	16,006,434
IRR (with VER Revenues)	10.48%	10.26%	10.03%	9.80%	**9.57%**	9.34%	9.11%	8.87%	8.64%
IRR (without VER Revenues)	8.16%	7.93%	7.69%	7.45%	**7.22%**	6.98%	6.73%	6.49%	6.25%
Variable	**Electrical Energy Generation**								
Variance	**-20%**	**-15%**	**-10%**	**-5%**	**0%**	**5%**	**10%**	**15%**	**20%**
Amount (MWh)	55,136	58,582	62,028	65,474	**68,920**	72,366	75,812	79,258	82,704
IRR (with VER Revenues)	3.44%	5.02%	6.57%	8.08%	**9.57%**	11.03%	12.48%	13.91%	15.32%
IRR (without VER Revenues)	1.40%	2.90%	4.37%	5.81%	**7.22%**	8.60%	9.97%	11.31%	12.64%
Variable	**Electrical Energy Sales Price**								

Variance	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%
Amount (EURcent/kWh)	4.40	4.68	4.95	5.23	**5.50**	5.78	6.05	6.33	6.60
IRR (with VER Revenues)	3.94%	5.39%	6.81%	8.20%	**9.57%**	10.92%	12.25%	13.57%	14.87%
IRR (without VER Revenues)	1.40%	2.90%	4.37%	5.81%	**7.22%**	8.60%	9.97%	11.31%	12.64%

The same results are also illustrated in the following figure:

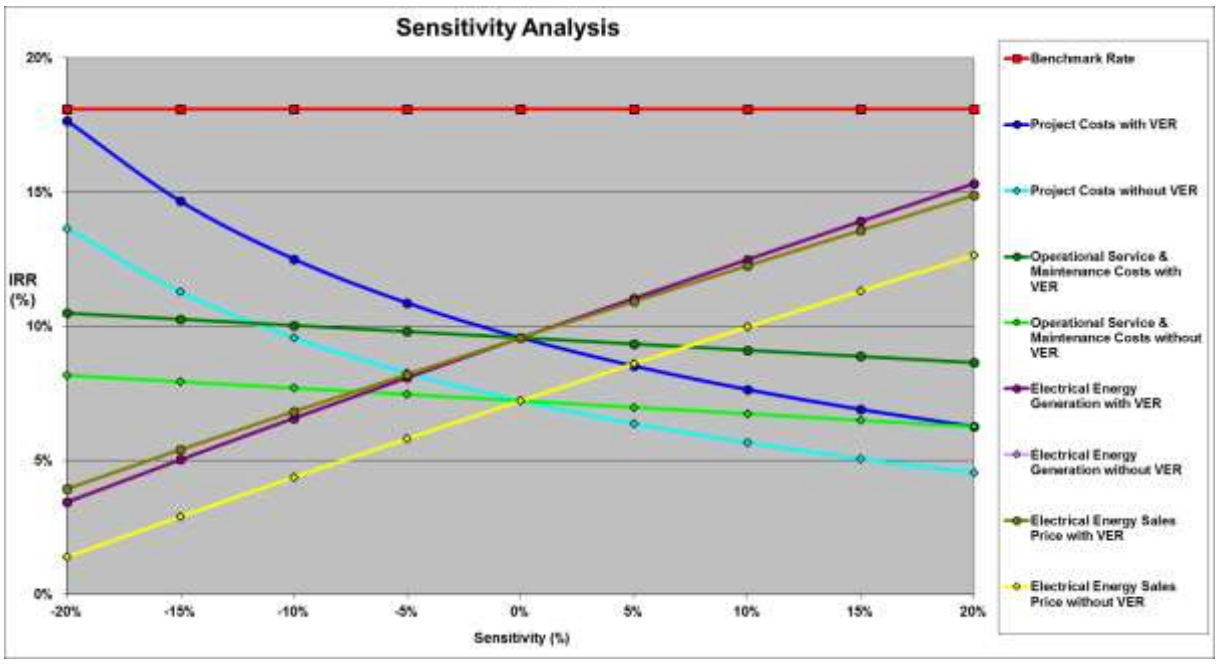

Figure 3. Sensitivity Analysis Results

The results found in the sensitivity analysis indicate that only under extreme alternative scenarios for some parameters with variations of more than about ± % 5 - 10, and only with carbon revenues, the Equity IRR value can reach or approach the Benchmark Discount Rate of 18.09 %. Without the carbon revenues, the occurrence of a parameter exceeding the benchmark is not possible even in the extreme conditions with variations more than ± %15.

The parameters most sensitive to change are Project Costs, Electrical Energy Generation, and Electrical Energy Sales Price. The Operational Service & Maintenance Costs parameter does not seem to cause very sensitive changes in IRR and its curve lies always well under the benchmark rate within the the specified change range of [-20%,+20%], with or without VER revenues. The Project Costs parameter causes the IRR to become 17.66% with VER revenues, and 13.64% without VER revenues, at the closest point with a decrease of 20%. The Electrical Energy Generation and Electrical Energy Sales Price parameters cause similar and mostly parallel variations, as expected, making the IRR about 15% with VER revenues, and about 13% without VER revenues at its closest point to the benchmark rate with a 20% increase.

Thus, the probability of the Equity IRR reaching or exceeding the Benchmark Discount Rate is very low, even with VER revenues. This can happen only in extreme conditions where the related paremeters vary more than 20%; as can be seen in the above tables and the figure. Considering the fact that a decrease in the project costs more than 20%, or an increase in generation amount or energy price more than 20% is very unlikely, such a case is not really possible.

Hence, the sensitivity analysis showed that the conclusion regarding financial/economic attractiveness of the project is robust to reasonable variations in the critical assumptions.

The details of investment analysis can be found in the separate spreadsheet file supplied as an annex to this Project Description.

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

Step 3: Barrier analysis

This step is not applied.

Step 4: Common practice analysis

According to "Tool for the demonstration and assessment of additionality-Version 07.0.0"[128] (Hereafter referred to as "The Tool" in this section regarding the Common Practice Analysis) and "Guidelines on common practice-Version 02.0"[129], (Hereafter referred to as "The Guidelines" in this section regarding the Common Practice Analysis), the Common Practice Analysis procedure was applied for the project activity.

The project activity is a wind farm realizing power generation based on renewable energy. Hence, it falls under the category defined in the sub-clause (ii) in the "Measure" definition of the Tool (page 5) and sub-clause (b) in the "Measure" definition of the Guidelines (page 1):

"Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies (example: energy efficiency improvements, power generation based on renewable energy);"[129]

As a result, sub-step 4a was applied.

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

According the rules of the Guideline, the applicable geographical area is Turkey, and the output of the project activity is electricity.

Since Turkey has no binding regulations under the Kyoto Protocol, there are no CDM projects in Turkey. For that reason, VER (Verified Emission Reduction) Projects developed voluntarily were accepted as CDM projects in applying the common practice analysis.

[128] Tool for the demonstration and assessment of additionality - Version 07.0.0. Section 4. Methodology procedure. Sub-section 4.5. Step 4: Common practice analysis. Paragraph 57. Page 13. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

[129] Guidelines on common practice-Version 02.0 https://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid44.pdf

The stepwise approach for common practice described in the second section of the Guidelines was applied.

For Step 1 of this stepwise approach, the calculation of the output range is done based on the installed capacity of the project. Since the installed capacity of the project is 24 MW, the output range will be 24 +/- 50 % = [12 – 36] MW.

For Step2, firstly, identification of the similar projects was done according to the sub-paragraphs (a), (b), (c), (d) and (f) of paragraph 6 of the stepwise approach, as described on page 2 - 3 of the Guidelines. The result of this first phase is operational wind farms in Turkey at the start date of the prpjec activity, which is 04/12/2012[61]. The below table shows these power plants:

Table 14. Operational Wind Power Plants in Turkey as at the Start Date of the Project Activity

Wind Farm Projects in Turkey (As at Start Date of the Project Activity-04/12/2012)							
	Legal Status	**Power Plant Name**	**Installed Capacity MW**	**Location (Province)**	**Commissioning Date**	**VER Standard**	**Markit Registry ID / Code**
1	IPP	AK ENERJİ AYYILDIZ (BANDIRMA)	15.0	Balikesir	05.09.2009	GS	103000000002293
2	IPP	AKDENİZ ELEK. MERSİN RES	33.0	Mersin	19.03.2010	GS	103000000002175
3	IPP	AKRES (AKHİSAR RÜZGAR)	43.8	Manisa	01.07.2011	GS	103000000001974
4	IPP	AKSU RES (AKSU TEMİZ EN.)	72.0	Kayseri	16.03.2012	GS	103000000001796
5	IPP	ALİZE ENERJİ (ÇAMSEKİ)	20.8	Canakkale	24.06.2009	GS	103000000002517
6	IPP	ALİZE ENERJİ (DELTA PLASTİK)	1.5	Izmir			
7	IPP	ALİZE ENERJİ (KELTEPE)	20.7	Balikesir	23.07.2009	GS	103000000002479
8	IPP	ALİZE ENERJİ (SARIKAYA ŞARKÖY)	28.8	Tekirdag	19.10.2009	GS	103000000002339
9	IPP	ANEMON ENERJİ (İNTEPE)	30.4	Canakkale	22.02.2007	GS	103000000002564
10	BOT	ARES (ALAÇATI)	7.2	Izmir			
11	IPP	ASMAKİNSAN (BANDIRMA-3 RES)	24.0	Balikesir	26.02.2010	GS	103000000002244
12	IPP	AYEN ENERJİ (AKBÜK)	31.5	Aydin	19.03.2009	GS	103000000002480
13	IPP	AYVACIK (AYRES)	5.0	Canakkale	23.10.2011	GS	103000000005541
14	IPP	BAKİ ELEKTRİK ŞAMLI RÜZGAR	114.0	Balikesir	08.08.2008	GS	103000000002560
15	IPP	BAKRAS ELEK.ŞENBÜK RES	15.0	Hatay	22.04.2010	GS	103000000002194
16	IPP	BALIKESİR RES	112.8	Balikesir	17.08.2012	GS	103000000001959
17	IPP	BANDIRMA RES (BORASKO)	60.0	Balikesir	18.09.2009	GS	103000000002183
18	IPP	BARES (BANDIRMA)	35.0	Balikesir	20.04.2006	GS, VER+	103000000001858
19	IPP	BELEN HATAY	36.0	Hatay	02.10.2009	GS	103000000002526
20	IPP	BERGAMA RES (ALİAĞA RES)	90.0	Izmir	16.06.2010	GS	103000000002192
21	IPP	BOREAS EN.(ENEZ RES)	15.0	Edirne	09.04.2010	GS	103000000002225
22	BOT	BORES (BOZCAADA)	10.2	Canakkale			
23	IPP	BOZYAKA RES (KARDEMİR)	12.0	Izmir	12.03.2012	GS	103000000001624
24	IPP	ÇANAKKALE RES (ENERJİ-SA)	29.9	Canakkale	11.02.2011	GS	103000000002023
25	IPP	ÇATALTEPE (ALİZE EN.)	16.0	Balikesir	19.04.2011	GS	103000000002342
26	IPP	DAĞPAZARI RES (ENERJİ SA)	39.0	Mersin	20.05.2012	GS	103000000001896
27	IPP	DATÇA RES	29.6	Mugla	18.12.2008	GS	103000000002478
28	IPP	DENİZLİ ELEKT. (Karakurt-Akhisar)	10.8	Manisa	28.05.2007	VCS, VER+	66
29	IPP	DOĞAL ENERJİ (BURGAZ)	14.9	Canakkale	08.05.2008	GS	103000000002477
30	IPP	ERTÜRK ELEKT. (ÇATALCA)	60.0	Istanbul	14.06.2008	GS	103000000002544

31	IPP	ERTÜRK ELEKT. (TEPE)	0.9	Istanbul	22.12.2006		
32	IPP	GÜNAYDIN RES (MANRES EL.)	10.0	Balikesir	20.11.2012	GS	103000000001752
33	IPP	İNNORES ELEK. YUNTDAĞ	57.5	Izmir	07.03.2008	GS	103000000002559
34	IPP	KARADAĞ RES (GARET EN.)	10.0	Izmir	04.07.2012		
35	IPP	KAYADÜZÜ RES (BAKTEPE EN.)	39.0	Amasya	16.03.2012	GS	103000000001979
36	IPP	KİLLİK RES (PEM EN.)	40.0	Tokat	13.10.2011	GS	103000000001982
37	IPP	KORES KOCADAĞ	15.0	Izmir	23.12.2009	GS	103000000002326
38	IPP	KUYUCAK (ALİZE ENER.)	25.6	Manisa	09.12.2010	GS	103000000002340
39	IPP	LODOS RES (TAŞOLUK)KEMERBURGAZ	24.0	Istanbul	20.06.2008	GS	103000000002413
40	IPP	MARE MANASTIR	39.2	Izmir	08.12.2006	GS	103000000002543
41	IPP	MAZI 3	30.0	Izmir	09.09.2009	GS	103000000002528
42	IPP	METRİSTEPE (CAN EN.)	39.0	Bilecik	12.03.2012	GS	103000000001863
43	IPP	POYRAZ RES	50.0	Balikesir	04.07.2012	GS	103000000002341
44	IPP	ROTOR (OSMANİYE RES-GÖKÇEDAĞ RES)	135.0	Osmaniye	15.10.2010	GS	103000000002442
45	IPP	SAMURLU RES(DOĞAL EN.)	22.0	Izmir	31.08.2012	GS	103000000002337
46	IPP	SARES (GARET ENER.)	22.5	Canakkale	22.12.2010	GS	103000000001967
47	IPP	SAYALAR RÜZGAR (DOĞAL ENERJİ)	34.2	Manisa	06.06.2008	GS	103000000001840
48	IPP	SEBENOBA (DENİZ ELEK.)SAMANDAĞ	30.0	Hatay	26.03.2008	VCS, VER+	553
49	IPP	SEYİTALİ RES (DORUK EN.)	30.0	Izmir	22.07.2011	GS	103000000002338
50	IPP	SOMA RES	140.1	Manisa	05.09.2009	GS	103000000002518
51	IPP	SOMA RES (BİLGİN ELEK.)	90.0	Manisa	13.08.2010	GS	103000000002272
52	IPP	SÖKE ÇATALBÜK RES (ABK EN.)	30.0	Aydin	08.01.2012	GS	103000000002274
53	AP	SUNJÜT	1.2	Istanbul	22.04.2005		
54	IPP	SUSURLUK (ALANTEK EN.)	45.0	Balikesir	13.02.2011	GS	103000000002075
55	IPP	ŞAH RES (GALATA WIND)	93.0	Balikesir	19.05.2011	GS	103000000002024
56	IPP	ŞENKÖY RES (EOLOS RÜZ.)	26.0	Hatay	04.05.2012	GS	103000000001895
57	IPP	TURGUTTEPE RES (SABAŞ ELEK.)	24.0	Aydin	30.12.2010	GS	103000000002317
58	IPP	ÜTOPYA ELEKTRİK	30.0	Izmir	11.08.2009	GS	103000000002255
59	IPP	ZİYARET RES	57.5	Hatay	15.07.2010	GS	103000000002310

Abbreviations: BOT: Build-Operate-Transfer, AP: Autoproducer, IPP: Independent Power Producer, VER: Verified Emission Reduction, GS: Gold Standard, VCS: Verified Carbon Standard

59 wind farms were operational at the start date of the project activity, which is 04/12/2012[130,131]. As can be seen from the table, most of the wind farms (53 of 59) have been developed as CDM project activities[132,133,134,135,136]. Only 6 wind farms are non-CDM projects. The reasons for their being non-CDM

[130] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2013-2017. Annex-1: Current System (As at the end of 2012). pp 80-97. Accessed on 15/08/2015. http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2013.pdf

[131] Republic of Turkey Ministry of Energy and Natural Resources > Info Bank > Publications > EIGM (General Directorate of Energy Affairs) Reports > Year 2012 Energy Investments. Accessed on 15/08/2015. http://www.enerji.gov.tr/File/?path=ROOT%2f1%2fDocuments%2fE%c4%b0GM+Ana+Rapor%2f2012_Yili_Enerji_Yatirimlari.xls

[132] Markit Environmental Registry Public View – Projects. Accessed on 17/08/2015. https://mer.markit.com/br-reg/public/index.jsp?entity=project&sort=project_name&dir=ASC&start=0&entity_domain=Markit,GoldStandard

[133] The VCS Project Database Project Search Results. Accessed on 17/08/2015. http://www.vcsprojectdatabase.org/#/projects

wind power projects is due to their legal status (BOT or Autoproducer), their early commissioning before the applicability of VER scheme or their small installed capacity size. For these reasons, these 6 projects could not be developed as VER projects.

If we apply the output range criterion for the identification of similar projects, as indicated in sub-paragraph (e) of paragraph 6 of the stepwise approach, all these 6 non-CDM projects will be eliminated, along with some of the CDM projects.

If we further proceed with Steps (3), (4) and (5) of the same stepwise approach, as explained in the paragraphs, (7), (8) and (9) of the stepwise approach of the Guideline, we will see that no projects can be identified as similar to the project. Hence N_{all} = 0, N_{diff} = 0, and the formula F = 1- N_{diff}/N_{all} becomes not applicable. Also, as per the paragraph (10), F is indefinite and N_{all} - N_{diff} = 0 is less than 3. So, the proposed project activity is not a "common practice".

Hence, no similar projects could be found according to the Common Practice Analysis made according to the Tool and the Guidelines, the project activity is not common practice.

Further details of common pracrice analysis can be found in the related worksheets of Emission Reduction Calculation spreadsheet file, which is an annex to this document.

Outcome of Step 4: The outcome of Step 4 is that the proposed project activity is not regarded as "common practice", hence, the proposed project activity is additional.

B.6. Emission reductions
B.6.1. Explanation of methodological choices

To establish the baseline scenario for the project, and to calculate the baseline emissions, project emissions, leakage and emission reductions, the latest version of the official methodology, "ACM0002: Grid-connected electricity generation from renewable sources - Version 16.0."[30] (Hereafter referred to as "The Methodology" in this section regarding the Emission reductions) and the latest version of the official tool "Tool to calculate the emission factor for an electricity system - Version 04.0"[32] (Hereafter referred to as "The Tool" in this section regarding the Emission reductions) were used.

The applicability of "ACM0002: Grid-connected electricity generation from renewable sources - Version 16.0" (The Methodology) is justified according to the explanation given under the heading of "Applicability" on page 4 of the Methodology, as follows[137]:

"2.2 Applicability

This methodology is applicable to grid-connected renewable energy power generation project activities that:

[134] The VCS Project Database Pipeline Search Results. Accessed on 17/08/2015. http://www.vcsprojectdatabase.org/#/pipeline
[135] Netinform Climate and Energy - VER+ Projects. Accessed on 17/08/2015. http://www.netinform.de/KE/Wegweiser/Ebene1_Projekte2.aspx?mode=4
[136] APX VCS Registry - Public Reports – Projects. Accessed on 17/08/2015. http://goldstandard.apx.com/
[137] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 2. Scope, applicability, and entry into force. Sub-section 2.2. Applicability Paragraphs 3 and 4. Page 4. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

(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 methodology is applicable under the following conditions:

(a) 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;"

Since the project is wind power greenfield plant, the Methodology is applicable.

Baseline Scenario is also identified according to the rules under the heading of "Baseline Methodology Procedure" on page 10 of the Methodology[34]:

5.2. "Identification of the baseline scenario

5.2.1. Baseline scenario for Greenfield power plant

23. If the project activity is the installation of a Greenfield power plant, the baseline scenario is 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"

Since the project activity is a wind power plant, project emissions are accepted as zero, $PE_y = 0$. The project activity involves no emissions, except from a diesel generator used for emergency backup purposes. The possible emissions from the use of fossil fuels for the back up or emergency purposes by the operation of this diesel generator are neglected according to the methodology[138].

Leakage emissions are also neglected as per the Methodology[139].

Baseline emissions are considered according to the following explanations and formulas included in the Methodology[140]:

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[138] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 5. Baseline methodology. Sub-section 5.4.1.Emissions from fossil fuel combustion ($PE_{FF,y}$). Paragraph 37. Page 12. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

[139] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 5. Baseline methodology. Sub-section 5.6. Leakage. Paragraph 60. Page 18. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

[140] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities >

5.5. "Baseline emissions

Baseline emissions include only CO_2 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 and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

Equation (7)

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

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2/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 using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

5.5.1. Calculation of $EG_{PJ,y}$

The calculation of $EG_{PJ,y}$ is different for Greenfield plants, capacity additions, retrofits, rehabilitations, and replacements. These cases are described as follows:

5.5.1.1. Greenfield power plants

If the project activity is the installation of a Greenfield power plant, then:

Equation (8)

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

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)"

Approved consolidated methodologies. Section 5. Baseline methodology. Sub-section 5.5. Baseline emissions. Paragraph 46. Sub-section 5.5.1. Calculation of $EGP_{J,y}$. Paragraph 47. Sub-section 5.5.1.1.Greenfield power plants. Paragraph 48. Page 15.
http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

Emission reduction calculations are similarly based on the relevant section of the Methodology[141]:

5.7. "Emission reductions

Emission reductions are calculated as follows:

Equation (13)

$$ER_y = BE_y - PE_y$$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2e/yr)

5.7.1. Estimation of emissions reductions prior to validation

Project participants shall prepare as part of the CDM-PDD an estimate of likely emission reductions from the proposed project activity during the crediting period. This estimate should, in principle, employ the same methodology as selected above. Where the grid emission factor ($EF_{CM,grid,y}$) is determined ex post during monitoring, project participants may use models or other tools to estimate the emission reductions prior to validation."

Since $PE_y = 0$, $ER_y = BE_y$. So, in order to calculate the emission reductions for the project, it will suffice to calculate the baseline emissions. Calculation of the baseline emissions was done according to the Tool as indicated in the Methodology.

Six-steps in the stepwise baseline methodology procedure in the Tool were followed to calculate the baseline emissions[142]:

"13. Project participants shall apply the following six steps:
(a) **Step 1:** Identify the relevant electricity systems;
(b) **Step 2:** Choose whether to include off-grid power plants in the project electricity system (optional);
(c) **Step 3:** Select a method to determine the operating margin (OM);
(d) **Step 4:** Calculate the operating margin emission factor according to the selected method;
(e) **Step 5:** Calculate the build margin (BM) emission factor;
(f) **Step 6:** Calculate the combined margin (CM) emission factor."

Step 1: Identify the relevant electricity systems

[141] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 5. Baseline methodology. Sub-section 5.7. Emission reductions. Paragraph 61. Sub-section 5.7.1. Estimation of emissions reductions prior to validation. Pargaraph 62. Page 18. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

[142] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Paragraph 13. pp. 6-7. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

In the Tool, on page 6, the project electricity system is defined as[143]:

"A grid/project electricity system - is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints;"

Also, on page 6 of the Tool, connected electricity system is defined as[143]:

"Connected electricity system - is an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint, and/or the transmission capacity of the transmission line(s) that is connecting electricity systems is less than 10 per cent of the installed capacity either of the project electricity system or of the connected electricity system, whichever is smaller;"

The project activity is connected to the national grid of Turkey. There is no DNA in Turkey which has published a delinaeation of the project electricity system and the connected electricity systems. Since such information is not available, the criteria for the transmission constraints suggested in Paragraph 18 of the Tool were used to clarify the definitions of the project electricity system and the connected electricity systems[144]. There are no available spot electricity markets in Turkey at the time of writing of this report. Also, there are no official data on availability or operational time of transmission lines in Turkey. Hence, these two criteria are not applicable.

There are interconnections between Turkey and all its neighbouring countries. However, these lines are in limited capacity and have significant transmission constraints as compared to national transmission lines in Turkey.[145,146] In addition, international electricity trade through these transboundary transmission lines has legal restrictions and is subject to permission of EMRA (Republic of Turkey Energy Market Regulatory Authority).[147,148,149]

The Turkish National Grid is operated by the responsible authority of TEIAS (Turkish Electricity Transmission Corporation). All the power plants in this system can be dispatched without significant transmission constraints. There are no layered dispatch systems (e.g. provincial/regional/national) within this national system.[150,151,152] So, there are no independent separate grids in the national grid.

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[143] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 4. Definitions. Paragraph 10. pp. 5-6. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[144] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.1. Step 1: Identify the relevant electricity systems. Paragraph 18. pp. 7-8. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[145] http://www.teias.gov.tr/Dosyalar/NetTransferKapasiteleri.doc . Accessed on 19/08/2015.

[146] http://212.175.131.171/makaleler/ENTSOE%20Bağlantısı%20ICCI%20v3.pdf

[147] http://www.epdk.gov.tr/documents/elektrik/mevzuat/yonetmelik/elektrik/ithalat_ihracat/Elk_Ynt_ithalat_ihracat_SonHali.doc . Accessed on 19/08/2015.

[148] http://www.epdk.gov.tr/documents/elektrik/mevzuat/yonetmelik/elektrik/ithalat_ihracat/iliskili_mevzuat/KapasiteTahsisiEsasl ar.doc . Accessed on 19/08/2015.

[149] http://www.epdk.gov.tr/index.php/elektrik-piyasasi/lisans?id=818 . Accessed on 19/08/2015.

[150] http://www.teias.gov.tr/Hakkimizda.aspx . Accessed on 19/08/2015.

[151] http://212.175.131.171/Faaliyet2011/ING_Teias.pdf . Accessed on 19/08/2015.

[152] http://geni.org/globalenergy/library/national_energy_grid/turkey/ .Accessed on 19/08/2015.

In the light of above information and the paragraphs (17) and (18) on the page 7 of the Tool, the project electricity system is defined as Turkish National Grid, and the connected electricity systems are defined as the neighbouring countries of Turkey, all of which are connected to Turkish national grid by transboundary transmission lines.

As per the paragraphs (19), (20), (21), (22) and (23) on page 8 of the Tool, electricity imports and exports and their usage in the emission calculations are defined. For the purpose of determining the operating margin emission factor, the CO_2 emission factor for net electricity imports from the connected electricity systems is accepted as 0 t CO_2/MWh according to paragraph (21), sub-paragraph (a) of the Tool, and the electricity exports are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors according to paragraph (23) of the Tool.

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

The Tool suggests two options between which the project participants may choose to calculate the operating margin and build margin emission factor[153]:

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.

The rationale behind Option II is explained in the Tool as "Option II provides the option to include off-grid power generation in the grid emission factor. Option II aims to reflect that in some countries off-grid power generation is significant and can partially be displaced by CDM project activities, that is if off-grid power plants are operated due to an unreliable and unstable electricity grid."

This is not the case for the National Grid of Turkey, the selected project system. The contribution of the off-grid power plants to Turkish grid is negligible. For the year 2013, the share of the isolated (off-grid) systems in Turkey's peak load is about 0.04%[154], and the contribution of the isolated (off-grid) systems to Turkey's gross electricity generation is about 0.007%[155]. Hence, the impact of off-grid (isolated) power plants in Turkish electricity system is very trivial. So, Option II is not appropriate.

Hence, Option I is selected and only grid power plants are included in the calculation of the operating margin and build margin emission factors.

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

[153] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.2. Step 2: Choose whether to include off-grid power plants in the project electricity system (optional). Paragraphs 24-32. pp. 8-9. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[154] Annual Development of Contribution of The Electricity Utilities to Turkey's Hourly and Instantaneous Peak Load (2006-2013). TEIAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 19/08/2015. http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2013/kgucunkullanim(14-22)/21(2006-2013).xls

[155] Monthly Distribution of Turkey's Gross Electricity Generation by The Electricity Utilities as Enterconnected-İsolated Systems (2013). TEIAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 19/08/2015. http://www.teias.gov.tr/TürkiyeElektrikİstatistikleri/istatistik2013/uretim%20tuketim(23-47)/47.xls

Selection of the method to determine the operating margin (OM) has been done according to the explanations and rules given in relevant part of the Tool (Tool to calculate the emission factor for an electricity system - Version 04.0)[156].

The Tool gives four following method options for the calculation of the operating margin emission factor ($EF_{grid,OM,y}$)[157]:

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

Since power plant specific data for generation, emission or emission factors are not available, "Simple adjusted OM" and "Dispatch data analysis OM" methods are not applicable. Hence, in this case, these two methods have automatically been eliminated.

This leaves us two options, namely Simple OM and Average OM, among which we should choose the method we shall use.

To decide upon the method, we should examine these two options more closely. Firstly, we will look at the Simple OM method.

In the Methodological Tool – Tool to calculate the emission factor for an electricity system, The Simple OM Method is further sub-divided into two options as follows[158]:

"The simple OM may be calculated by one of the following two options:
(a) Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or
(b) 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 power plant specific data for generation, emission or emission factors are not available, Option A of "Simple OM" method is not applicable. The remaining two methods are Option B of "Simple OM" and "Average OM" methods. To decide between these two alternative methods, we have to take the situation of low-cost/must-run power plants into account. Following table summarizes the generation amounts and percentage of low-cost/must-run power plants for the five most recent years available at the time of writing of this report, that is, the period of [2009 – 2013].

Table 15. The Contribution of Low-Cost/Must-Run Power Plants to the Gross Generation of Turkey for the 5-year period of [2009 – 2013][159,160,161]

[156] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.3. Step 3: Select a method to determine the operating margin (OM). Paragraphs 33-39. pp. 9-10.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[157] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.4. Step 4: Calculate the operating margin emission factor according to the selected method. Paragraphs 40-67. pp. 10-19.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[158] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.4. Step 4: Calculate the operating margin emission factor according to the selected method. Sub-section 6.4.1. Simple OM Paragraph 41. Page. 11.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

Gross Generations and Percentages by Fuel Types and Primary Energy Resources of Low-Cost/Must-Run Power Units in Turkey (Unit: GWh)							
Primary Energy Resource or Fuel Type	Years					5-Year Total	5-Year Percentage
	2009	2010	2011	2012	2013		
Hard Coal + Imported Coal + Asphaltite	16,595.6	19,104.3	27,347.5	33,324.2	33,524.0	129,895.6	11.65%
Lignite	39,089.5	35,942.1	38,870.4	34,688.9	30,262.0	178,852.9	16.04%
Total Coal	**55,685.1**	**55,046.4**	**66,217.9**	**68,013.1**	**63,786.1**	**308,748.5**	**27.69%**
Fuel-Oil	4,439.8	2,143.8	900.5	981.3	1,192.5	9,657.9	0.87%
Diesel Oil	345.8	4.3	3.1	657.4	546.3	1,556.9	0.14%
LPG	0.4	0.0	0.0	0.0	0.0	0.4	0.00%
Naphtha	17.6	31.9	0.0	0.0	0.0	49.5	0.00%
Total Oil (Liquid Total)	**4,803.5**	**2,180.0**	**903.6**	**1,638.7**	**1,738.8**	**11,264.7**	**1.01%**
Natural Gas	96,094.7	98,143.7	104,047.6	104,499.2	105,116.3	507,901.6	45.55%
Renewables and Wastes	340.1	457.5	469.2	720.7	1,171.2	3,158.8	0.28%
Thermal	**156,923.4**	**155,827.6**	**171,638.3**	**174,871.7**	**171,812.5**	**831,073.5**	**74.53%**
Hydro + Geothermal + Wind Total	**37,889.5**	**55,380.1**	**57,756.8**	**64,625.1**	**68,341.5**	**283,993.0**	**25.47%**
Hydro	**35,958.4**	**51,795.5**	**52,338.6**	**57,865.0**	**59,420.5**	**257,378.0**	**23.08%**
Geothermal + Wind	**1,931.1**	**3,584.6**	**5,418.2**	**6,760.1**	**8,921.0**	**26,615.0**	**2.39%**
General Total (Gross)	**194,812.9**	**211,207.7**	**229,395.1**	**239,496.8**	**240,154.0**	**1,115,066.5**	**100.00%**
Gross - Low-Cost/Must-Run	**37,889.5**	**55,380.1**	**57,756.8**	**64,625.1**	**68,341.5**	**283,993.0**	**25.47%**
Gross Excluding Low-Cost/Must-Run (Thermal)	**156,923.4**	**155,827.6**	**171,638.3**	**174,871.7**	**171,812.5**	**831,073.5**	**74.53%**

Since generation from low-cost/must-run resources constitute less than 50% (25.47%) of total (gross) grid generation in average of the five most recent years (2009-2013), Simple Operating Margin Method (Option B) can be used.

[159] Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (2006-2013). TEİAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 21/08/2015. http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/37(06-13).xls

[160] Annual Development of Turkey's Gross Electricity Generation by Share of Primary Energy Resources (1970-2013). TEİAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 21/08/2015. http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/38.xls

[161] Annual Development of Turkey's Gross Electricity Generation by Primary Energy Resources and The Electricity Utilities (2006-2013). TEİAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 21/08/2015. http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/42(06-13).xls

Since the Tool allows the choice of the method among the available ones freely, in this case Simple OM (Option B) and Average OM, the Simple OM (Option B) Method will be chosen and used in the calculations.

The selection of the low-cost/must run power plants was done according to the definition on page 6 of the Tool[143]:

"Low-cost/must-run resources - are defined as power plants with low marginal generation costs or dispatched independently of the daily or seasonal load of the grid. They include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If a fossil fuel plant is dispatched independently of the daily or seasonal load of the grid and if this can be demonstrated based on the publicly available data, it should be considered as a low-cost/must-run;"

Hence, the selection in the table which assumes the total of hydro, geothermal and wind as the low-cost/must-run resources is justified. Since there are no nuclear power plants and also no grid-connected solar power plants in Turkey at the time of writing of this report, these resource types are automatically excluded.

As can be seen from the table, low-cost/must-run resources constitute less than 50 per cent of total grid generation (excluding electricity generated by off-grid power plants) in average of the five most recent years [2009 – 2013], which is in line with the relevant rule, paragraph 34 on page 10 of the Tool[162]:

"The simple OM method (Option a) can only be used if low-cost/must-run resources constitute less than 50 per cent of total grid generation (excluding electricity generated by off-grid power plants) in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production."

The rules for the usability of Simple OM method Option, which was stated in paragraph 42, on page 11 of the Tool, as below, are also met[163]:

"Option B can only be used if:

(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2)."

As a result, Option B of Simple OM method was selected as the method to determine the operating margin.

To calculate the emission factor, the tool gives two options that can be selected and used freely for the reference period in paragraph 36, on page 10 of the Tool[164]:

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[162] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.3. Step 3: Select a method to determine the operating margin (OM). Paragraph 34. Page 10.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[163] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.4. Step 4: Calculate the operating margin emission factor according to the selected method. Sub-section 6.4.1. Simple OM. Paragraph 42. Page 11.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

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

(a) 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. For off-grid power plants, use a single calendar year within the five most recent calendar years prior to the time of submission of the CDM-PDD for validation;

(b) Ex post option: if the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate 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."

Hence, ex ante option was preferred to calculate the emissions factor, and the reference period was selected as the three-year period of [2011 – 2013].

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

Since the Simple OM (Option B) Method has been chosen to calculate the operating margin emission factor in the previous chapter, the subsequent calculations shall be made in line with the explanations given in the Tool regarding this specific method, as below:

Operating Margin Emission Factor was calculated using the formulation and procedure described in the paragraphs (49) and (50) in sub-section 6.4.1.2., on pages 14 – 15 of the Tool:

"6.4.1.2. Option B: Calculation based on total fuel consumption and electricity generation of the system

49. Under this option, 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:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \qquad \text{Equation (7)}$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO2 emission factor in year *y* (t CO2/MWh)

[164] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.3. Step 3: Select a method to determine the operating margin (OM). Paragraph 36. Page 10.
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

$FC_{i,y}$	=	Amount of fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
$F_{CO2,i,y}$	=	CO_2 emission factor of fuel type *i* in year *y* (t CO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year *y* (MWh)
i	=	All fuel types combusted in power sources in the project electricity system in year *y*
y	=	The relevant year as per the data vintage chosen in Step 3

50. For this approach (simple OM) to calculate the operating margin, the subscript *m* refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports should be treated as one power plant *m*."

Fossil fuel types and their amounts were taken from the official data of Electricity Generation & Transmission Statistics of Turkey, published by TEIAS (Turkish Electricity Transmission Company, the state authority responsible for the national transmission system of Turkey), as indicated in the table below[165]:

Table 16. Fuel Consumption in Electricity Generation in Turkey for the 3-year period of [2011 – 2013][165]

Fuel Consumption in Electricity Generation Excluding Low-Cost/Must-Run (Unit: Ton (solid and liquid) /10³ m³ (gas))	**2011**	**2012**	**2013**
Hard Coal+Imported Coal+Asphaltite	10,574,434.0	12,258,462.0	12,105,930.0
Lignite	61,507,310.0	55,742,463.0	47,120,306.0
Fuel Oil	531,608.0	564,796.0	573,534.0
Diesel oil	15,047.0	176,379.0	129,359.0
LPG	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0
Natural Gas	22,804,587.0	23,090,121.0	22,909,746.0
*Renewables and Wastes**			
* Since heating values and fuel amounts of renewable and waste materials are not included in TEIAS Statistics, these are also ignored here.			

To calculate the Net Calorific Values, data on heating values of fuels consumed in thermal power plants in Turkey by the electric utilities along with the fuel amounts mentioned above were used, as shown in the table below:

Table 17. Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities [2011 – 2013][166]

[165] Fuels Consumed in Thermal Power Plants in Turkey by The Electricity Utilities (2006-2013). TEİAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 21/08/2015. http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/49.xls

[166] Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by The Electricity Utilities ((2006-2013) TEİAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey –

Heating Values of Fuels Consumed in Thermal Power Plants (Unit: Tcal)	2011	2012	2013
Hard Coal+Imported Coal+Asphaltite	57,567.3	71,270.2	68,784.8
Lignite	107,209.5	93,586.6	81,676.2
Fuel Oil	5,279.9	5,624.8	5,837.2
Diesel oil	155.1	1,883.6	1,363.2
LPG	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0
Natural Gas	202,064.1	203,766.4	203,243.7
*Renewables and Wastes**			
Turkey's Thermal Total	**372,275.9**	**376,131.6**	**360,905.2**
* Since heating values and fuel amounts of renewable and waste materials are not included in TEIAS Statistics, these are also ignored here.			

Since there are no plant-specific or fuel-type specific emission factor data officially available in Turkey, we have to use the emission factors published by IPCC.[167] The related emission factors are indicated in the following table:

Table 18. IPCC Default Emission Factor Values by Different Fuel Types[167]

Default CO_2 Emission Factors for Combustion	Table 1.4		
	Effective CO_2 Emission Factor (kg/TJ)		
Fuel Type	Default	Lower	Upper
Anthracite	98,300	94,600	101,000
Coking Coal	94,600	87,300	101,000
Other Bituminous Coal	94,600	89,500	99,700
Sub-Bituminous Coal	96,100	92,800	100,000
Lignite	101,000	90,900	115,000
Fuel Oil	77,400	75,500	78,800
Diesel Oil	74,100	72,600	74,800
LPG	63,100	61,600	65,600
Naphtha	73,300	69,300	76,300
Natural Gas	56,100	54,300	58,300

For the sake of conservativeness, the lower limits of the 95 percent confidence intervals were used in the calculation of Operating Margin Emission Factor.

2013. Accessed on 21/08/2015.
http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/yak%C4%B1t48-53/51.xls

[167] 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Volume 2: Energy. Table 1.4. pp. 1.23-1.24. Accessed on 21/08/2015.
http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Since the emission factors of IPCC are based on mass-units, and the fuel consumption amounts for natural gas is given in volume units in TEIAS statistics, we should convert the amount of natural gas from volume units to mass units. For this purpose, the density of natural gas must be specified. Natural Gas Density of Turkey for Electricity Generation was calculated using the data for Turkey in International Energy Agency's (IEA) Natural Gas Information (2010 Edition)[168], IEA Key World Energy Statistics 2011[169], and IEA Energy Statistics Manual[170].

Turkey's main natural gas supplier is Russian Federation, along with its neighbouring countries[171]. This fact is also confirmed by IEA Natural Gas Information[168] by comparing average gross calorific value of natural gas of Turkey for consumption and that of Russian Federation for production. So, natural gas produced and exported by Russian Federation and imported and consumed by Turkey was accepted as the representative of natural gas used as fuel in electricity generation in Turkish National Grid.

To calculate the density of natural gas, the following table was used:

Table 19. Conversion Factors from Mass or Volume to Heat (Gross Calorific Value) for Natural Gas Supplied by Russian Federation[168]

	GAS	
	Russia	
To:	MJ	Btu
From:	multiply by:	
cm*	38.23	36,235
Kg	55.25	52,363
* Standard Cubic Meters		

This gives us a natural gas density of 0.692 kg/m^3, which we used to calculate the mass of natural gas used as fuel in power plants in Turkey for electricity generation.

As a result, the Fuel Consumption in Electricity Generation in Turkey can be shown again with all the amounts in mass units as in the following table:

Table 20. Fuel Consumption in Electricity Generation in Turkey for the 3-year period of [2011 – 2013] (in mass units)[165]

Fuel Consumption in Electricity	

[168]IEA Statistics, Natural Gas Information 2010, International Energy Agency - Introductory Information, Section 7, Abbreviations and conversion factors, pp. xxvii - xxx. Accessed on 24/08/2015. http://www.dma.dk/themes/LNGinfrastructureproject/Documents/Infrastructure/IEA%20-%20natural_gas_information%202010.pdf

[169]2011 Key World Energy Statistics. International Energy Agency. Conversion Factors, pp. 58 – 60. Accessed on 21/08/2015. http://www.ocean-energy-systems.org/documents/31807_iea_key_world_energy_stats.pdf/

[170]Energy Statistics Manual. International Energy Agency. Annex 3 Units and Conversion Equivalents – Natural Gas – pp. 182 – 183. Accessed on 21/08/2015. http://www.iea.org/publications/freepublications/publication/statistics_manual.pdf

[171] BOTAS (Petroleum Pipeline Corporation)>Natural Gas>Purchase Agreements. Natural Gas Purchase Agreements Information. Accessed on 24/08/2015. http://www.botas.gov.tr/index.asp

Generation Excluding Low-Cost/Must-Run (Unit: Ton)	2011	2012	2013
Hard Coal+Imported Coal+Asphaltite	10,574,434.0	12,258,462.0	12,105,930.0
Lignite	61,507,310.0	55,742,463.0	47,120,306.0
Fuel Oil	531,608.0	564,796.0	573,534.0
Diesel oil	15,047.0	176,379.0	129,359.0
LPG	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0
Natural Gas	15,779,535.9	15,977,110.0	15,852,300.3
*Renewables and Wastes**			
Turkey's Thermal Total	**88,407,934.9**	**84,719,210.0**	**75,781,429.3**
* Since heating values and fuel amounts of renewable and waste materials are not included in TEIAS Statistics, these are also ignored here.			

Net Calorific Values can be calculated using the heating values and the fuel amounts:

Table 21. Net Calorific Values calculated for fuel types in Electricity Generation in Turkey for the 3-year period of [2011 – 2013][166]

Net Calorific Values of Fuels Consumed in Thermal Power Plants (Unit: TJ/Gg)	2011	2012	2013
Hard Coal+Imported Coal+Asphaltite	22.8	24.3	23.8
Lignite	7.3	7.0	7.3
Fuel Oil	41.6	41.7	42.6
Diesel oil	43.2	44.7	44.1
LPG	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0
Natural Gas	53.6	53.4	53.7
*Renewables and Wastes**	0.0	0.0	0.0
* Assumed as zero due to unavailability of data and conservativeness			

It is not very clear whether the heating values given in TEIAS statisitics[166] are lower heating values (Net Calorific Values = NCV) or higher heating values (Gross Calorific Values = GCV). However, some other sources of state, academic and NGO (chamber of engineers) origin confirm that these are lower heating values (net calorific values) by giving values in the same range as the calculated NCV values[172,173,174,175,176,177]. Moreover, these data is compliant with the value given in National Inventory

[172]Energy Efficiency Portal of Republic of Turkey.>Documents>Tables>TEP (TOE=Tons of Oil Equivalent) Calculation Table. Accessed on 24/08/2015. http://enver.eie.gov.tr/DocObjects/Download/60094/TepHesap.xls

[173]Local Evaluation and Long Term Forecast of Carbon Dioxide Emission Originating From Electricity Generation. S. Yeşer ASLANOĞLU, Merih AYDINALP KÖKSAL. Hacettepe University Department of Environmental Engineering. Air Pollution Research Magazine. 1 (2012) 19–29. Accessed on 24/08/2015. http://www.hkad.org/makaleler/cilt1/sayi1/HKAD-12-004.pdf

Reports and Common Report Formats of Turkey submitted to UNFCCC, in which it was also stated that the heating values given are NCV values[178,179]. As a result, these values are assumed to be the net calorific values of thermal power plants in Turkey for the relevant period.

Turkey's Net Electricity Generation by primary energy resources was not given in the TEIAS Turkish Electricity Generation – Transmission Statistics[180]. Instead, Gross Electricity Generation by primary energy resources[161], net generation amount and percentages for the whole national grid regardless of the primary energy resources are available[181]. As a result, it becomes necessary to calculate the net generation by primary energy resources by using these two data sets available.

For this purpose, the net/gross electricity generation ratio was assumed to be the same for all primary energy resources. According to some studies made on this subject, the net/gross electricity generation ratio of renewable energy power plants is slightly higher than that of thermal power plants[182,183,184,185,186,187]. Since the gross generation percentage of renewable energy power plants is lower

[174]Turkish Coal Enterprise. Coal Sector Report (Lignite) 2011. Accessed on 24/08/2015. http://www.enerji.gov.tr/File/?path=ROOT%2F1%2FDocuments%2FSekt%C3%B6r+Raporu%2FSektor_Raporu_TKI_2011.pdf

[175]Thermal Power Plants in Turkey. Publication of Chamber of Mechanical Engineers of Turkey. Accessed on 24/08/2015. http://www.mmo.org.tr/resimler/dosya_ekler/a9393ba5ea45a12_ek.pdf

[176]Local Heating by Utilisation of Waste Heat of Thermal Electricity Power Plants in Zonguldak and Its Effect on Greenhouse Gas Emission. Assisstant Prof. Mustafa Eyriboyun. Publication of Chamber of Mechanical Engineers of Turkey. 24.06.2011. Accessed on 24/08/2015. http://www.mmo.org.tr/resimler/dosya_ekler/b4d09fdaf9131ab_ek.pdf?dergi=1148

[177]Exergetic Analysis of a Natural Gas Cogeneration System. Nilay Akdeniz. Master's Thesis. Department of Mechanical Engineering. Suleyman Demirel University. Isparta-2007. Accessed on 24/08/2015. http://tez.sdu.edu.tr/Tezler/TF00997.pdf

[178]UNFCCC National Reports. National Inventory Submissions. 2013 Annex I Party GHG Inventory Submissions. National Inventory Report of Turkey. Dated 15 April 2013. Accessed on 24/08/2015. http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2013-nir-15apr.zip

[179]UNFCCC National Reports. National Inventory Submissions. 2013 Annex I Party GHG Inventory Submissions. Common Reporting Format of Turkey. Dated 12 April 2013. Accessed on 24/08/2015. http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2013-crf-12apr.zip

[180]TEIAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 21/08/2015. http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/istatistik2013.htm

[181]Annual Development of Electricity Generation- Consumption and Losses in Turkey (1984-2013). TEIAS (Turkish Electricity Tranmission Company) Electricity Generation & Transmission Statistics of Turkey – 2013. Accessed on 21/08/2015. http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/uretim%20tuketim(23-47)/34(84-13).xls

[182]Program on Technology Innovation: Electricity Use in the Electric Sector. Opportunities to Enhance Electric Energy Efficiency in the Production and Delivery of Electricity. 2011 Technical Report. EPRI – Electric Power Research Institute. pp. 2-6 – 2-14. Accessed on 24/08/2015. http://www.pserc.wisc.edu/documents/publications/special_interest_publications/EPRI_Electricity_Use_Report_Final_1024651.pdf

[183]Case No. 6 of 2013 In the matter of Determination of Generic Tariff for the fourth year of the first Control Period under Regulation 8 of the Maharashtra Electricity Regulatory Commission (Terms and Conditions for Determination of Renewable Energy Tariff) Regulations, 2010. Shri V.P. Raja, Chairman, Shri Vijay L. Sonavane, Member. Dated: 22 March , 2013. Accessed on 24/08/2015. http://www.ireeed.gov.in/policyfiles/171-35_MH98R01220313.pdf

[184] Future Electricity Supplies: Redefining Efficiency From a Systems Perspective. Stephen Connors, Katherine Martin, Michael Adams and Edward Kern. Analysis Group for Regional Electricity Alternatives (AGREA) MIT

than the percentage of thermal power plants, using the same average net/gross electricity generation ratio for all power plants would result in a slightly lower share for renewable energy power plants in the total net electricity generation than it would be if we used the actual net/gross electricity generation ratios. Likewise, the net generation share of thermal power plants will be slightly higher than that it would normally be. This would cause a slightly higher operational margin emission factor value for the whole system, if we used all the power plants including renewable ones, in the emission factor calculation. This would still be acceptable since the difference between net/gross electricity generation ratio of renewable and non-renewable power plants is very low (about 1 – 2 %), and could be assumed in the allowed error range.

However, by choosing Option B of Simple OM method for operating margin emission factor calculation, we excluded all the low-cost/must-run power plants, that is, renewable ones. So, the impact of net/gross electricity generation ratio for renewable power plants is automatically eliminated. Since the corresponding ratio for different thermal plants is almost the same, using the same average net/gross electricity generation ratio for all thermal power plants is acceptable.

The following table summarizes the calculation of net electricity generation from gross electricity generation distribution by primary energy resources and net/gross electricity generation ratio for all system.

Table 22. Net Electricity Generation Calculation by Primary Energy Resources for Turkey for the 5-year period of [2009 – 2013][159,160,161,181]

Gross & Net Generations and Percentages of Fuel Types and Primary Energy Resources (Unit: GWh)							
Primary Energy Resource or Fuel Type	Years					5-Year Total	5-Year Percentage
	2009	2010	2011	2012	2013		
Hard Coal + Imported Coal + Asphaltite	16,595.6	19,104.3	27,347.5	33,324.2	33,524.0	129,895.6	11.65%
Lignite	39,089.5	35,942.1	38,870.4	34,688.9	30,262.0	178,852.9	16.04%
Total Coal	**55,685.1**	**55,046.4**	**66,217.9**	**68,013.1**	**63,786.1**	**308,748.5**	**27.69%**
Fuel-Oil	4,439.8	2,143.8	900.5	981.3	1,192.5	9,657.9	0.87%
Diesel Oil	345.8	4.3	3.1	657.4	546.3	1,556.9	0.14%
LPG	0.4	0.0	0.0	0.0	0.0	0.4	0.00%
Naphtha	17.6	31.9	0.0	0.0	0.0	49.5	0.00%
Total Oil (Liquid Total)	**4,803.5**	**2,180.0**	**903.6**	**1,638.7**	**1,738.8**	**11,264.7**	**1.01%**
Natural Gas	96,094.7	98,143.7	104,047.6	104,499.2	105,116.3	507,901.6	45.55%
Renewables and Wastes	340.1	457.5	469.2	720.7	1,171.2	3,158.8	0.28%

Laboratory for Energy and the Environment (LFEE). LFEE Working Paper: LFEE-WP-04-005. June 2004. Page 7. Accessed on 24/08/2015.
http://web.mit.edu/connorsr/www/docs/Connors_Future%20Electricity_Jun04.pdf

[185] Orissa Electricity Regulatory Commission Bidyut Niyamak Bhavan, Unit – Viii, Bhubaneswar. Accessed on 24/08/2015.
http://www.orierc.org/Suo_Moto_petition_2014_to_2018.pdf

[186] International comparison of fossil power efficiency and CO_2 intensity - Update 2014. Final Report. By: Charlotte Hussy, Erik Klaassen, Joris Koornneef and Fabian Wigand Date: 5 September 2014 Project number: CESNL1517. Ecofys 2014 by order of: Mitsubishi Research Institute, Japan. Page 62, Footnote 11. Accessed on 24/08/2015.
http://www.ecofys.com/files/files/ecofys-2014-international-comparison-fossil-power-efficiency.pdf

[187] Peaking & Reserve Capacity in India. Using flexible, gas-based power plants for affordable, reliable and sustainable power. 2014 Wärtsilä Corporation. Annexure 2. Page 21. Accessed on 24/08/2015.
http://wartsila.prod.avaus.fi/docs/default-source/Power-Plants-documents/downloads/White-papers/asia-australia-middle-east/Peaking-and-Reserve-Capacity-In-India.pdf?sfvrsn=4

Thermal	**156,923.4**	**155,827.6**	**171,638.3**	**174,871.7**	**171,812.5**	**831,073.5**	**74.53%**
Hydro + Geothermal + Wind Total	**37,889.5**	**55,380.1**	**57,756.8**	**64,625.1**	**68,341.5**	**283,993.0**	**25.47%**
Hydro	**35,958.4**	**51,795.5**	**52,338.6**	**57,865.0**	**59,420.5**	**257,378.0**	**23.08%**
Geothermal + Wind	**1,931.1**	**3,584.6**	**5,418.2**	**6,760.1**	**8,921.0**	**26,615.0**	**2.39%**
Geothermal	435.7	668.2	694.3	899.3	1,363.5	4,061.1	0.36%
Wind	1,495.4	2,916.4	4,723.9	5,860.8	7,557.5	22,553.9	2.02%
General Total (Gross)	**194,812.9**	**211,207.7**	**229,395.1**	**239,496.8**	**240,154.0**	**1,115,066.5**	**100.00%**
General Total (Net)	**186,619.3**	**203,046.1**	**217,557.7**	**227,707.3**	**228,977.0**	**1,063,907.4**	**95.41%**
Net / Gross Ratio	**95.79%**	**96.14%**	**94.84%**	**95.08%**	**95.35%**	**95.41%**	
Gross - Low-Cost/Must-Run	**37,889.5**	**55,380.1**	**57,756.8**	**64,625.1**	**68,341.5**	**283,993.0**	**25.47%**
Gross Excluding Low-Cost/Must-Run (Thermal)	**156,923.4**	**155,827.6**	**171,638.3**	**174,871.7**	**171,812.5**	**831,073.5**	**74.53%**
Net - Low-Cost/Must-Run	**36,295.9**	**53,240.1**	**54,776.4**	**61,443.9**	**65,160.8**	**270,917.1**	
Net Excluding Low-Cost/Must-Run (Thermal)	**150,323.4**	**149,806.0**	**162,781.3**	**166,263.4**	**163,816.2**	**792,990.3**	

The operating margin emission factor was calculated using the above assumptions, data and formulations. The details are in the Section "B.6.3. Ex ante calculation of emission reductions".

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

For this step, Option I indicated in paragraph 68 of the Tool[188] was chosen and the build margin emission factor is calculated ex ante based on the most recent information available at the time of writing this report.

Power plant based generation data is unavailable for Turkish National Grid. However, plant based generation capacity data are available in annually published Capacity Projection Reports of TEIAS[189], except the latest of these reports, "TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2014-2018"[35]. This latest report contain the project and firm generation capacities by primary energy resources and fuels as at the end of year 2013, but does not give the generation values for each power plant.

On the other hand, the report previous to the latest one, "TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2013-2017"[190] includes the project and firm generation capacities of each power plant as at the end of year 2012. In this report, there are "Project Generation Capacity" and "Firm Generation Capacity" for each power plant. Project Generation Capacity is the value written on the generation licence given by EMRA for each power plant, and indicates the generation that could be achieved under ideal conditions. Firm Generation Capacity reflects the real generation capacity, taking into account various parameters that could affect the generation, and mostly based on the actual generations of the previous years. Hence, firm generation capacities of power plants

[188] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.5. Step 5: Calculate the build margin (BM) emission factor. Paragraph 68. pp 19-20. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[189] TEIAS (Turkish Electricity Tranmission Company) Capacity Projection Reports. TEİAS (Turkish Electricity Tranmission Company) Web Site > Publications > Capacity Projection. Accessed on 24/08/2015. http://www.teias.gov.tr/YayinRapor%5CAPK%5Cprojeksiyon%5Cindex.htm

[190] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2013-2017. Accessed on 24/08/2015. http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2013.pdf

indicated in this report were selected as the reference generation data for the build margin emission calculation.

The total firm generation capacity in 2012 is calculated as 277,583.5 GWh[191], a figure higher than total gross generation of 239,496.8 GWh in 2012[161]. This is expected, since the full annual firm generation capacities of power plants commissioned in 2012 have been taken into account. Since the real contribution of firm generation capacities of power plants commissioned in 2012 to real gross generation in 2012 is very hard to calculate, the firm generation capacities of all power plants at the end of 2012 is assumed as their gross generation in 2012, to calculate the build margin emission factor calculation. This is also in line with the logic behind the build margin emission factor calculation, that is, this assumption reflects the impact of power plants that started to supply electricity to the grid most recently better.

The "TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2013-2017"[190] gives the definitive situation of the Turkish Energy Generation System as at the end of 2012[191]. At this date, there were 771 power plants in Turkey[192]. 747 of these were listed namely, 24 of them under the categorisation of "Others" in 5 different places in the Annex 1 of the report[191]. So, since it is impossible to specify the names and commissioning dates of the power plants in the "Others" category, these were excluded in the build margin emission factor calculation.

However, the individual project and firm generation values for the power plants commissioned in year 2013[193] are not available. Hence, their firm generations had to be calculated using their installed capacities, and their capacity factors. The corresponding capacity factors are calculated using the installed capacity values at the end of 2013[21] and the gross generation values in 2013[160] for each primary energy source / fuel. The details f this calculation can be found in the "CF" worksheet of the Emission Calculation Spreadsheet file, which is an annex to this document.

Capacity additions of retrofits of power plants were selected by comparing the installed capacity values and fuel types given in the capacity projection reports for different years[189], and explanations given in energy investment data of Ministry of Energy and Natural Resources of Turkey[194], which includes commissioning dates of all power plants in Turkey beginning from 2003.

CDM-VER project activities in Turkey at the end of 2013 were specified by using the registry web sites of emission reduction standards used in Turkey, i.e. Gold Standard (GS), Verified Carbon Standard (VCS), and VER+ standards[132,133,134,135,136]. A total of 236 power plants have been specified as CDM-VER Projects in Turkey listed in the registry sites of these standards, as at the end of 2013.

[191] TEIAS Report on 5-Year Generation Capacity Projection of Electrical Energy of Turkey for 2013-2017. Annex-1, Current System (As at the end of 2012), pages 80-97.
http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2013.pdf

[192] TEIAS Installed Capacity Data of Turkey. Updated Regularly. Installed Capacity at the End of 2012. Accessed on 25 February 2013.
http://www.teias.gov.tr/yukdagitim/kuruluguc.xls

[193] Republic of Turkey Ministry of Energy and Natural Resources > Info Bank > Publications > EIGM (General Directorate of Energy Affairs) Reports > Year 2013 Energy Investments. Accessed on 24/08/2015.
http://www.enerji.gov.tr/File/?path=ROOT/1/Documents/EİGM Ana Rapor/2013_Yili_12_Aylik_Enerji_Yatirimlari.xls

[194] Republic of Turkey Ministry of Energy and Natural Resources Web Site > Info Bank > Publications > EIGM (General Directorate of Energy Affairs) Reports > Energy Investments. Accessed on 24/0/2015.
http://www.enerji.gov.tr/tr-TR/EIGM-Raporlari

The commissioning of power plants in Turkey are often made in multiple stages, as allowed in the "Electrical Installations Acceptance Bylaw"[195]. The rationale of this procedure is mostly to commission the part or group of the power plant that has been completed and ready to be commissioned without having to wait for all the power plant to be completed; and not to lose revenues from electricity sales in this period. These single stages of commissionings are called "provisional acceptance" and represents the date on which the electricity generated by the power plant started to be sold.

As a result, these partial commissionings, which are the individual stages of commissioning process indicated by provisional acceptances, have to be taken into account to calculate the build margin emission factor correctly. For this reason, each single partial commissioning of a power plant is considered as a separate power unit.

The project and firm generation of each power unit is found by multiplying the total project and firm generation of the power plant by the ratio found by dividing the installed capacity of the power unit by that of the whole power plant.

The dates of commissionings, or power units, were taken from Capacity Projection Reports of TEIAS[188] and Energy Investment Data of Ministry of Energy and Natural Resources[194]. The commissionings were sorted by their dates beginning from the newest to the oldest to identify the two sets of power units $SET_{5\text{-}units}$, and $SET_{20\ per\ cent}$, according to paragraph 71 on the page 20 of the Tool[196].

The calculation of build margin emission factor calculation is done according to the paragraph 73 and 74, on page 22 of the Tool[197]:

"73. 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:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \text{Equation (13)}$$

Where:

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

[195] Electrical Installations Acceptance Bylaw. Republic of Turkey Official Gazette. Issue: 22280, Date: 07/05/1995. pp. 2 – 37. Accessed on 26/08/2015. http://www.resmigazete.gov.tr/arsiv/22280.pdf.

[196] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.5. Step 5: Calculate the build margin (BM) emission factor. Paragraph 71. pp 20-21. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[197] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.5. Step 5: Calculate the build margin (BM) emission factor. Paragraphs 73-74. Page 22. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

74. The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$)should be determined as per the guidance in Step 4 section 6.4.1 for the simple OM, using Options A1, A2 or A3, using for y the most recent historical year for which electricity generation data is available, and using for *m* the power units included in the build margin."

Since the power plant based data of emission factors and consumed fuels are not available, but generations and fuel types are available for the sample group of power units m used to calculate the build margin, only Option A2 of the Simple OM method is convenient for a calculation. So, emission factor for power plants for each fuel is calculated as indicated in the following sub-paragraph (b) of paragraph 44 on page 12 of the Tool[198]:

"(b) **Option A2** - If for a power unit *m* only data on electricity generation and the fuel types used is available, the emission factor should be determined based on the CO2 emission factor of the fuel type used and the efficiency of the power unit, as follows:

$$EF_{EL,m,y} = \frac{EF_{CO_2,m,i,y} \times 3.6}{\eta_{m,y}} \qquad \text{Equation (3)}$$

Where:

$EF_{EL,m,y}$	=	CO_2 emission factor of power unit *m* in year *y* (t CO_2/MWh)
$EF_{CO2,m,i,y}$	=	Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (t CO_2/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"

For the average emission factor of fuel types, the emission factors published by IPCC[167] were taken as reference, and the lower limits of the 95 percent confidence intervals were used, as in the calculation of Operating Margin Emission Factor.

For the average net energy conversion efficiency of the power units for each fuel type, Table 1 in Appendix 1 on page 33 of the Tool[199] was taken as reference, as indicated in the table below.

Table 23. Default Efficiency Factors for Grid Power Plants[199]

Appendix 1. Default efficiency factors for power plants - Table 1. Grid power plants
Grid Power Plant

[198] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.5. Step 5: Calculate the build margin (BM) emission factor. Paragraph 44. Page 12. http://cdm.unfcagec.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[199] Tool to calculate the emission factor for an electricity system- Version 04.0. Appendix 1. Default efficiency factors for power plants. Table 1. Grid power plants. Page 33. http://cdm.unfcagec.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

Generation Technology	Old Units (before and in 2000)	New Units (after 2000)
Coal	-	-
Subcritical	37.0%	39.0%
Supercritical	-	45.0%
Ultra-Supercriticial	-	50.0%
IGCC	-	50.0%
FBS	35.5%	-
CFBS	36.5%	40.0%
PFBS	-	41.5%
Oil	-	-
Steam turbine	37.5%	39.0%
Open cycle	30.0%	39.5%
Combined cycle	46.0%	46.0%
Natural gas	-	-
Steam turbine	37.5%	37.5%
Open cycle	30.0%	39.5%
Combined cycle	46.0%	60.0%

For most of the power plants included in the build margin emission factor calculation, power-plant specific data could not be found. For these, the data in the above table was used and maximum applicable values considering conservativeness were taken. The values for new units (after 2000) were used.

However, for the thermal power plants using imported coal that were in the build margin emission calculation set, the efficiency data had been able to be found[200]. For these, generation-weighted average efficiency was calculated and this value is used in the build margin emission factor calculation, as indicated in the following table:

Table 24. Efficiency Factors for Power Plants Using Imported Coal as the Fuel in the Sample Group used in the Build Margin Emission Calculation

Legal Status	Fuel / Energy Source	POWER PLANT NAME	Installed Capacity MW	Firm Generation Capacity (year 2012) GWh	Commissioning Date	Location (Province)	Efficiency	Firm Generation x Efficiency
IPP	IC	BEKİRLİ TES (İÇDAŞ ELEKT.)	600.000	4,320.0	2011-12-15	Canakkale	41.5%	1,792.80
IPP	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	600.000	4,005.9	2010-12-29	Zonguldak	42.0%	1,682.47
IPP	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	600.000	4,005.9	2010-11-01	Zonguldak	42.0%	1,682.47
IPP	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	160.000	1,068.2	2010-07-15	Zonguldak	41.0%	437.98
IPP	IC	İÇDAŞ ÇELİK	135.000	961.7	2009-10-13	Canakkale	35.0%	336.58
IPP	IC	İÇDAŞ ÇELİK	135.000	961.7	2009-07-24	Canakkale	35.0%	336.58
	IC	TOTAL	2,230.0	15,323.3	Average Efficiency		**40.9%**	6,268.9

[200] Panel about "Coal-Fired Power Plants and Investment Models", Middle East Technical University Alumni Association Visnelik Facility, 23 February 2013 / Saturday / 13:30, Presentation given by Muzaffer BASARAN. Slides 31 – 40. Accessed on 26/08/2015.
http://www.odtumd.org.tr/dosyaArsivi/Etkinlik/muzaffer_basaran_odtu_komur_santral_230213.pptx

This result is compatible with the information given by IEA (International Energy Agency), in which it was stated that supercritical pulverised (SCPC) is the dominant option for new coal fired power plants and maximum value for generating efficiency of SCPC plants is 46% (lower heating value, LHV), as of 2010[201].

For the power plants using other types of solid fuels (hard coal, lignite, asphaltite, and waste materials incinerated), since there are no specific data that could be found, the efficiency factor is assumed as equal to that of imported coal, and the value that is nearest to the efficiency calculated for power plants using imported coal in the IPCC Default Efficiency Factors Table (Table 23), that is 41.5 %, was accepted as the efficiency factor. This is in line with the rule of conservativeness, since generally efficiency of other types of coal and other solid fuels is expected to be lower than that of imported coal, which is of higher quality. Also, since the share of other types of solid wastes are very small as compared to that of imported coal, their effect is minimal.

For natural gas, the maximum value (60.0 %) is accepted. For naphta, biogas, and liquefied petroleum gas (LPG), the efficiency factor is accepted as equal to natural gas.

For liquid fuels except naphta, that is fuel oil and diesel oil, the efficiency factor is accepted as the maximum value in the table, 46 %, according to the rule of conservativeness.

The results were put into the Equation (13) on page 22 of the Tool[197] to calculate the Build Margin Emission Factor.

Step 6: Calculate the combined margin emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is done preferring the Weighted Average CM method, as indicated in paragraphs 77, 78, and 79 in the sub-section 6.6 on page 23 of the Tool[202].

The weighted average combined margin emission factor calculation is done according to paragraphs 80 and 81 on page 23 of the Tool[203], as follows:

"80. The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \qquad \text{Equation (14)}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO2 emission factor in year y (t CO_2/MWh)
w_{OM}	=	Weighting of operating margin emissions factor (per cent)

[201] IEA (International Energy Agency) Energy Technology Network. ETSAP (Energy Technology Systems Analysis Programme). Technology Brief E01. April 2010. Page 1. Accessed on 26/08/2015. http://www.iea-etsap.org/web/E-TechDS/PDF/E01-coal-fired-power-GS-AD-gct.pdf

[202] Tool to calculate the emission factor for an electricity system- Version 04.0. Sub-section 6.6. Step 6: Calculate the combined margin emissions factor. Paragraphs 77, 78, 79. Page 22. http://cdm.unfcagec.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

[203] Tool to calculate the emission factor for an electricity system- Version 04.0. Sub-section 6.6. Step 6: Calculate the combined margin emissions factor. Sub-section 6.6.1. Weighted average CM. Paragraphs 80-81. Page 23. http://cdm.unfcagec.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

w_{BM} = Weighting of build margin emissions factor (per cent)

81. The following default values should be used for w_{OM} and w_{BM}:

(a) Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;

(b) All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool."

The details are in the Section "B.6.3. Ex ante calculation of emission reductions".

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EG_{gross,y}$
Unit	GWh
Description	Total quantity of gross electricity generation of power plants connected to the grid including low-cost/must-run power plants in year y for years in the 3-year period of [2011 – 2013].
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details.
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206].
Purpose of data	Calculation of baseline emissions.
Additional comment	

[204]Official Statistics Portal of the Republic of Turkey. Energy Statistics. Accessed on 27/08/2015. http://www.resmiistatistik.gov.tr/?q=tr/content/43-enerji-istatistikleri

[205]Turkey in Statistics 2014. Publication of the Turkish Statistical Institute. ISBN 978-975-19-6365-9. Chapter 14. Energy. Page 58. Accessed on 27/08/2015. http://www.turkstat.gov.tr/IcerikGetir.do?istab_id=5

[206] What the Figures Say 2014. Publication of the Turkish Statistical Institute. ISBN 978-975-19-6241-6. Energy. Page 25. Accessed on 27/08/2015. http://www.turkstat.gov.tr/IcerikGetir.do?istab_id=4

Data / Parameter	$EG_{gross,i,y}$
Unit	GWh
Description	Quantity of gross electricity generation of power plants using fuel type / utilizing primary energy source i connected to the grid including low-cost/must-run power plants in year y for years in the 3-year period of [2011 – 2013].
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206]. Since power plant based data is unavailable, the amounts of generation for group of power plants using the same fuel type / utilizing the same primary energy source are used.
Purpose of data	Calculation of baseline emissions.
Additional comment	

Data / Parameter	EG_y
Unit	GWh
Description	Total net quantity of electricity generation of power plants connected to the grid, not including low-cost/must-run power plants in year y for years in the 3-year period of [2011 – 2013].
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206].
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$EG_{i,y}$
Unit	GWh
Description	Net quantity of electricity generation of power plants using fuel type i connected to the grid, not including low-cost/must-run power plants in year y for years in the 3-year period of [2011 – 2013].
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206]. Since power plant based and fuel/primary energy source specific data is not available, net electricity generation of each group of power plants using the same fuel i for that year y is calculated applying the same net/gross electricity generation ratio for that year y to gross generation of each group of power plants using the same fuel i in that year y.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$EG_{import,y}$
Unit	GWh
Description	Quantity of electricity imports in year y for years in the 3-year period of [2011 – 2013].
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206].
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$FC_{i,y}$
Unit	ton (liquid and solid fuels) / 10^3 m^3 (gaseous fuels)
Description	Amount of fuels consumed in thermal power plants in Turkey by fuel type i in year y for years in the 3-year period of [2011 – 2013].
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206].
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$NCV_{i,y}$
Unit	TJ/Gg, GJ/ton
Description	Net calorific value of fuel type i consumed by thermal power plants in year y in the 3-year period of [2009 – 2011]
Source of data	Official data from TEIAS (Turkish Electricity Transmission Company), the responsible authority for the operation of Turkish National Grid.
Value(s) applied	See Section B.6.3 and/or Appendix 4 for details
Choice of data or Measurement methods and procedures	Official data. According to the regulations regarding the Turkish Statistical Institute, the state organization responsible for the statistical affairs in the Republic of Turkey, TEIAS is the official source of data for energy[204,205,206]. The net calorific values are calculated using the amount of fuels used[165] and the heating values of the fuels[166].
Purpose of data	Calculation of baseline emissions.
Additional comment	In order for all the units of consumed fuels to be compatible with each other, the unit of natural gas consumed should be converted to mass units. Also, heating values given by TEIAS, which are expressed in [cal], must be converted into [J]. For this purpose, conversion factors given in International Energy Agency were used[168]. Natural gas density was accepted as 0.692 kg/m^3, and 1 cal was assumed to be equal to 4.1868 J.

Data / Parameter	$EF_{CO2,i,y}$
Unit	kg/TJ
Description	Default CO_2 emission factors of fossil fuel type i for combustion.
Source of data	IPCC default values at the lower limit of the uncertainty at a 95 per cent confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories, pages 1.23 – 1.24[167].
Value(s) applied	See Section B.6.1, B.6.3 and/or Appendix 4 for details.
Choice of data or Measurement methods and procedures	Country or project specific data are not available for power plants using fossil fuels in Turkey. Hence, IPCC default emission factors have been used according to the Tool (Section 7, page 29) and the UNFCCC CDM "Guidance on IPCC Default Values"[207].
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$\eta_{i,y}$
Unit	Dimensionless (% ratio)
Description	Average net energy conversion efficiency of power units using fuel i in year y.
Source of data	For power plants using imported coal as fuel, the data given in presentation by Muzaffer Basaran in Panel about "Coal-Fired Power Plants and Investment Models", in Middle East Technical University Alumni Association Visnelik Facility, on 23 February 2013[200] were used. For other types of fuels, the values in Table 1 in Appendix 1 of the Tool[199] were applied.
Value(s) applied	See Section B.6.1, B.6.3 and/or Appendix 4 for details.
Choice of data or Measurement methods and procedures	Power plant and/or fuel type specific of net energy conversion efficiencies are impossible or very hard to find. Hence, the data available for imported coal using power plants from a panel conducted at the alumni association of a technical university (Middle East Technical University) were used. For the other fuel types, default efficiency factors for power plants in Appendix 1 of the Tool were selected taking the conservativeness rule into account.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

[207] Guidance on IPCC default values. UNFCCC > CDM > Rules and Reference > Guidelines. http://cdm.unfccc.int/Reference/Guidclarif/meth/meth_guid16_v01.pdf

Data / Parameter	CAP_{BM}
Unit	Power Plant Name, Installed Capacity [MW], Electricity Generation [GWh], Commissioning Date [YYYY-MM-DD]
Description	Capacity additions forming the sample group of power units used to calculate the build margin.
Source of data	TEIAS (Turkish Electricity Transmission Company) Capacity Projection Reports[189] and Ministry of Energy and Natural Resources of Republic of Turkey Energy Investment Data[194]. Operational power plants at the end of 2013 were selected as the reference group.
Value(s) applied	See Section B.6.3 and Appendix 4.
Choice of data or Measurement methods and procedures	Annual electricity generation of the project electricity system AEG_{total} was determined excluding power units registered as CDM project activities and capacity additions from retrofits of power plants. Since generation data for individual power plants are not available, but firm generation capacities of individual power plants are available, firm generation capacities were used as the actual generations. Every single commissioning of each power plant is assumed as a power unit. These power units are sorted by date from the newest to the oldest. The newest 5 power units, $SET_{5\text{-}units}$, their electricity generation $AEG_{SET\text{-}5\text{-}units}$, and the group of power units that started to supply electricity to the grid most recently and that comprise 20 per cent of AEG_{total}, $SET_{\text{/}20\ per\ cent}$, and their electricity generation $AEG_{SET\text{-}\text{/}20\ per\ cent}$ were identified.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

a) Operating Margin Emission Factor Calculation:

The calculation was performed according to the Option B of the Simple OM method of the Tool[208]. Only grid connected power plants were included in the project electricity system. Ex-ante option was chosen, and a 3-year generation-weighted average, based on the most recent data available at the time of submission, was taken. The relevant reference period corresponds to the 3 year period of [2011 – 2013]. The gross electricity generations of these years by primary energy sources are as follows[160,161]:

[208] Tool to calculate the emission factor for an electricity system- Version 04.0. Section 6. Baseline methodology procedure. Sub-section 6.4. Step 4: Calculate the operating margin emission factor according to the selected method. Sub-section 6.4.1.2. Option B: Calculation based on total fuel consumption and electricity generation of the system. Paragraphs 49-50. pp 14-15. http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf

Table 25. Gross Electricity Generations of Turkish Electricity System by Primary Energy Sources in Years [2011 – 2013][160,161]

Gross Generations by Fuel Types and Primary Energy Resources in [2011 - 2013] (Unit: GWh)				
Primary Energy Resource or Fuel Type	Years			3-Year Total
	2011	2012	2013	
Hard Coal + Imported Coal + Asphaltite	27,347.5	33,324.2	33,524.0	94,195.7
Lignite	38,870.4	34,688.9	30,262.0	103,821.3
Total Coal	**66,217.9**	**68,013.1**	**63,786.1**	**198,017.1**
Fuel-Oil	900.5	981.3	1,192.5	3,074.3
Diesel Oil	3.1	657.4	546.3	1,206.8
LPG	0.0	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0	0.0
Total Oil (Liquid Total)	**903.6**	**1,638.7**	**1,738.8**	**4,281.1**
Natural Gas	104,047.6	104,499.2	105,116.3	313,663.1
Renewables and Wastes	469.2	720.7	1,171.2	2,361.1
Thermal	**171,638.3**	**174,871.7**	**171,812.5**	**518,322.5**
Hydro + Geothermal + Wind Total	**57,756.8**	**64,625.1**	**68,341.5**	**190,723.4**
Hydro	**52,338.6**	**57,865.0**	**59,420.5**	**169,624.1**
Geothermal + Wind	**5,418.2**	**6,760.1**	**8,921.0**	**21,099.3**
Geothermal	694.3	899.3	1,363.5	2,957.2
Wind	4,723.9	5,860.8	7,557.5	18,142.2
General Total (Gross)	**229,395.1**	**239,496.8**	**240,154.0**	**709,045.9**

Net electricity generation is only available for the whole project electricity system, not for each fuel type or primary energy source[181]:

Table 26. Gross and Net Electricity Generations of Turkish Electricity System in Years [2011 – 2013][181]

Gross and Net Generations in [2011 - 2013] (Unit: GWh)				
Primary Energy Resource or Fuel Type	Years			3-Year Total
	2011	2012	2013	
General Total (Gross)	**229,395.1**	**239,496.8**	**240,154.0**	**709,045.9**
General Total (Net)	**217,557.7**	**227,707.3**	**228,977.0**	**674,242.0**
Net / Gross Ratio	**94.84%**	**95.08%**	**95.35%**	**95.09%**

The corresponding net/gross ratio of each year was applied to gross generations of each primary energy source to find the net generation of group of power plants utilizing that primary energy source, with low-cost/must-run power plants excluded:

Table 27. Net Electricity Generations of Turkish Electricity System by Primary Energy Sources, Excluding Low-Cost/Must-Run Power Plants, (Thermal Power Plants) in Years [2011 – 2013][161,181]

Net Electricity Generation Excluding Low-	Years	3-Year

Cost/Must-Run (Thermal Power Plants) (Unit: GWh)	2011	2012	2013	Total
Hard Coal+Imported Coal+Asphaltite	25,936.3	31,683.8	31,963.8	89,583.9
Lignite	36,864.6	32,981.3	28,853.6	98,699.5
Fuel Oil	854.0	933.0	1,137.0	2,924.0
Diesel oil	2.9	625.0	520.9	1,148.9
LPG	0.0	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0	0.0
Natural Gas	98,678.5	99,355.1	100,224.1	298,257.7
Renewables and Wastes	445.0	685.2	1,116.7	2,246.9
Turkey's Thermal Total	**162,781.3**	**166,263.4**	**163,816.2**	**492,860.9**

Fuel consumptions of thermal power plants were also taken from TEIAS statistics[165]. The amount of natural gas was converted from volume to mass units using the density value of 0.692 kg/m^3, as explained in section B.6.1.

Table 28. Fuel Consumption of Thermal Power Plants by Fuel Type, in Years [2011 – 2013]

Fuel Consumption in Electricity Generation Excluding Low-Cost/Must-Run (Unit: Ton)	Years			3-Year Total
	2011	2012	2013	
Hard Coal+Imported Coal+Asphaltite	10,574,434.0	12,258,462.0	12,105,930.0	34,938,826.0
Lignite	61,507,310.0	55,742,463.0	47,120,306.0	164,370,079.0
Fuel Oil	531,608.0	564,796.0	573,534.0	1,669,938.0
Diesel oil	15,047.0	176,379.0	129,359.0	320,785.0
LPG	0.0	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0	0.0
Natural Gas	15,779,535.9	15,977,110.0	15,852,300.3	47,608,946.2
Turkey's Thermal Total	**88,407,934.9**	**84,719,210.0**	**75,781,429.3**	**248,908,574.2**

Heating values of fuels consumed in power plants were also taken from the TEIAS statistics[166]. These values were in [Tcal] units, and were converted into [TJ], using the ratio 1 cal = 4.1868 J, given by IEA[168,169,170].

Table 29. Heating Values of Fuels Consumed in Thermal Power Plants in Turkey, in Years [2011 – 2013][166]

Heating Values of Fuels Consumed in Thermal Power Plants (Unit: TJ)	Years			3-Year Total
	2011	2012	2013	
Hard Coal+Imported Coal+Asphaltite	57,567.3	71,270.2	68,784.8	197,622.2
Lignite	107,209.5	93,586.6	81,676.2	282,472.4
Fuel Oil	5,279.9	5,624.8	5,837.2	16,741.9
Diesel oil	155.1	1,883.6	1,363.2	3,402.0
LPG	0.0	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0	0.0
Natural Gas	202,064.1	203,766.4	203,243.7	609,074.2
Turkey's Thermal Total	**372,275.9**	**376,131.6**	**360,905.2**	**1,109,312.6**

The corresponding net calorific values (NCV) were found as follows:

Table 30. Net Calorific Values of Fuels Consumed in Thermal Power Plants in Turkey, in Years [2011 – 2013]

Net Calorific Values of Fuels Consumed in Thermal Power Plants (Unit: TJ/Gg)	Years		
	2011	2012	2013
Hard Coal+Imported Coal+Asphaltite	22.8	24.3	23.8
Lignite	7.3	7.0	7.3
Fuel Oil	41.6	41.7	42.6
Diesel oil	43.2	44.7	44.1
LPG	0.0	0.0	0.0
Naphtha	0.0	0.0	0.0
Natural Gas	53.6	53.4	53.7
Turkey's Thermal Total	**17.6**	**18.6**	**19.9**

Due to the absence of power-plant based or fuel based emission factor data, the lower limit of the 95 percent confidence intervals of IPCC default emission factor values were applied[167], and the emission factor for electricity imports were assumed as zero:

Table 31. Emission Factors used in the Operating Margin Emission Factor Calculation.

Emission Factors by Fuel Type (IPCC Values) (kg/TJ)	Table 1.4		
	Default CO_2 Emission Factors for Combustion (kg/TJ)		
	Default	Lower	Upper
Hard Coal+Imported Coal+Asphaltite	94,600	89,500	99,700
Lignite	101,000	90,900	115,000
Fuel Oil	77,400	75,500	78,800
Diesel oil	74,100	72,600	74,800
LPG	63,100	61,600	65,600
Naphtha	73,300	69,300	76,300
Natural Gas	56,100	54,300	58,300
Import	0	0	0

The corresponding emissions and Operating Margin Emission Factors were calculated using the above values:

Table 32. Operating Margin Emission Factor Calculation.

Operating Margin Emission Factor Calculation			
CO_2 Emissions (ton)	**Years**		
	2011	**2012**	**2013**
Hard Coal+Imported Coal+Asphaltite	21,571,526.82	26,706,251.95	25,774,929.02

Lignite	40,801,815.79	35,617,213.92	31,084,353.22
Fuel Oil	1,668,984.86	1,778,007.02	1,845,170.78
Diesel oil	47,138.38	572,555.90	414,369.07
LPG	0.00	0.00	0.00
Naphtha	0.00	0.00	0.00
Natural Gas	45,937,907.18	46,324,907.21	46,206,080.59
Import	0.00	0.00	0.00
Total Emission [ton]	**110,027,373.03**	**110,998,936.01**	**105,324,902.68**
Net Electricity Generation Including Imports and Excluding Low-Cost/Must-Run(Unit: GWh)	**166,892.12**	**171,404.92**	**170,128.87**
Yearly Emission Factor [tCO_2/MWh]	**0.659**	**0.648**	**0.619**
2009-2011 Total Emissions [ton]			**326,351,211.72**
2009-2011 Total Net Electricity Gen. [GWh]			**508,425.9**
2009-2011 OMEF Calculation [tCO_2/MWh]			**0.642**

As a result, the Operating Margin Emission Factor for the selected period was found to be

$EF_{grid,OM,\ simple}$ **= 0.642 tCO_2/MWh.**

b) Build Margin Emission Factor Calculation:

Option 1, ex ante based build margin emission factor calculation, was selected.

Capacity additions from retrofits of power plants that could be identified are as follows:

Table 33. Capacity additions from retrofits of power plants that could be identified in commissioned power units.

Capacity Additions from Retrofit of Power Plants (As at the end 2013)							
No	**Fuel / Energy Source**	**POWER PLANT NAME**	**Installed Capacity MW**	**Firm Generation Capacity (year 2013) GWh**	**Commissioning Date**	**Location (Province)**	**Retrofit Type**
1	NG	AKBAŞLAR	3.960	30.06	13.09.2003	Bursa	FS from FO to NG
2	NG	AMYLUM NİŞASTA (Adana)	6.200	34.69		Adana	FS from FO to NG
3	NG	DENİZLİ ÇİMENTO	14.000	113.00	04.05.2006	Denizli	FS from FO to NG
4	NG	ISPARTA MENSUCAT	4.300	33.00		Isparta	FS from FO to NG
5	NG	PAKGIDA (Düzce-Köseköy)	4.800	38.26		Duzce	FS from LPG to NG
6	NG	PAKMAYA (Köseköy)	4.800	38.26		Kocaeli	FS from LPG to NG
7	NG	PAKMAYA (Köseköy)	2.100	16.74	02.07.2003	Kocaeli	FS from LPG to NG
8	NG	KAREGE ARGES	26.280	209.09	30.07.2003	Izmir	FS from FO to NG
9	NG	AMBARLI THERMAL POWER PLANT	300.000	1,280.05	21.11.2013	Istanbul	FS from FO to NG
GENERAL TOTAL			**366.4**	**1,793.1**			
Abbreviations: FS: Fuel Switch, NG: Natural Gas, FO: Fuel Oil, LPG: Liquefied Petroleum Gas							

CDM project activities are identified as follows[132,133,134,135,136,189,194]:

Table 34. CDM VER Projects in Turkey as at the end of 2013

No	Fuel / Energy Source	Power Plant Name	Installed Capacity MW	Location (Province)	Commissioning Date (If multiple, first date)	Standard	Code / Number / Project ID
1	WD	AK ENERJİ AYYILDIZ (BANDIRMA)	15.0	Balikesir	05.09.2009	GS	GS634
2	WS	AKÇANSA TERMİK-KOJENERASYON SANTRALİ	15.2	ÇANAKKALE	01.03.2013	GS	
3	HE	AKÇAY	28.8	Aydin	14.08.2009	VCS	1174
4	WD	AKDENİZ ELEK. MERSİN RES	34.0	Mersin	19.03.2010	GS	GS753
5	HE	AKIM (CEVİZLİK HES)	91.4	Rize	28.05.2010	VCS	753
6	WD	AKRES (AKHİSAR RÜZGAR)	43.8	Manisa	01.07.2011	GS	GS955
7	BG	AKSARAY OSB BİYOGAZ SANTRALİ	2.1	AKSARAY	28.08.2013	GS	
8	WD	AKSU RES (AKSU TEMİZ EN.)	72.0	Kayseri	16.03.2012	GS	GS1134
9	HE	ALABALIK REG.(DARBOĞAZ)	13.8	Erzurum	14.12.2012	GS	
10	HE	ALABALIK REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	2.5	ERZURUM	29.03.2013	GS	
11	WD	ALİZE ENERJİ (ÇAMSEKİ)	20.8	Canakkale	24.06.2009	GS	GS399
12	WD	ALİZE ENERJİ (KELTEPE)	20.7	Balikesir	23.07.2009	GS	GS437
13	WD	ALİZE ENERJİ (SARIKAYA ŞARKÖY)	28.8	Tekirdag	19.10.2009	GS	GS577
14	HE	ANADOLU ÇAKIRLAR	16.2	Artvin	13.08.2009	GS	GS917
15	WD	ANEMON ENERJİ (İNTEPE)	30.4	Canakkale	22.02.2007	GS	GS347
16	HE	ARCA HES (GÜRSU EL.)	16.4	Trabzon	06.04.2012	VCS	1152
17	HE	ASA EN.(KALE REG.)	9.6	Rize	19.02.2010	GS	GS637
18	WD	ASMAKİNSAN (BANDIRMA-3 RES)	24.0	Balikesir	26.02.2010	GS	GS683
19	HE	AVANOS REG. VE CEMEL HES (CEMEL I)	14.4	NEVŞEHİR	27.06.2013	GS	
20	HE	AYANCIK HES (İLK EL.)	15.6	Sinop	21.10.2012	GS	
21	GT	AYDIN GERMENCİK JEO.(MAREN MARAŞ)	20.0	Aydin	11.11.2011	GS	GS861
22	WD	AYEN ENERJİ (AKBÜK)	31.5	Aydin	19.03.2009	GS	GS436
23	HE	AYRANCILAR HES MURADİYE EL.)	41.5	Van	25.03.2011	GS, VCS	GS729, 577
24	WD	AYVACIK (AYRES)	5.0	Canakkale	23.10.2011	GS	GS956
25	WD	BAKİ ELEKTRİK ŞAMLI RÜZGAR	114.0	Balikesir	08.08.2008	GS	GS351
26	WD	BAKRAS ELEK.ŞENBÜK RES	15.0	Hatay	22.04.2010	GS	GS733
27	WD	BALIKESİR RES	142.6	Balikesir	17.08.2012	GS	
28	HE	BALKONDU I HES (BTA ELEK.)	9.2	Trabzon	05.08.2011	VCS	PL1101
29	HE	BALKUSAN I HES (KAREN)	13.0	Karaman	04.08.2012	VCS	918
30	HE	BALKUSAN II HES (KAREN)	25.0	Karaman	04.08.2012	VCS	918
31	WD	BANDIRMA RES (BORASKO)	60.0	Balikesir	18.09.2009	GS	GS744
32	HE	BANGAL REG. KUŞLUK HES(KUDRET EN.)	17.0	Trabzon	16.05.2012	GS	
33	WD	BARES (BANDIRMA)	35.0	Balikesir	20.04.2006	GS, VER+	GS1072, 52-1

34	WS	BATIÇİM BATI ANADOLU ÇİMENTO SANAYİİ A.Ş. TERMİK KOJENERASYON SANTRALİ	9.0	İZMİR	12.10.2013	VCS	822
35	WS	BATISÖKE ATIK ISI OTOPRODÜKTÖR SANTRALİ	5.3	AYDIN	27.07.2013	VCS	816
36	WD	BELEN HATAY	36.0	Hatay	02.10.2009	GS	GS390
37	HE	BEREKET (KOYULHİSAR)	42.0	Sivas	12.06.2009	VCS	713
38	WD	BERGAMA RES (ALİAĞA RES)	90.0	Izmir	16.06.2010	GS	GS735
39	HE	BEYOBASI (SIRMA)	5.9	Aydin	23.05.2009	VCS	603
40	HE	BEYTEK(ÇATALOLUK HES)	9.5	K.Maras	07.04.2010	GS	GS872
41	BG	BİYOKÜTLE (ÇÖP GAZI) ENERJİ ÜRETİM SANTRALİ	1.2	SAMSUN	27.09.2013	GS	
42	BG	BİYOKÜTLEDEN ENERJİ ÜRETİM SANTRALİ	8.5	ANKARA	31.05.2013	GS	
43	WS	BOLU BEL.ÇÖP (CEV MARMARA)	1.1	Bolu	26.08.2011	GS	GS764
44	WD	BOREAS EN.(ENEZ RES)	15.0	Edirne	09.04.2010	GS	GS702
45	WD	BOZYAKA RES (KARDEMİR)	12.0	Izmir	12.03.2012	GS	
46	HE	BULAM	7.0	Adiyaman	10.08.2010	GS	GS642
47	HE	BURÇBENDİ (AKKUR EN.)	27.3	Adiyaman	04.11.2010	VCS	419
48	WS	CEV EN.(GAZİANTEP ÇÖP)	5.7	Gaziantep	01.02.2010	GS	
49	HE	CEVHER (ÖZCEVHER)	16.4	Trabzon	17.01.2011	GS	GS688
50	HE	CEYHAN HES (BERKMAN HES-ENOVA)	37.8	Osmaniye	20.08.2010	VCS	810
51	HE	CEYHAN HES (OŞKAN HES-ENOVA)	23.9	Osmaniye	03.06.2010	VCS	810
52	HE	CEYKAR BAĞIŞLI	29.6	Hakkari	21.03.2009	VCS	657
53	HE	ÇAKIT HES	20.2	Adana	01.06.2010	VCS	685
54	HE	ÇALDERE ELEKTRİK DALAMAN MUĞLA	8.7	Mugla	02.04.2008	VCS	363
55	HE	ÇAMLICA III	27.6	Kayseri	01.04.2011	VCS	759
56	WD	ÇANAKKALE RES (ENERJİ-SA)	29.9	Canakkale	11.02.2011	GS	GS906
57	WD	ÇATALTEPE (ALİZE EN.)	16.0	Balikesir	19.04.2011	GS	GS574
58	HE	ÇERMİKLER BARAJI VE HES	25.0	SİVAS	24.10.2013	VCS	PL1050
59	HE	ÇOBANLI HİDROELEKTRİK SANTRALİ	19.0	SİVAS	09.02.2013	VCS	PL1059
60	HE	DAĞDELEN REGÜLATÖRÜ VE HES	8.0	KAHRAMANMARAŞ	10.05.2013	VCS	1284
61	WD	DAĞPAZARI RES (ENERJİ SA)	39.0	Mersin	20.05.2012	GS	
62	HE	DAMLAPINAR(CENAY ELEK.)	16.4	Karaman	08.07.2010	VCS, VER+	1066
63	HE	DARCA HES (BÜKOR EL.)	8.9	Bilecik	26.05.2011	GS	GS887
64	WD	DATÇA RES	29.6	Mugla	18.12.2008	GS	GS438
65	HE	DEĞİRMEN HES	13.0	GÜMÜŞHANE	26.07.2013	GS	
66	HE	DEĞİRMENÜSTÜ (KAHRAMANMARAŞ)	38.6	K.Maras	05.12.2008	VCS	565
67	HE	DEMİRCİLER HES(PAK EN.)	8.4	Denizli	03.08.2012	GS	
68	WD	DENİZLİ ELEKT. (Karakurt-Akhisar)	10.8	Manisa	28.05.2007	VCS, VER+	66
69	WD	DİNAR RES (OLGU EN.)	50.0	Afyonkarahisar	22.12.2012	GS	
70	HE	DİYOBAN HİDROELEKTRİK SANTRALİ	8.5	ARTVİN	15.03.2013	VCS	1402
71	WD	DOĞAL ENERJİ (BURGAZ)	14.9	Canakkale	08.05.2008	GS	GS439

72	GT	DORA-3 JEOTERMAL ENERJİ SANTRALİ	17.0	AYDIN	16.08.2013	GS	
73	WD	DÜZOVA RÜZGAR ENERJİ SANTRALİ	0.0	İZMİR	12.02.2013	GS	
74	WD	EDİNCİK RES	30.0	BALIKESİR	19.07.2013	GS	
75	HE	EGEMEN 1 HES (ENERSİS ELEK.)	19.9	Bursa	26.11.2010	GS	GS755
76	HE	EĞLENCE 2 HES	26.0	ADANA	10.04.2013	VCS	1221
77	HE	EĞLENCE-I HES	42.7	ADANA	13.06.2013	VCS	1221
78	HE	ELESTAŞ YAYLABEL	5.1	Isparta	07.09.2009	VCS	582
79	HE	ELESTAŞ YAZI	1.1	Cankiri	02.10.2009	VCS	583
80	HE	ERİKLİ-AKOCAK REG.(AK EN.)	82.5	Trabzon	29.07.2010	VCS	535
81	WD	ERTÜRK ELEKT. (ÇATALCA)	60.0	Istanbul	14.06.2008	GS	GS367
82	HE	ESENDURAK (MERAL EL.)	9.3	Erzurum	23.10.2012	GS	
83	HE	EŞEN-I (GÖLTAŞ)	60.0	Mugla	24.04.2011	VER+	97-1
84	HE	FEKE 2 (AKKUR EN.)	69.3	Adana	24.12.2010	VCS	534
85	HE	FEKE I (AKKUR EN.)	29.4	Adana	27.06.2012	VCS	533
86	HE	FİLYOS YALNIZCA HES	14.4	Karabük	16.09.2009	GS	GS618
87	HE	GELİNKAYA HES	6.9	ERZURUM	14.06.2013	GS	
88	HE	GEMİCİLER REG.(BOZTEPE)	8.0	Adiyaman	18.12.2012	GS	
89	WD	GEYCEK RES	83.0	KIRŞEHİR	13.09.2013	GS	
90	HE	GÖZELOLUK REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	13.6	GÜMÜŞHANE	29.08.2013	VCS	
91	HE	GÜLLÜBAĞ (SEN EN.)	96.0	Erzurum	23.03.2012	VCS	391
92	WD	GÜNAYDIN RES (MANRES EL.)	10.0	Balikesir	20.11.2012	GS	
93	HE	GÜNDER REG.(ARIK)	28.2	Karaman	31.05.2012	VCS	912
94	HE	GÜZELÇAY I-II HES(İLK EN.)	8.1	Sinop	15.06.2010	GS	GS711
95	HE	HAMZALI HES (TURKON MNG ELEK.)	16.7	Kirikkale	08.11.2008	GS	GS633
96	HE	HASANKALE REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	5.3	NEVŞEHİR	22.05.2013	VCS	
97	HE	HASANLAR (DÜZCE)	4.7	Duzce	02.12.2011	GS	GS831
98	HE	IRMAK HES	5.7	ORDU	01.08.2013	GS	
99	WS	ITC BURSA	9.8	Bursa	19.05.2012	GS	
100	WS	ITC-KA ENERJİ ADANA (BİYOKÜTLE)	15.6	Adana	02.09.2010	GS	GS715
101	WS	ITC-KA ENERJİ KONYA (ASLIM BİYOKÜTLE)	5.7	Konya	09.09.2011	GS	GS1016
102	WS	ITC-KA ENERJİ MAMAK	25.4	Ankara	03.11.2006	GS	GS440
103	WS	ITC-KA ENERJİ SİNCAN	5.7	Ankara	17.07.2009	GS	GS675
104	HE	İNCİRLİ REG.(LASKAR EN.)	25.2	Rize	25.05.2011	VCS	
105	WD	İNNORES ELEK. YUNTDAĞ	57.5	Izmir	07.03.2008	GS	GS352
106	BG	İSTANBUL - KEMERBURGAZ - ODAYERİ ÇÖP BİYOGAZ PROJESİ	7.0	İSTANBUL	13.02.2013	GS	
107	BG	İSTANBUL - ŞİLE - KÖMÜRCÜODA ÇÖP BİYOGAZ PROJESİ	5.7	İSTANBUL	22.08.2013	GS	
108	HE	KALE HES	34.1	K.Maras	16.06.2010	VCS	893
109	HE	KALE HİDROELEKTRİK	29.3	AMASYA	01.03.2013	VCS	1104

		SANTRALİ					
110	HE	KALECİK HES	19.1	ANKARA	19.01.2013	GS	
111	HE	KALEN ENER. (KALEN I-II)	31.3	Giresun	16.04.2008	VCS	932
112	HE	KALKANDERE-YOKUŞLU HES(AKIM EN.)	40.2	Rize	28.01.2011	VCS	905
113	HE	KANDİL BARAJI VE HES	203.2	KAHRAMANMARAŞ	10.10.2013	VCS	1284
114	WD	KAPIDAĞ RES	8.0	BALIKESİR	31.01.2013	GS	
115	WD	KARABURUN RES	120.0	İZMİR	15.03.2013	GS	
116	HE	KARADENİZ ELEK.(UZUNDERE I HES)	62.2	Rize	27.05.2010	VCS	964
117	HE	KARASU 4-2 HES (İDEAL EN.)	10.4	Erzincan	24.11.2011	GS	GS928
118	HE	KARASU 4-3 HES (İDEAL EN.)	4.6	Erzincan	05.08.2011	GS	GS929
119	HE	KARASU 5 HES (İDEAL EN.)	4.1	Erzincan	03.08.2011	GS	GS929
120	HE	KARASU I HES (İDEAL EN.)	3.8	Erzurum	19.05.2011	GS	GS927
121	HE	KAR-EN KARADENİZ ELEK.(ARALIK HES)	12.4	Artvin	30.04.2010	GS	GS663
122	HE	KAVAKÇALI HİDROELEKTRİK SANTRALİ	11.1	MUĞLA	29.03.2013	GS	
123	HE	KAVŞAK BENDİ HES	62.0	ADANA	19.12.2013	VCS	1287
124	HE	KAYABÜKÜ HES (ELİTE ELEK.)	14.6	Bolu	21.07.2010	GS	GS726
125	WD	KAYADÜZÜ RES (BAKTEPE EN.)	39.0	Amasya	16.03.2012	GS	
126	WS	KAYSERİ KATI ATIK (HER EN.)	4.3	Kayseri	01.11.2011	GS	GS1061
127	HE	KIRAN HES (ARSAN EN.)	9.7	Giresun	04.11.2011	GS, VCS	GS691, 1170
128	WD	KİLLİK RES (PEM EN.)	40.0	Tokat	13.10.2011	GS	GS947
129	WS	KOCAELİ ÇÖP	2.3	Kocaeli	02.03.2012	GS	
130	WD	KORES KOCADAĞ	15.0	Izmir	23.12.2009	GS	GS601
131	WD	KOZBEYLİ RES (DOĞAL EN.)	28.0	Izmir	22.12.2012	GS	
132	HE	KOZDERE (ADO MAD.)	9.3	Antalya	08.10.2011	GS	G434
133	HE	KÖPRÜBAŞI HİDROELEKTRİK SANTRALİ	14.7	GÜMÜŞHANE	08.11.2013	VCS	PL1107
134	HE	KUMKÖY HES (KUMKÖY EN.)	17.5	Samsun	23.02.2011	VCS, VER+	986
135	HE	KUŞAKLI REGÜLATÖRÜ VE HES	20.0	ADANA	20.09.2013	GS	
136	WD	KUYUCAK (ALİZE ENER.)	25.6	Manisa	09.12.2010	GS	GS576
137	HE	LAMAS III-IV (TGT EN.)	35.7	Mersin	05.06.2009	VCS	726
138	WD	LODOS RES (TAŞOLUK)KEMERBURGAZ	24.0	Istanbul	20.06.2008	GS	GS503
139	WD	MADRANBABA RES	19.5	AYDIN	30.07.2013	GS	
140	HE	MARAŞ ENERJİ (FIRNIS)	7.2	K.Maras	05.06.2008	VER+	
141	WD	MARE MANASTIR	39.2	Izmir	08.12.2006	GS	GS368
142	WD	MAZI 3	30.0	Izmir	09.09.2009	GS	GS388
143	GT	MENDERES JEOTERMAL	8.0	Aydin	10.05.2006	VCS	120
144	GT	MENDERES JEOTERMAL DORA-2	9.5	Aydin	26.03.2010	GS	GS445
145	HE	MENGE (ENERJİ-SA)	89.4	Adana	22.12.2011	VCS	578
146	HE	MEREKLER REGÜLATÖRÜ VE ALGÖLÜ HES	11.2	ARDAHAN	18.07.2013	GS	
147	WD	METRİSTEPE (CAN EN.)	39.0	Bilecik	12.03.2012	GS	
148	HE	MİDİLLİ HES	11.6	AMASYA	24.12.2013	VCS	1330

149	WD	MORDOĞAN RES	30.8	İZMİR	27.09.2013	GS	
150	HE	NİKSAR (BAŞAK REG.)	40.2	Tokat	23.05.2012	VCS, VER+	1019
151	HE	NİSAN EN.(BAŞAK HES)	6.9	Kastamonu	09.04.2010	VCS	1013
152	WS	ORTADOĞU ENERJİ (KÖMÜRCÜODA)	8.6	Istanbul	15.07.2009	GS	GS707
153	WS	ORTADOĞU ENERJİ (Oda yeri)	21.1	Istanbul	29.12.2008	GS	
154	HE	OSMANCIK HES	9.0	AMASYA	15.02.2013	VCS	1105
155	HE	OTLUCA I HES (BEYOBASI)	37.5	Mersin	07.04.2011	VCS	755
156	HE	OTLUCA II HES (BEYOBASI)	6.4	Mersin	13.07.2011	VCS	755
157	HE	OYLAT HES	1.9	BURSA	03.12.2013	VCS	1336
158	HE	ÖZGÜR ELEKTR.AZMAK I	11.8	Mersin	01.04.2010	VCS	554
159	HE	ÖZGÜR ELEKTR.AZMAK II	6.3	Mersin	25.12.2009	VCS	554
160	HE	ÖZTAY GÜNAYŞE	8.3	Trabzon	13.08.2009	GS	GS636
161	WS	PAMUKOVA YEN.EN.	1.4	Sakarya	05.05.2012	GS	
162	GT	PAMUKÖREN JES	45.0	AYDIN	31.10.2013	GS	
163	HE	PAPART HES (ELİTE)	26.6	Artvin	02.03.2012	VCS	1300
164	HE	PAŞA HES(ÖZGÜR EL.)	8.7	Bolu	11.06.2010	GS	GS681
165	HE	PİRİNÇLİ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	18.7	ÇORUM	16.07.2013	GS	
166	WD	POYRAZ RES	54.9	Balikesir	04.07.2012	GS	
167	HE	REŞADİYE I HES(TURKON MNG EL.)	15.7	Sivas	26.11.2010	GS	GS643
168	HE	REŞADİYE II HES(TURKON MNG EL.)	26.1	Tokat	17.09.2010	GS	GS644
169	HE	REŞADİYE III HES(TURKON MNG EL.)	22.3	Tokat	11.11.2009	GS	GS645
170	WD	ROTOR (OSMANİYE RES-GÖKÇEDAĞ RES)	135.0	Osmaniye	15.10.2010	GS	GS474
171	HE	SAF I HES	8.6	BİNGÖL	06.09.2013	VCS	1372
172	WS	SAMSUN AVDAN KATI ATIK	2.4	Samsun	09.03.2012	GS	
173	WD	SAMURLU RES(DOĞAL EN.)	30.0	Izmir	31.08.2012	GS	
174	HE	SARAÇBENDİ (ÇAMLICA)	25.5	Sivas	06.05.2011	VCS	758
175	WD	SARAY RES	4.0	TEKİRDAĞ	27.09.2013	GS	
176	WD	SARES (GARET ENER.)	22.5	Canakkale	22.12.2010	GS	GS963
177	HE	SARIGÜZEL HES	102.5	KAHRAMANMARAŞ	20.09.2013	VCS	771
178	WD	SAYALAR RÜZGAR (DOĞAL ENERJİ)	54.2	Manisa	06.06.2008	GS	GS369
179	HE	SAYAN (KAREL)	14.9	Osmaniye	19.11.2011	GS	GS730
180	WD	SEBENOBA (DENİZ ELEK.)SAMANDAĞ	30.0	Hatay	26.03.2008	VCS, VER+	553
181	HE	SEFAKÖY (PURE)	33.1	Kars	12.10.2011	VCS	747
182	HE	SELEN EL.(KEPEZKAYA HES)	28.0	Karaman	06.09.2010	VCS, VER+	954
183	HE	SELİMOĞLU HES (ARSIN EN.)	8.8	Trabzon	07.01.2010	GS	GS635
184	HE	SENA HES	21.4	KARS	19.08.2013	VCS	1091
185	WD	SEYİTALİ RES (DORUK EN.)	30.0	Izmir	22.07.2011	GS	GS578
186	HE	SIRAKONAKLAR(2M)	18.0	Erzurum	06.04.2012	GS	
187	HE	SOĞUKPINAR HİDROELEKTRİK SANTRALİ	8.9	GİRESUN	15.11.2013	VCS	PL1106
188	WD	SOMA RES	140.1	Manisa	05.09.2009	GS	GS398

189	WD	SOMA RES (BİLGİN ELEK.)	90.0	Manisa	13.08.2010	GS	GS655
190	HE	SÖĞÜTLÜKAYA (POSOF HES) YENİGÜN EN.	6.1	Ardahan	20.01.2011	GS	GS891
191	WD	SÖKE ÇATALBÜK RES (ABK EN.)	30.0	Aydin	08.01.2012	GS	
192	HE	SUKENARI REGÜLATÖRÜ VE HES	8.6	TRABZON	19.12.2013	GS	
193	HE	SULUKÖY HES (DU EL.)	6.9	Bursa	16.03.2012	GS	
194	WD	SUSURLUK (ALANTEK EN.)	45.0	Balikesir	13.02.2011	GS	GS854
195	WD	ŞAH RES (GALATA WIND)	93.0	Balikesir	19.05.2011	GS	GS905
196	WD	ŞENBÜK RES	27.0	HATAY	27.06.2013	GS	
197	WD	ŞENKÖY RES (EOLOS RÜZ.)	26.0	Hatay	04.05.2012		
198	HE	ŞİRİKÇİOĞLU KOZAK	4.4	K.Maras	08.07.2009	VCS	
199	HE	TATAR HİDROELEKTRİK SANTRALİ	128.2	ELAZIĞ	14.11.2013	VCS	1205
200	HE	TEKTUĞ-ERKENEK	13.0	Adiyaman	26.02.2009	VCS	693
201	HE	TEKTUĞ-KALEALTI HES	15.0	Osmaniye	30.11.2006	VCS	111
202	HE	TEKTUĞ-KARGILIK	23.9	K.Maras	24.04.2005	VCS	264
203	HE	TEKTUĞ-KEBENDERESİ	5.0	Elazig	09.05.2007	VCS	598
204	HE	TORLAR HİDROELEKTRİK SANTRALİ	14.8	KAHRAMANMARAŞ	08.02.2013	VCS	1331
205	HE	TUNA HES (NİSAN)	37.2	Tokat	13.01.2012	VCS	668
206	WD	TURGUTTEPE RES (SABAŞ ELEK.)	24.0	Aydin	30.12.2010	GS	GS610
207	HE	TUZKÖY (BATEN)	8.4	Nevsehir	28.09.2012	GS	
208	GT	TUZLA JEO.	7.5	Canakkale	13.01.2010	GS	GS353
209	HE	TUZLAKÖY-SERGE (TUYAT) (BATEN)	7.1	Erzurum	31.03.2012	GS	
210	HE	TUZTAŞI HES (GÜRÜZ ELEK. ÜR. LTD.ŞTİ.)	1.6	Sivas	04.07.2011	VCS	
211	HE	ULUBAT KUVVET TÜN.(AK EN.)	100.0	Bursa	22.10.2010	VCS	536
212	HE	UMUT I HES(NİSAN EL.)	5.8	Ordu	04.10.2012	VCS	1012
213	HE	UMUT III HES(NİSAN EL.)	12.0	Ordu	13.12.2010	VCS	1010
214	HE	UZUNÇAYIR	82.0	Tunceli	02.12.2009	VCS	762
215	WD	ÜTOPYA ELEKTRİK	30.0	Izmir	11.08.2009	GS	GS672
216	HE	VİZARA (ÖZTÜRK)	8.6	Trabzon	18.04.2012	GS	
217	HE	YAĞMUR (BT BORDO)	8.9	Trabzon	27.11.2012	GS	
218	HE	YAMAÇ HES (YAMAÇ ENERJİ ÜRETİM A.Ş.)	5.5	Osmaniye	20.07.2011	GS	GS926
219	HE	YAMANLI III GÖKKAYA (MEM)	28.5	Adana	14.09.2012	VCS	1014
220	HE	YAMANLI III HİMMETLİ (MEM)	27.0	Adana	12.05.2012	VCS	1014
221	HE	YAPISAN KARICA DARICA	110.3	Ordu	10.10.2009	VCS	506
222	HE	YAPRAK HES	9.0	ANTALYA	05.09.2013	VCS	1385
223	HE	YAPRAK HİDROELEKTRİK SANTRALİ (YAPRAK I)	13.5	AMASYA	11.01.2013	VCS	1009
224	HE	YAPRAK II HES (NİSAN EL. ENERJİ)	10.8	Amasya	03.04.2011	VCS	1008
225	HE	YAZYURDU REGÜLATÖRÜ VE HES	14.9	ERZURUM	22.11.2013	GS	
226	HE	YEDİSU HES (ÖZALTIN)	22.7	Bingol	03.02.2012	VCS	752
227	HE	YEŞİLBAŞ	14.0	Sivas	04.12.2009	VCS	806
228	HE	YEŞİLIRMAK-I HİDROELEKTRİK SANTRALİ	14.3	TOKAT	22.03.2013	GS	

229	HE	YPM ALTINTEPE SUŞEHRİ HES	4.0	Sivas	07.06.2007	VCS	914
230	HE	YPM BEYPINAR HES	3.6	Sivas	07.06.2007	VCS	914
231	HE	YPM GÖLOVA	1.1	Sivas	10.06.2009	VCS	914
232	HE	YPM KONAK HES (SUŞEHRİ/SİVAS)	4.0	Sivas	20.07.2007	VCS	914
233	HE	YPM SEVİNDİK	5.7	Sivas	09.06.2009	VCS	914
234	HE	YÜCE HİDROELEKTRİK SANTRALİ	5.3	GİRESUN	31.05.2013	GS	
235	WD	ZEYTİNELİ RES	49.5	İZMİR	30.05.2013	GS	
236	WD	ZİYARET RES	57.5	Hatay	15.07.2010	GS	GS617
Abbreviations: WD: Wind, HE: Hydroelectric, WS: Waste, GT: Geothermal, GS: Gold Standard, VCS: Verified Carbon Standard							

The remaining power units constitute the sample group used to calculate the build margin emission calculation. There are 864 power units in this group. Complete list of this sample group is in the Appendix 4 of this report.

These power units in the sample group were sorted by date from the newest to the oldest. The newest 5 power units, $SET_{5\text{-}units}$, were identified as follows:

Table 35. The set of five power units, excluding power units registered as CDM project activities that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$)

No	Fuel / Energy Source	POWER PLANT NAME	Installed Capacity (MW)	Firm Generation Capacity (year 2012) (GWh)	Commissioning Date	Location (Province)
1	NG	KOJENERASYON	2.022	8.6	27.12.2013	MERSİN
2	HE	ÖZLÜCE HES	18.190	48.5	27.12.2013	ERZURUM
3	HE	UZUNDERE II HES	7.020	18.7	27.12.2013	RİZE
4	HE	BURÇAK HES 2. KADEME	26.260	70.0	26.12.2013	GİRESUN
5	WS	KOJENERASYON	12.930	63.9	26.12.2013	KONYA
Total			**66.4**	**209.8**		
$\boldsymbol{AEG_{SET\text{-}5\text{-}units}}$				**209,759**	MWh	
Abbreviations: NG: Natural Gas, IC: Imported Coal, HE: Hydroelectric						

Hence, electricity generation of $SET_{5\text{-}units}$ is found to be $AEG_{SET\text{-}5\text{-}units}$ = 209,759 MWh.

The total generation of the sample group of power units used to calculate the buildmargin emission factor is AEG_{total} = 284,643,549 MWh. 20 % of this value is $AEG_{SET\text{-}=20\ per\ cent}$ = 56,928,710 MWh. When sorted from the newest to the oldest, the cumulative firm generation amount up to and including the 327th power unit in the list, ENERJİ-SA (Bandırma) Natural Gas Power Plant, with an installed capacity of 930.8 MW and firm generation capacity of 7,540.0 GWh, which was commissioned on 07.10.2010, gives us an firm generation amount of 63,068,040 MWh, and satisfies the condition of $SET_{/20\ per\ cent}$.

Hence electricity generation of $SET_{/20\ per\ cent}$ is found to be $AEG_{SET\text{-}/20\ per\ cent}$ = 63,068,040 MWh.

Since $AEG_{SET\text{-}/20\ per\ cent} > AEG_{SET\text{-}5\text{-}units}$, and none of the power units in the $SET_{/20\ per\ cent}$ started to supply electricity to the grid more than 10 years ago, it was assumed that $SET_{sample} = SET_{/20\ per\ cent}$.

The generation distribution of SET_{sample} by primary energy sources is as follows:

Table 36. The distribution of sample group used to calculate the build margin (SET_{sample}) by primary energy sources (fuels consumed)

Energy Source / Fuel	Installed Capacity (MW)	Firm Generation Capacity (year 2013) GWh
Asphaltite	0.0	0.0
Biogas	20.7	127.4
Diesel Oil	0.0	0.0
Fuel Oil	126.0	835.0
Geothermal	134.6	761.9
Hard Coal	0.0	0.0
Hydroelectric	4,536.0	9,959.2
Imported Coal	1,831.6	12,360.8
Lignite	5.0	40.0
Liquefied Petroleum Gas	0.0	0.0
Natural Gas	6,737.4	38,867.5
Naphta	0.0	0.0
Wind	4.8	13.1
Waste	18.0	103.1
Total	**13,414.1**	**63,068.0**

These generation values were put into the formulation as explained in the section B.6.1., and the Build margin emission factor was calculated as shown in the following table:

Table 37. Build Margin Emission Factor Calculation

Energy Source / Fuel	Firm Generation Capacity (year 2013) (GWh)	Assumed Emission Factor (kg/TJ)	Assumed Default Efficiency (%)	Calculated Emission Factor ((tCO2/MWh)	Emission (ton)
Asphaltite	0.0	89,500	41.5%	0.776	0.0
Biogas	127.4	46,200	60.0%	0.277	35,303.0
Diesel Oil	0.0	72,600	46.0%	0.568	0.0
Fuel Oil	835.0	75,500	46.0%	0.591	493,362.7
Geothermal	761.9	0	0.0%	0.000	0.0
Hard Coal	0.0	92,800	41.5%	0.805	0.0
Hydroelectric	9,959.2	0	0.0%	0.000	0.0
Imported Coal	12,360.8	89,500	41.3%	0.780	9,645,372.7
Lignite	40.0	90,900	41.5%	0.789	31,541.2
Liquefied Petroleum Gas	0.0	61,600	60.0%	0.370	0.0
Natural Gas	38,867.5	54,300	60.0%	0.326	12,663,028.4
Naphta	0.0	69,300	60.0%	0.416	0.0

Wind	13.1	0	0.0%	0.000	0.0
Waste	103.1	73,300	41.5%	0.636	65,572.8
Total / Overall	**63,068.0**			**0.364**	**22,934,180.8**

The calculated Build Margin Emission Factor is $\boldsymbol{EF_{grid,BM,y}}$ **= 0.364 tCO₂/MWh.**

c) Combined Margin Emission Factor Calculation:

Combined Margin Emission Factor calculation was done according to the tool as explained the section B.6.1., by using Weighted Average CM method, with weightings w_{OM} = 0.75 and w_{BM} = 0.25, since the project activity is a wind farm:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \qquad \text{Equation (14)}$$

$EF_{grid,CM,y}$ = 0.642 * 0.75 + 0.364 * 0.25 = 0.572

The Combined Margin Emission Factor is found to be $\boldsymbol{EF_{grid,CM,y}}$ **= 0.572 tCO₂/MWh.**

d) Emission Reduction Calculation:

Emission reduction calculation for the first crediting period was done according to the Methodology[141], as indicated in section B.6.1., as follows:

$$ER_y = BE_y - PE_y \qquad \text{Equation (13)}$$

Where:

ER_y	=	Emission reductions in year y (t CO_2/yr)
BE_y	=	Baseline emissions in year y (t CO_2/yr)
PE_y	=	Project emissions in year y (t CO_2/yr)

Since no leakage emissions are considered by the Methodology, and the project emissions are assumed as zero as explained in the section B.6.1., we found that the emission reductions is equal to the baseline emissions.

$ER_y = BE_y$

Baseline emissions are calculated using the formulation indicated on page 15 of the Methodology[140]:

"Baseline emissions

Baseline emissions include only CO_2 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 and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \qquad \textbf{(7)}$$

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/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 using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh)"

Since the project activity is a greenfield renewable energy power plant, the net electricity generation of the project activity is calculated according to the rule explained on page 15 of the Methodology[140]:

"**5.5.1. Calculation of $EG_{PJ,y}$**

47. The calculation of $EG_{PJ,y}$ is different for Greenfield plants, capacity additions, retrofits, rehabilitations, and replacements. These cases are described as follows:

5.5.1.1. Greenfield power plants

48. If the project activity is the installation of a Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y}$$ Equation (8)

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)"

The net annual electricity generation of the project is calculated as $EG_{facility,y}$ = 68,920 MWh, as explained in section B.5. The details of this calculation are in both Emission Reduction Calculation and Investment Analysis spreadsheets as annexes to PDD.

The baseline emission is found as:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$ = 68,920 * 0.572 = 39,422 tCO_2/yr.

Hence, the emission reductions is $\boldsymbol{ER_y}$ **= 39,422 tCO_2/yr.**

For the first year of the crediting period (2014), the net average electricity generation is found to be 23,854 MWh. Hence for 2014, the emission reductions is ER_{2014} = 13,645 tCO_2.

For the last year of the crediting period (2021), the net average electricity generation is found to be 42,862 MWh. Hence for 2021, the emission reductions is ER_{2021} = 24,517 tCO_2.

Total amount of emission reductions for the first crediting period is 274,694 tCO_2. Annual average over the first crediting period is calculated as 39,242 tCO_2/yr. This value is lower than the estimated amount of annual average GHG emission reductions, due to the partial commissionings in the first year, causing a lower amount of net electricity generation than the other years.

The details of the emission factor and emission reduction calculations can be found in the emission reduction calculation spreadsheet as an annex to PDD.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2014	13,645	0	0	13,645
2015	39,422	0	0	39,422
2016	39,422	0	0	39,422
2017	39,422	0	0	39,422
2018	39,422	0	0	39,422
2019	39,422	0	0	39,422
2020	39,422	0	0	39,422
2021	24,517	0	0	24,517
Total	274,694	0	0	274,694
Total number of crediting years	7 years			
Annual average over the crediting period	39,242	0	0	39,242

B.7. Monitoring plan
B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*.
Source of data	Main source is the data from the web site of PMUM (Market Financial Settlement Centre) or EPIAS (Energy Markets Operation Company, which will replace PMUM according to the new Electricity Market Law in Turkey)[209] or any other equivalent state authority responsible for the operation of national electricity market in Turkey, in case it is enforced by the law before the end of the first crediting period. These data is based on the automatic meter reading from the electricity meters of the project activity, which is performed by TEIAS. This will be the preferred data. Auxiliary sources will be the monthly electricity protocols signed by TEIAS officials or electricity sales invoices. These will be used as confirmative and supportive documents, if necessary.
Value(s) applied	68,920 MWh/yr (See related explanations in Section A.1. on pages 2 – 3)
Measurement methods and procedures	There is a single group of electricity meters for the project activity, as indicated in the Section B.3 about the project boundary. This group of electricity meters consists of a main meter and a backup meter. The amount of net electricity generation supplied by the project to the grid will be calculated by subtracting the amount of electricity drawn from the grid from the amount fed into the grid for the main electricity meter.
Monitoring frequency	Unless otherwise enforced by the law, or stated in the monitoring reports, the monitoring will be done on a monthly basis.

[209]Electricity Market Law. Republic of Turkey Official Gazette. Issue: 28603, Date: 30/03/2013. Accessed on 26/08/2015.
http://www.resmigazete.gov.tr/eskiler/2013/03/20130330-14.htm

QA/QC procedures	TEIAS is responsible for the electricity meter measurements and testing and control of electricity meters according to "Communiqué on Meters to be used in the Electricity Market"[210], and other related legislation. TEIAS performs annual periodic tests on every electricity meter, and the meters are sealed after each test, according to the System Usage Agreement made between the project proponent and TEIAS[211]. These seals can only be broken and re-sealed only by TEIAS authorised personnel. Apart from the annual tests, the companies producing or importing the electricity meters are required to guarantee the accuracy and calibration of the meters.[212] According to the legislation, electricity and other meters must be periodically examined. This procedure is intended for calibration and controlled by Ministry of Science, Industry and Technology. This can be considered as a validation of meters. On the other hand, annual control of the meters is under the control of TEIAS and can be considered as a verification of meters. The data of PMUM (EPIAS, etc.) uses the electricity measurement data of TEIAS. This data is reliable since it is only accessible to project owner apart from PMUM (EPIAS, etc.), and used for invoicing purposes. The data of the SCADA system installed within the project activity can also be used to cross-check the measurements of the electricity meters.
Purpose of data	Calculation of baseline emissions
Additional comment	The electricity measurements are used for billing and strictly checked by project owner and TEIAS. Also, according to the Section III about Monitoring Methodology of "ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources --- Version 13.0.0", all data collected as part of monitoring will be archived electronically and be kept at least two years after the end of the last crediting period.

B.7.2. Sampling plan

There will be no sampling procedures and all the data related with the electricity measurements will be used for monitoring purposes.

B.7.3. Other elements of monitoring plan

Operational and Management Structure

[210]Communiqué on Meters to be used in the Electricity Market. Energy Market Regulatory Authority (EMRA) Web Site. Accessed on 26/08/2015.
http://www.epdk.org.tr/documents/elektrik/mevzuat/teblig/elektrik/sayaclar_hakkinda/Elk_Tblg_Sayaclar.doc

[211]TEIAS (Turkish Electricity Transmission Company) Department of Access and Applications Web Site. Sample System Usage Agreement. Accessed on 26/08/2015.
http://eud.teias.gov.tr/SKAM/SKAornek.pdf

[212] Measurement and Measuring Instruments Inspection Bylaw. Ministry of Science, Industry and Technology Web Site. Directive, Clause 9, Page 2. Accessed on 26/08/2015.
http://www.sanayi.gov.tr/Files/Mevzuat/olcu-ve-olcu-aletleri-mua-2882013184633.pdf

Monitoring will be done according to "ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0"[213].

Electricity meters are located at the points indicated in the figure regarding the project boundary and simplified one-line single diagram of the project activity in the Section B.3 about the project boundary.

At the end of each month, the data about the electricity measurements from PMUM (EPIAS, etc.) will be collected from the official web site after it has become definite. This data will be copied to spreadsheets to make the calculations easier. The web pages containing the relevant data will be saved as screenshot s and/or in suitable file formats and be kept for future reference. The monthly electricity meter reading protocols signed by authorised TEIAS officials will also be kept, if these are available. This will be done monthly.

The expected verification period is one year. At the end of each verification period, all the documents collected monthly will be compiled and an emission reduction calculation spreadsheet will be prepared to show the final results of the emission reductions of the corresponding verification period. This spreadsheet and documents about electricity generation and the electricity meter readings will be sent to verifying DOE along with the monitoring report of the corresponding verification period.

Responsibilities and Institutional Arrangements for Data Collection and Archiving

Data collection and archiving will be under the responsibility of the project proponent. Power plant personnel will send the monthly electricity meter reading protocols and other relevant supportive documents, if any, to project proponent company headquarters. Power plant personnel will also give support and help during the site visits of validation, verification and other similar related processes. The data collection, archiving and communication with the DOEs will be done by the responsible personnel in the project proponent company headquarters.

Emergency Action Plan

An Emergency Action Plan was prepared for Occupational Hazards, Fire and Earthquake.[214] The necessary trainings were given to the responsible personnel.[215,216]

Also, a Diesel Generator is present in the project site area as an energy backup source in case of a power outage occurring in the part of the grid connected to the project.[217]

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

According to the "Glossary of CDM terms"[218] the start date of a project activity is defined as follows:

[213] ACM0002: Grid-connected electricity generation from renewable sources --- Version 16.0. UNFCCC > CDM > Methodologies > Approved Baseline and Monitoring Methodologies for Large Scale CDM Project Activities > Approved consolidated methodologies. Section 6. Monitoring methodology. Pp. 23-27. http://cdm.unfccc.int/UserManagement/FileStorage/0X6IERWMG92J7V3B8OTKFSL1QZH5PA

[214] Korkmaz Wind Farm Environmental Impact Assessment Report. February 2011. Last Revision, 11/03/2011 (Turkish Version). Section VIII: Monitoring Program. pp. 107- 109.

[215] Korkmaz WPP Occupational Health and Safety Training Participation Certificates – Dated 15/10/2014 – Provided to DOE.

[216] Korkmaz WPP Fire Protection Training and Exercise Certificate – Dated 20/02/2014 – Provided to DOE.

[217] Approved Single Line Diagram of Korkmaz Wind Farm. Dated 02/07/2013. Provided to DOE.

"In the context of a CDM project activity or CPA, the earliest date at which either the implementation or construction or real action of a CDM project activity or CPA begins. In the context of a CDM PoA, the date on which the coordinating/managing entity officially notifies the secretariat and the DNA of their intention to seek the CDM status or the date of publication of the PoA-DD for global stakeholder consultation in accordance with the relevant CDM rules and requirements."

The project was developed as a Gold Standard Voluntary Emission Reduction (GS VER) project, under the rules of Gold Standard Version 2.1. Gold Standard Version 2.1 Requirements allow a project to apply Regular Project Cycle if the time of first submission is before the start date of construction or implementation, making a distinction and also permitting a selection between these two dates[219].In addition, for VER project activities proceeding under the regular project cycle, the start date of the Gold Standard Crediting Period is indicated as the date of start of operation or a maximum of two years prior Gold Standard registration, whichever occurs later[220].

Along with this explanations, construction beginning date is assumed as the start date of the project activity.

Therefore, the start date of the project activity is 04/12/2012.

C.1.2. Expected operational lifetime of project activity

20 years (As explained in the section A.1. on pages 3-4)

C.2. Crediting period of project activity
C.2.1. Type of crediting period

Renewable, first crediting period.

C.2.2. Start date of crediting period

15/08/2014 (The date of start of operation of the project was selected as the start date of crediting period according to the Gold Standard Version 2.1, the Gold Standard version under which the project was developed[220]. Accordingly, first partial commissioning date of the project activity is specified as the start date of the crediting period.[2] This is the date on which the project started feeding energy to the grid.)

C.2.3. Length of crediting period

7 years, 0 months.

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts

[218] Glossary of CDM terms (Version 08.0). UNFCCC > CDM > Rules and Reference. "Start Date" Definition. Page 20.
http://cdm.unfccc.int/sunsetcms/storage/contents/stored-file-20150226124446845/glos_CDM.pdf
[219] Gold Standard Requirements Version 2.1, pages 26, 27, 35.
http://www.cdmgoldstandard.org/wp-content/uploads/2011/10/GSv2.1_Requirements-11.pdf
[220] Gold Standard Version 2.1 Requirements, Section V.a.2. Start of the Gold Standard Crediting Period, page 36.
http://www.cdmgoldstandard.org/wp-content/uploads/2011/10/GSv2.1_Requirements-11.pdf

According to the "Environmental Impact Assessment Regulation"[221] valid at the time of first submission, the project activity is exempt from the environmental impact assessment. This is also certified by the exemption decision granted by the responsible state authorities[44]. However, considering that an environmental impact assessment study will ease the credit and emission reduction related affairs, the project proponent had an accredited consultant company prepare an environmental study. As a result, an environmental impact assessment report has been prepared[222].

According to this report, the project is found to be compatible with regulations related with the environmental impact assessment, and no harmful effects to the environment could be found. The details are in the referred EIA report.

D.2. Environmental impact assessment

No environmental impact assessment is required. In addition, the results of the voluntary environmental impact assessment study indicate that the project activity has minimal, if any, effects on the environment. Further information regarding various aspects of environmental impact assessment study can be found in the EIA report.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

Since the project activity is intended to be developed as a Gold Standard project, a thorough and detailed local stakeholder consultation process has been conducted. A Local Stakeholder Consultation meeting was held on 18/03/2011 in Seferihisar district of Izmir province, after a comprehensive invitation process.

Detailed information can be found in the Local Stakeholder Consultation Report and the Gold Standard Passport of the project.

E.2. Summary of comments received

In general, the comments were positive. No significant concerns about the probable negative effects of the project were raised during the meeting. Detailed information can be found in the Local Stakeholder Consultation Report and the Gold Standard Passport of the project.

E.3. Report on consideration of comments received

Please refer to Local Stakeholder Consultation Report and the Gold Standard Passport of the project for detailed information about this issue.

SECTION F. Approval and authorization

Not available.

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[221]Environmental Impact Assessment Regulation. Republic of Turkey Official Gazette. Issue: 29186, Date: 25/11/2014. Accessed on 26/08/2015.
http://www.resmigazete.gov.tr/eskiler/2014/11/20141125-1.htm

[222]Korkmaz Wind Farm Environmental Impact Assessment Report. February 2011. Last Revision, 11/03/2011 (Turkish Version). Prepared by Topcuoglu Mining, Industry and Trade Co. Ltd. This EIA report has been uploaded to the registry site and is available for the DOE.

Appendix 1: Contact information of project participants

Organization name	Ayen Enerji A.S.
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Last name	Demir
Middle name	
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Department	
Mobile	
Direct fax	
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Appendix 2: Affirmation regarding public funding

The project does not obtain any public funding.

Appendix 3: Applicability of selected methodology

Not available.

Appendix 4: Further background information on ex ante calculation of emission reductions

Power Plants Used to Calculate the Build Margin Emission Reduction Sorted by Commissioning Date from the Newest to the Oldest (The System at the End of 2013 with CDM-VER Projects and Capacity Additions from Retrofits of Power Plants Removed)

No	Fuel / Energy Source	POWER PLANT NAME	Installed Capacity MW	Firm Generation Capacity GWh	Commissioning Date	Location (Province)
1	NG	KOJENERASYON	2.022	8.628	27.12.2013	MERSİN
2	HE	ÖZLÜCE HES	18.190	48.493	27.12.2013	ERZURUM
3	HE	UZUNDERE II HES	7.020	18.715	27.12.2013	RİZE
4	HE	BURÇAK HES 2. KADEME	26.260	70.007	26.12.2013	GİRESUN
5	WS	KOJENERASYON	12.930	63.917	26.12.2013	KONYA
6	NG	YEŞİLYURT DGKÇS	11.396	48.625	26.12.2013	SAMSUN
7	HE	ÇAMBAŞI REGÜLATÖRÜ VE HES	44.100	117.566	20.12.2013	TRABZON
8	HE	ÇİĞDEM REGÜLATÖRÜ VE HES	17.700	47.187	20.12.2013	GİRESUN
9	NG	YENİ ELEKTRİK ÜRETİM A.Ş. DGKÇS	575.909	2,457.306	20.12.2013	KOCAELİ
10	HE	BOZTEPE HES	18.150	48.386	17.12.2013	ORDU
11	HE	ADACAMİ HİDROELEKTRİK SANTRALİ	14.652	39.061	16.12.2013	RİZE
12	HE	ORDU HES	21.000	55.984	13.12.2013	ORDU
13	HE	AKBAŞ HİDROELEKTRİK SANTRALİ	12.502	33.329	12.12.2013	DENİZLİ
14	NG	KAYA BELEK TERMİK KOJENERASYON SANTRALİ	1.286	5.487	08.12.2013	ANTALYA
15	HE	SIRIMTAŞ HİDROELEKTRİK SANTRALİ	13.617	36.302	07.12.2013	ADIYAMAN
16	NG	ORTADOĞU RULMAN SANAYİ TERMİK KOJENERASYON SANTRALİ	7.744	33.042	06.12.2013	ANKARA
17	NG	YENİ ELEKTRİK ÜRETİM A.Ş. DGKÇS	289.091	1,233.502	06.12.2013	KOCAELİ
18	HE	DARAN HİDROELEKTRİK SANTRALİ	23.870	63.635	05.12.2013	KARAMAN
19	HE	KİRAZLIK REGÜLATÖRÜ VE HES	14.537	38.754	05.12.2013	SİİRT
20	HE	DURU REGÜLATÖRÜ VE HES	1.630	4.345	04.12.2013	AMASYA
21	NG	ISPARTA MENSUCAT SAN. VE TİC. A.Ş. KOJENERASYON SANTRALİ	0.000	0.000	29.11.2013	ISPARTA
22	HE	ADASU HİDROELEKTRİK SANTRALİ	9.600	25.593	28.11.2013	SAKARYA
23	HE	AĞKOLU HES	4.380	11.677	28.11.2013	ORDU
24	HE	KARAKÖY HİDROELEKTRİK SANTRALİ	3.000	7.998	28.11.2013	ANKARA
25	WD	PAŞALİMANI RES	0.800	2.191	25.11.2013	BALIKESİR
26	HE	EREM HİDROELEKTRİK SANTRALİ	3.050	8.131	23.11.2013	OSMANİYE
27	HE	AKKENT CALKUYUCAK HES	13.813	36.824	22.11.2013	DENİZLİ
28	NG	AMBARLI TERMİK SANTRALİ	516.000	2,201.684	21.11.2013	İSTANBUL
29	NG	H.G. ENERJİ GEDİZ SANTRALİ	5.350	22.828	15.11.2013	KÜTAHYA
30	NG	LUTUF MENSUCAT KOJENERASYON SANTRALİ	2.000	8.534	08.11.2013	KAHRAMANMARAŞ
31	GT	KIZILDERE II JES	20.000	87.737	31.10.2013	DENİZLİ
32	BG	SENKRON EFELER BİYOGAZ SANTRALİ	2.400	11.864	31.10.2013	AYDIN
33	HE	ORTAÇAĞ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	12.944	34.507	24.10.2013	TRABZON
34	NG	ODAŞ I DOĞALGAZ KOMBİNE ÇEVRİM SANTRALİ	12.000	51.202	23.10.2013	ŞANLIURFA
35	NG	NAKSAN ENERJİ SANTRALİ 2	1.100	4.694	11.10.2013	GAZİANTEP
36	NG	İPEKSAN ELEKTRİK ÜRETİM A.Ş. TERMİK KOJENERASYON SANTRALİ	8.600	36.695	10.10.2013	MARDİN

37	NG	GOREN-2 TERMİK KOJENERASYON SANTRALİ	48.650	207.581	04.10.2013	GAZİANTEP
38	HE	DERİNER HİDROELEKTRİK SANTRALİ	167.500	446.539	02.10.2013	ARTVİN
39	HE	ÜÇHANLAR REGÜLATÖRÜ VE HES	11.939	31.828	27.09.2013	TRABZON
40	HE	DARIVEREN HES	3.065	8.171	20.09.2013	DENİZLİ
41	BG	KONYA ATIKSU ARITMA TESİSİ ELEKTRİK SANTRALİ	2.436	12.042	19.09.2013	KONYA
42	GT	GÜMÜŞKÖY JES	6.600	28.953	15.09.2013	AYDIN
43	WD	ATİK RES	4.000	10.954	13.09.2013	HATAY
44	HE	TONYA I-II HES	1.250	3.332	13.09.2013	TRABZON
45	HE	YAYLA REGÜLATÖRÜ VE HES	4.670	12.450	06.09.2013	ARTVİN
46	HE	DEVECİKONAĞI BARAJI VE HES	23.000	61.316	30.08.2013	BURSA
47	NG	DOKUBOY OTOPRODÜKTÖR SANTRALİ	4.300	18.347	30.08.2013	KAHRAMANMARAŞ
48	NG	KESKİNKILIÇ GIDA TERMİK KOJENERASYON SANTRALİ	10.000	42.668	30.08.2013	AKSARAY
49	GT	KIZILDERE II JEOTERMAL SANTRALİ	60.000	263.211	30.08.2013	DENİZLİ
50	NG	AKSA SANTRALİ	0.000	0.000	23.08.2013	YALOVA
51	NG	ŞİMŞEK BİSKÜVİ TERMİK KOJENERASYON SANTRALİ	1.560	6.656	23.08.2013	KARAMAN
52	HE	GECÜR HİDROOELEKTRİK SANTRALİ	3.098	8.259	05.08.2013	GİRESUN
53	HE	ADACAMİ HİDROELEKTRİK SANTRALİ	14.652	39.061	02.08.2013	RİZE
54	HE	ARAKLI-4 REGÜLATÖRÜ VE HES	8.911	23.756	02.08.2013	TRABZON
55	HE	DERİNER BARAJI VE HES	335.000	893.079	02.08.2013	ARTVİN
56	BG	FRITO LAY GIDA SAN. VE TİC. A.Ş. TERMİK KOJENERASYON TESİSİ	0.660	3.263	02.08.2013	MERSİN
57	NG	YEŞİLYURT ENERJİ SAMSUN MERKEZ OSB DOĞALGAZ KOMBİNE ÇEVRİM SANTRALİ	128.247	547.208	02.08.2013	SAMSUN
58	HE	KEMERÇAYIR REGÜLATÖRÜ VE HES	15.498	41.316	01.08.2013	TRABZON
59	NG	BOSSA TİCARET VE SANAYİ İŞLETMELERİ T.A.Ş TERMİK KOJENERASYON SANTRALİ	6.698	28.579	31.07.2013	ADANA
60	NG	DOĞALGAZ YAKITLI KOJENERASYON SANTRALİ	1.200	5.120	29.07.2013	KAYSERİ
61	NG	İSKUR TEKSTİL ENERJİ TİC. VE SAN. A.Ş. OTOPRODÜKTÖR SANTRALİ	8.600	36.695	26.07.2013	KAHRAMANMARAŞ
62	NG	GÜLSAN SENTETİK DOKUMA SAN. VE TİC. A.Ş. TERMİK KOJENERASYIN TESİSİ	36.642	156.345	20.07.2013	GAZİANTEP
63	NG	ÖZDİLEK EV TETSTİL SAN. VE TİC. A.Ş. OTOPRODÜKTÖR SANTRALİ	4.300	18.347	12.07.2013	BURSA
64	NG	ANADOLU İPLİK VE TEKSTİL SAN. A.Ş. TERMİK KOJENERASYON SANTRALİ	8.600	36.695	05.07.2013	TEKİRDAĞ
65	HE	DERİNER BARAJI VE HES	167.500	446.539	05.07.2013	ARTVİN
66	HE	GÜNEŞLİ II HİDROELEKTRİK SANTRALİ	12.380	33.004	03.07.2013	TRABZON
67	HE	MOR-2 HİDROELEKTRİK SANTRALİ	6.630	17.675	03.07.2013	GÜMÜŞHANE
68	BG	AREL ENERJİ MANAVGAT BİYOKÜTLE TESİSİ	2.400	11.864	21.06.2013	ANTALYA
69	NG	RWE&TURCAS GÜNEY DENİZLİ DGKÇS	797.400	3,402.370	21.06.2013	DENİZLİ
70	NG	OMW SAMSUN DGKÇS	886.920	3,784.337	20.06.2013	SAMSUN
71	NG	HASIRCI TEKSTİL SAN. VE TİC. TERMİK KOJENERASYIN SANTRALİ	2.300	9.814	15.06.2013	GAZİANTEP
72	HE	ESKİKÖY REGÜLATÖRÜ VE HES	2.630	7.011	13.06.2013	ANTALYA
73	NG	ARSAN DOKUMA TERMİK KOJENERASYON SANTRALİ	4.300	18.347	08.06.2013	KAHRAMANMARAŞ
74	HE	AKKAYA REGÜLATÖRÜ VE HES	4.400	11.730	02.06.2013	KASTAMONU
75	NG	KÜÇÜKBAY YAĞ VE DETERJAN SAN. A.Ş. TERMİK	1.605	6.848	30.05.2013	İZMİR

		KOJENERASYON SANTRALİ				
76	NG	RENAISSANCE ISTANBUL BOSPHORUS HOTEL KOJENERASYON SANTRALİ	0.501	2.138	30.05.2013	İSTANBUL
77	NG	AGE DENİZLİ DOĞALGAZ KOMBİNE ÇEVRİM SANTRALİ	64.500	275.211	25.05.2013	DENİZLİ
78	NG	GAZİANTEP ÖZEL SAĞLIK HASTANESİ A.Ş. KOJENERASYON SANTRALİ	1.188	5.069	24.05.2013	GAZİANTEP
79	HE	DARAN-I HİDROELEKTRİK SANTRALİ	23.870	63.635	21.05.2013	KARAMAN
80	HE	YEŞİLVADİ HES	9.980	26.606	18.05.2013	HATAY
81	NG	FLORANCE NIGHTINGALE HASTANESİ KOJENERASYON SANTRALİ	2.000	8.534	17.05.2013	İSTANBUL
82	HE	TOROS HES	49.990	133.269	17.05.2013	ADANA
83	HE	BAĞIŞTAŞ-II HİDROELEKTRİK SANTRALİ	16.200	43.188	16.05.2013	ERZİNCAN
84	HE	AKKÖY-ESPİYE HİDROELEKTRİK SANTRALİ	4.456	11.879	10.05.2013	GİRESUN
85	NG	DOĞALGAZ KOMBİNE ÇEVRİM SANTRALİ	13.000	55.469	27.04.2013	AYDIN
86	HE	ÇIRAKDAMI REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	24.550	65.448	26.04.2013	GİRESUN
87	HE	KÖPRÜ BARAJI VE HES	77.240	205.915	26.04.2013	ADANA
88	BG	KIRIKKALE ÇÖP GAZI (BİYOKÜTLE) SANTRALİ	1.003	4.958	23.04.2013	KIRIKKALE
89	NG	NAKSAN ENERJİ SANTRALİ -2	19.460	83.033	19.04.2013	GAZİANTEP
90	HE	TUZLAKÖY-SERGE REGÜLATÖRÜ VE HES - II	9.520	25.379	19.04.2013	ERZURUM
91	HE	ÇİFTEKÖPRÜ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	7.770	20.714	18.04.2013	ARTVİN
92	HE	DURU 1 REGÜLATÖRÜ VE HES	4.000	10.664	18.04.2013	AMASYA
93	NG	ACARSOY DENİZLİ DOĞALGAZ KOMBİNE ÇEVRİM SANTRALİ	13.000	55.469	12.04.2013	DENİZLİ
94	NG	OTOPRODÜKTÖR SANTRALİ	24.580	104.879	12.04.2013	İZMİR
95	HE	ARAKLI 1 HES	1.844	4.916	11.04.2013	TRABZON
96	HE	KAYAKÖPRÜ HİDROELEKTRİK SANTRALİ	14.200	37.856	05.04.2013	GİRESUN
97	NG	KOJENERASYON SANTRALİ	5.538	23.630	30.03.2013	İZMİR
98	HE	MAVİ REGÜLATÖRÜ VE HES	11.390	30.365	21.03.2013	MERSİN
99	NG	BEYBO KOJENERASYON TESİSİ	2.022	8.628	15.03.2013	TEKİRDAĞ
100	HE	KÖPRÜ BARAJI VE HİDROELEKTRİK SANTRALİ	77.924	207.738	08.03.2013	ADANA
101	HE	BURÇAK HİDROELEKTRİK SANTRALİ (BURÇAK I)	33.400	89.041	07.03.2013	GİRESUN
102	HE	KÖPRÜBAŞI HES	74.000	197.277	05.03.2013	BOLU
103	HE	BUCAKKÖY HİDROELEKTRİK SANTRALİ	2.900	7.731	01.03.2013	ANTALYA
104	BG	FRİTO LAY KOJENERASYON SANTRALİ	0.305	1.508	01.03.2013	KOCAELİ
105	HE	KOÇAK REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	24.108	64.270	01.03.2013	GİRESUN
106	NG	GEBZE KOJENERASYON TESİSİ	7.960	33.964	27.02.2013	KOCAELİ
107	HE	FINDIK REGÜLATÖRÜ VE HES	8.500	22.660	22.02.2013	GÜMÜŞHANE
108	HE	GÖZEDE II HES	4.000	10.664	22.02.2013	BURSA
109	HE	BURÇAK HİDROELEKTRİK SANTRALİ (BURÇAK I)	6.630	17.675	18.02.2013	GİRESUN
110	BG	KARMA-1 BES	1.487	7.351	16.02.2013	SAKARYA
111	HE	ÇELTİKDERE HİDROELEKTRİK SANTRALİ	2.150	5.732	14.02.2013	BOLU
112	HE	CEVİZLİDERE HİDROELEKTRİK SANTRALİ	3.400	9.064	13.02.2013	BOLU
113	HE	REMSU HİDROELEKTRİK SANTRALİ	1.958	5.220	13.02.2013	MERSİN
114	NG	TERMİK-KOMBİNE ÇEVRİM SANTRALİ (STG3)	28.000	119.471	13.02.2013	BURSA

115	HE	BUCAKKÖY HİDROELEKTRİK SANTRALİ	5.800	15.462	01.02.2013	ANTALYA
116	HE	DARAN HİDROELEKTRİK SANTRALİ (DARAN II)	19.420	51.772	01.02.2013	KARAMAN
117	HE	DİNÇ REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	1.970	5.252	01.02.2013	MERSİN
118	HE	KILAVUZLU BARAJI VE HES	13.500	35.990	01.02.2013	KAHRAMANMARAŞ
119	NG	OTOPRODÜKTÖR KOJENERASYON SANTRALİ	0.849	3.623	31.01.2013	İSTANBUL
120	HE	ÇENGER I REGÜLATÖRÜ VE HİDROELEKTRİK SANTRALİ	5.690	15.169	25.01.2013	ANTALYA
121	NG	TREMİK-DOĞALGAZ KOMBİNE ÇEVRİM SANTRALİ	24.000	102.404	25.01.2013	İZMİR
122	HE	ÜÇHARMANLAR HİDROELEKTRİK SANTRALİ	16.640	44.361	24.01.2013	TRABZON
123	NG	LİNYİT KÖMÜR/DOĞALGAZ YAKITLI AKIŞKAN YATAKLI EL. ÜR. SANTRALİ	37.000	157.873	12.01.2013	KONYA
124	NG	NAKSAN TERMİK KOJENERASYON TESİSİ	19.760	84.313	07.01.2013	GAZİANTEP
125	HE	GARZAN HİDROELEKTRİK SANTRALİ	42.030	112.048	04.01.2013	BATMAN
126	NG	ALES DGKÇ	49.0	370.0	29.12.2012	Aydin
127	HE	TUĞRA REG. (VİRA)	4.9	10.0	29.12.2012	Giresun
128	NG	ACARSOY TERMİK KOM.ÇEV	50.0	375.0	27.12.2012	Denizli
129	HE	FINDIK I HES(ADV)	11.3	27.0	27.12.2012	Gumushane
130	HE	MİDİLLİ REG.(MASAT EN.)	21.0	45.0	27.12.2012	Amasya
131	HE	BAĞIŞTAŞ II (AKDENİZ EL.)	32.4	69.0	23.12.2012	Erzincan
132	NG	BİNATOM ELEKTRİK ÜRT. A.Ş.	2.022	15.2	19.12.2012	Kutahya
133	HE	KILAVUZLU	40.5	100.0	18.12.2012	K.Maras
134	NG	İZMİR BÜYÜK EFES OTELİ KOJEN.	1.2	9.0	14.12.2012	Izmir
135	HE	ARAKLI I REG.(YÜCEYURT EN.)	13.1	28.0	07.12.2012	Trabzon
136	HE	BEKTEMUR HES (DİZ-EP)	3.5	11.0	30.11.2012	Amasya
137	HE	BOYABAT	513.0	830.0	29.11.2012	Sinop
138	NG	KIVANÇ TEKSTİL	2.145	11.7	23.11.2012	Adana
139	HE	YILDIRIM HES (BAYBURT)	3.559	7.3	23.11.2012	Bayburt
140	HE	ÇAĞLAYAN HES	6.0	12.0	22.11.2012	Trabzon
141	HE	ŞİFRİN (BOMONTİ)	6.7	10.0	22.11.2012	Adiyaman
142	NG	GÜRTEKS İPLİK	6.7	53.0	17.11.2012	Gaziantep
143	NG	AKDENİZ KİMYA	2.00	15.0	16.11.2012	Izmir
144	NG	BİLECİK DGKÇ (TEKNO)	25.8	190.0	16.11.2012	Bilecik
145	NG	AGE DGKÇ (DENİZLİ)	47.0	352.3	15.11.2012	Denizli
146	HE	ALPARSLAN 1	80.0	209.0	13.11.2012	Mus
147	NG	BİNATOM ELEKTRİK ÜRT. A.Ş.	4.044	30.5	03.11.2012	Kutahya
148	WS	İZAYDAŞ (İzmit çöp)	0.33	2.2	31.10.2012	Kocaeli
149	WS	EKİM BİYOGAZ	1.2	10.0	30.10.2012	Konya
150	GT	DENİZ JEO.(MAREN MARAŞ)	24.0	191.0	30.10.2012	Aydin
151	HE	ERMENEK	151.2	408.5	17.10.2012	Karaman
152	GT	SİNEM JEO.(MAREN MARAŞ)	24.0	191.0	16.10.2012	Aydin
153	WS	AREL EN.BİYOKÜTLE	1.20	9.0	13.10.2012	Afyonkarahisar
154	NG	GOODYEAR İZMİT	5.2	39.0	12.10.2012	Kocaeli
155	HE	TELLİ I-II HES (FALANJ)	8.7	18.0	10.10.2012	Giresun
156	NG	ŞANLIURFA OSB (RASA EN.)	11.72	82.1	05.10.2012	Sanliurfa
157	HE	MURAT I-II REG.	35.6	107.0	05.10.2012	Adiyaman
158	BG	TRAKYA YENİŞEHİR CAM SAN.	6.0	45.0	28.09.2012	Bursa
159	HE	CUNİŞ REG.(RİNERJİ)	5.6	14.0	28.09.2012	Trabzon
160	HE	YILDIRIM HES (BAYBURT)	7.118	14.7	28.09.2012	Bayburt
161	NG	JTI TORBALI KOJEN.	4.0	30.0	21.09.2012	Izmir
162	HE	DUMLU HES	4.0	5.0	15.09.2012	Erzurum
163	HE	ERİK	6.5	21.0	14.09.2012	Karaman
164	HE	ERMENEK	151.2	408.5	14.09.2012	Karaman
165	LN	KÜÇÜKER TEKSTİL	5.0	40.0	14.09.2012	Denizli
166	NG	DURUM GIDA	3.6	29.0	14.09.2012	Mersin

167	NG	BİNATOM ELEKTRİK ÜRT. A.Ş.	2.145	16.2	08.09.2012	Kutahya
168	HE	ÇARŞAMBA HES	11.3	36.0	30.08.2012	Samsun
169	NG	ODAŞ DOĞAL GAZ	18.32	138.0	17.08.2012	Sanliurfa
170	WS	SEZER BİYOENERJİ (KALEMİRLER EN.)	0.5	4.0	17.08.2012	Antalya
171	HE	ARPA HES (MCK EL.)	32.4	44.0	16.08.2012	Artvin
172	IC	GÖKNUR GIDA	1.6	6.0	09.08.2012	Nigde
173	NG	AFYON DGKÇ (DEDELİ DG)	126.1	945.0	05.08.2012	Afyonkarahisar
174	HE	ALPARSLAN 1	80.0	209.0	03.08.2012	Mus
175	NG	AGE DGKÇ (DENİZLİ)	94.0	704.7	01.08.2012	Denizli
176	HE	TELEME (TAYEN)	1.6	6.0	31.07.2012	K.Maras
177	HE	CUNİŞ REG.(RİNERJİ)	2.8	7.0	28.07.2012	Trabzon
178	NG	PANCAR ELEK.	17.460	130.0	27.07.2012	Izmir
179	NG	TEKİRDAĞ -ÇORLU KOJ.(ODE YALITIM)	2.0	15.0	20.07.2012	Tekirdag
180	HE	CAN I HES(HED ELEK.)	1.8	6.0	20.07.2012	Kars
181	NG	NAKSAN A.Ş.	8.0	60.0	14.07.2012	Gaziantep
182	HE	ÜÇKAYA (ŞİRİKÇİOĞLU)	1.0	3.0	14.07.2012	K.Maras
183	NG	PANCAR ELEK.	17.460	130.0	13.07.2012	Izmir
184	NG	İŞBİRLİĞİ ENERJİ ÜR.A.Ş.	19.5	146.0	12.07.2012	Izmir
185	NG	BAMEN KOJEN.(BAŞYAZICIOĞLU TEKS.)	2.1	14.0	08.07.2012	Kayseri
186	NG	ALTINYILDIZ (TEKİRDAĞ)	5.5	38.0	06.07.2012	Tekirdag
187	HE	AKKÖY ENERJİ II (AKKÖY HES)	114.84	254.0	05.07.2012	Gumushane
188	HE	KAYAKÖPRÜ II HES (ARSAN ELEK.)	10.2	36.0	04.07.2012	Giresun
189	NG	BİS ENERJİ (Bursa San.)	48.0	361.6	30.06.2012	Bursa
190	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	30.0	196.0	29.06.2012	Zonguldak
191	HE	KARTALKAYA(SIR)	8.0	15.0	28.06.2012	K.Maras
192	NG	BOSEN (Bursa San.)	27.96	209.9	26.06.2012	Bursa
193	WS	BEREKET EN ÜR.BİYOGAZ	0.6	5.0	17.06.2012	Denizli
194	NG	DURMAZLAR MAK.	1.3	10.0	16.06.2012	Bursa
195	NG	ASAŞ ALÜMİNYUM	8.6	65.0	15.06.2012	Sakarya
196	NG	BEYPİ BEYPAZARI	8.6	63.0	15.06.2012	Bolu
197	NG	MUTLU MAKARNACILIK	2.0	16.0	15.06.2012	Gaziantep
198	HE	HORYAN	5.7	15.0	15.06.2012	Trabzon
199	NG	BİLECİK DGKÇ (DEDELİ)	106.7	799.6	09.06.2012	Bilecik
200	HE	AKKÖY ENERJİ II (AKKÖY HES)	114.84	254.0	07.06.2012	Gumushane
201	HE	BÜYÜKDÜZ HES (AYEN EN.)	68.9	109.0	31.05.2012	Gumushane
202	WS	AREL EN.BİYOKÜTLE	1.20	9.0	25.05.2012	Afyonkarahisar
203	NG	BİLECİK DGKÇ (DEDELİ)	19.4	145.4	20.05.2012	Bilecik
204	NG	BİNATOM ELEKTRİK ÜRT. A.Ş.	2.145	16.2	18.05.2012	Kutahya
205	NG	ERZURUM MEYDAN AVM (REDEVKO)	2.4	16.0	12.05.2012	Erzurum
206	HE	AKKÖY ESPİYE(KONİ İNŞ.)	8.9	22.0	06.05.2012	Giresun
207	HE	YAVUZ HES (AREM EN.)	5.8	8.0	04.05.2012	Kastamonu
208	NG	ODAŞ DOĞAL GAZ	54.96	413.9	30.04.2012	Sanliurfa
209	HE	ANAK HES(KOR-EN EL.)	3.8	9.0	27.04.2012	Antalya
210	HE	SEYRANTEPE HES (SEYRANTEPE BARAJI)	7.14	20.2	27.04.2012	Elazig
211	HE	ZEYTİNBENDİ HES	5.2	10.0	27.04.2012	K.Maras
212	NG	ÖZMAYA SAN.	5.4	40.0	22.04.2012	Amasya
213	NG	BİLKUR TEKSTİL	2.0	14.0	20.04.2012	K.Maras
214	NG	KESKİNOĞLU TAVUKÇULUK	6.0	44.8	20.04.2012	Manisa
215	HE	DOĞANKAYA (MAR-EN)	20.6	56.0	20.04.2012	Adiyaman
216	FO	ERDEMİR	53.9	351.2	13.04.2012	Zonguldak
217	HE	POLAT HES (ELESTAŞ)	3.28	10.0	07.04.2012	Sivas
218	HE	MURATLI HES (ARMAHES ELEK.)	11.0	16.0	05.04.2012	Sivas
219	HE	AVCILAR HES	16.7	28.0	04.04.2012	K.Maras
220	HE	KÖKNAR(AYCAN)	8.0	15.0	04.04.2012	Duzce
221	NG	AKDENİZ KİMYA	2.00	15.0	30.03.2012	Izmir
222	HE	GÖKGEDİK (UHUD) HES	3.776	11.7	30.03.2012	K.Maras
223	HE	AKKÖPRÜ	57.5	88.0	29.03.2012	Mugla

224	BG	GAZKİ MERKEZ ATIK SU AR.	1.7	12.0	29.03.2012	Gaziantep
225	HE	ÇINAR I HES	9.3	19.0	23.03.2012	Duzce
226	HE	POLAT HES (ELESTAŞ)	3.28	10.0	23.03.2012	Sivas
227	NG	AKSA AKRİLİK KİMYA (İTH.KÖM.+D.G)	75.0	525.0	22.03.2012	Yalova
228	NG	SELVA GIDA	1.7	14.0	16.03.2012	Konya
229	HE	GÖKGEDİK (UHUD) HES	20.490	63.3	16.03.2012	K.Maras
230	NG	OFİM EN.	2.1	16.0	12.03.2012	Ankara
231	NG	BALSUYU MENSUCAT	9.7	68.0	10.03.2012	K.Maras
232	NG	HATİPOĞLU PLASTİK YAPI ELEM.	2.0	14.0	10.03.2012	Eskisehir
233	NG	YENİ UŞAK ENERJİ	9.73	71.3	02.03.2012	Usak
234	NG	YONGAPAN (Kastamonu)	15.04	109.4	24.02.2012	Kocaeli
235	HE	SANCAR REG.(MELİTA)	0.7	2.0	24.02.2012	Malatya
236	BG	ES ES ESKİŞEHİR EN.	2.0	15.0	16.02.2012	Eskisehir
237	HE	HORU REG.(MARAŞ)	4.240	8.5	16.02.2012	Osmaniye
238	HE	KÜRCE REG.(DEDEGÖL)	12.0	36.0	15.02.2012	Antalya
239	HE	AKKÖPRÜ	57.5	88.0	14.02.2012	Mugla
240	NG	SELÇUK İPLİK	8.6	65.0	02.02.2012	Gaziantep
241	HE	MURSAL I (PETA MÜH.)	4.2	13.0	28.01.2012	Sivas
242	NG	MANİSA O.S.B.	12.000	89.8	27.01.2012	Manisa
243	HE	SARIHIDIR HES(MOLU)	6.0	18.0	22.01.2012	Nevsehir
244	HE	EGER HES	1.9	6.0	19.01.2012	Kutahya
245	NG	ZORLU ENERJİ (B.Karıştıran)	25.70	192.8	13.01.2012	Kirklareli
246	HE	GÜDÜL II (YAŞAM EN.)	4.9	15.0	13.01.2012	Malatya
247	HE	HORU REG.(MARAŞ)	4.240	8.5	12.01.2012	Osmaniye
248	NG	TİRENDA TİRE	58.4	410.0	30.12.2011	Izmir
249	NG	AKSA AKRİLİK KİMYA (İTH.KÖM.+D.G)	25.0	175.0	30.12.2011	Yalova
250	NG	ALİAĞA Çakmaktepe Enerji	8.73	65.7	29.12.2011	Izmir
251	IC	BEKİRLİ TES (İÇDAŞ ELEKT.)	600.0	4,320.0	15.12.2011	Canakkale
252	HE	SARIKAVAK (ESER)	8.1	24.0	25.11.2011	Mersin
253	FO	MARDİN-KIZILTEPE(AKSA EN.)	32.1	225.0	18.11.2011	Mardin
254	HE	ÇUKURÇAYI HES (AYDEMİR)	1.8	4.0	03.11.2011	Isparta
255	NG	ODAŞ DOĞAL GAZ	55.00	414.2	28.10.2011	Sanliurfa
256	HE	MURATLI HES (ARMAHES ELEK.)	26.7	39.0	27.10.2011	Sivas
257	NG	TEKİRDAĞ TEKS.(NİL ÖRME)	2.7	21.0	25.10.2011	Tekirdag
258	NG	SARAY HALI A.Ş.	4.3	33.0	15.10.2011	Kayseri
259	HE	TEFEN HES (AKSU)	11.000	26.7	13.10.2011	Zonguldak
260	HE	YEDİGÖL REG. VE HES (YEDİGÖL HES)	21.9	42.0	13.10.2011	Erzurum
261	NG	AKSA ENERJİ (Antalya)	190.0	1,321.7	07.10.2011	Antalya
262	NG	GOREN-1 (GAZİANTEP ORG.SAN.)	48.7	277.0	30.09.2011	Gazinatep
263	HE	ÇANAKÇI HES (CAN EN.)	4.633	11.0	29.09.2011	Trabzon
264	NG	AKSA ENERJİ (Antalya)	110.0	765.2	17.09.2011	Antalya
265	HE	BOĞUNTU (BEYOBASI EN.ÜR.)	3.8	10.0	16.09.2011	Mersin
266	HE	POYRAZ HES(YEŞİL EN.)	2.7	6.0	16.09.2011	K.Maras
267	NG	BOSEN (Bursa San.)	93.00	698.1	10.09.2011	Bursa
268	HE	ÇANAKÇI HES (CAN EN.)	4.633	11.0	25.08.2011	Trabzon
269	HE	ÇAMLIKAYA	2.824	3.7	11.08.2011	Trabzon
270	NG	GORDİON AVM (REDEVCO ÜÇ)	2.0	15.0	05.08.2011	Ankara
271	HE	KORUKÖY HES (AKAR EN.)	3.0	13.0	05.08.2011	Adiyaman
272	NG	LOKMAN HEKİM ENGÜRÜ(SİNCAN)	0.5	4.0	29.07.2011	Ankara
273	NG	ŞANLIURFA OSB (RASA EN.)	116.80	817.9	26.07.2011	Sanliurfa
274	NG	HASIRCI TEKSTİL TİC. VE SAN.	2.0	15.0	16.07.2011	Gaziantep
275	NG	KNAUF İNŞ. VE YAPI ELEMANLARI	1.6	12.0	15.07.2011	Ankara
276	NG	MANİSA O.S.B.	43.500	325.5	13.07.2011	Manisa
277	NG	ALİAĞA Çakmaktepe Enerji	130.95	986.0	01.07.2011	Izmir
278	HE	KÖYOBASI HES (ŞİRİKOĞLU ELEK.)	1.1	3.0	30.06.2011	K.Maras
279	HE	YAŞIL HES (YAŞIL ENERJİ EL. ÜRETİM A.Ş.)	2.276	4.8	29.06.2011	K.Maras
280	NG	POLYPLEX EUROPA	3.904	30.7	24.06.2011	Tekirdag
281	HE	ÜZÜMLÜ HES (AKGÜN EN. ÜR. VE TİC. A.Ş.)	11.4	23.0	23.06.2011	Erzincan

282	NG	ALDAŞ ALTYAPI YÖN.	2.0	15.0	15.06.2011	Antalya
283	HE	GÖKMEN REG. (SU-GÜCÜ ELEK.)	2.9	8.0	15.06.2011	Yozgat
284	HE	TEFEN HES (AKSU)	22.000	53.3	10.06.2011	Zonguldak
285	HE	KARASU II HES (İDEAL EN.)	3.1	8.0	03.06.2011	Erzurum
286	HE	ÖREN REG.(ÇELİKLER)	6.6	16.0	26.05.2011	Giresun
287	HE	YAŞIL HES (YAŞIL ENERJİ EL. ÜRETİM A.Ş.)	1.518	3.2	20.05.2011	K.Maras
288	NG	ZORLU ENERJİ (B.Karıştıran)	7.20	54.0	14.05.2011	Kirklareli
289	HE	KESME REG.(KIVANÇ EN.)	2.305	4.5	22.04.2011	K.Maras
290	HE	KESME REG.(KIVANÇ EN.)	2.305	4.5	14.04.2011	K.Maras
291	HE	ALKUMRU BARAJI VE HES(LİMAK)	87.090	156.0	12.04.2011	Siirt
292	NG	GLOBAL ENERJİ (PELİTLİK)	4.000	30.0	08.04.2011	Tekirdag
293	HE	KAZANKAYA REG.İNCESU HES(AKSA)	15.0	27.0	08.04.2011	Çorum
294	NG	CENGİZ ENERJİ (Tekkeköy/SAMSUN)	35.000	281.3	30.03.2011	Samsun
295	NG	BOYTEKS TEKS.	8.6	67.0	19.03.2011	Kayseri
296	HE	HACININOĞLU HES (ENERJİ-SA)	71.140	102.0	17.03.2011	K.Maras
297	HE	NARİNKALE HES (EBD EN.)	30.4	55.4	17.03.2011	Kars
298	HE	ALKUMRU BARAJI VE HES(LİMAK)	174.180	312.0	10.03.2011	Siirt
299	NG	GÜLLE ENTEGRE (Çorlu)	3.904	18.0	04.03.2011	Tekirdag
300	HE	KULP I HES (YILDIZLAR EN.)	22.9	44.0	04.03.2011	Diyarbakir
301	HE	DURU 2 REG.(DURUCASU EL.)	4.5	13.0	25.02.2011	Amasya
302	HE	ÇAKIRMAN (YUSAKA EN.)	7.0	15.0	19.02.2011	Erzincan
303	NG	TÜPRAŞ (Orta Anadolu-Kırıkkale)	12.0	84.8	04.02.2011	Kirikkale
304	HE	HACININOĞLU HES (ENERJİ-SA)	71.140	102.0	03.02.2011	K.Maras
305	NG	İSTANBUL SABİHA GÖKÇEN HAV.	4.0	32.0	31.01.2011	Istanbul
306	NG	HG ENERJİ	52.4	366.0	27.01.2011	Kutahya
307	HE	YEDİGÖZE HES	155.330	134.0	26.01.2011	Adana
308	NG	FRAPORT İÇ İÇTAŞ ANTALYA HAV.	8.0	64.0	24.01.2011	Antalya
309	HE	BAYRAMHACILI (SENERJİ EN.)	47.0	95.0	20.01.2011	Nevsehir
310	HE	AKSU REG.(KALEN EN.)	5.2	12.0	12.01.2011	Giresun
311	HE	ÇEŞMEBAŞI (GİMAK)	8.2	17.0	12.01.2011	Ankara
312	NG	INTERNATIONAL HOSPITAL (İstanbul)	0.8	6.0	31.12.2010	Istanbul
313	NG	RASA ENERJİ (VAN)	10.124	64.4	29.12.2010	Van
314	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	600.0	3,919.4	29.12.2010	Zonguldak
315	NG	ALTEK ALARKO	21.890	151.4	18.12.2010	Kirklareli
316	NG	POLYPLEX EUROPA	7.808	61.3	16.12.2010	Tekirdag
317	FO	TÜPRAŞ (İzmit-Yarımca)	40.0	258.8	15.12.2010	Kocaeli
318	NG	SÖNMEZ ELEKTRİK	2.564	19.8	07.12.2010	Usak
319	HE	YEDİGÖZE HES	155.330	134.0	02.12.2010	Adana
320	BG	FRİTOLEY GIDA	0.330	2.5	26.11.2010	Kocaeli
321	NG	ALİAĞA Çakmaktepe Enerji	69.84	525.9	26.11.2010	Izmir
322	NG	MARMARA PAMUK	26.19	203.6	25.11.2010	Tekirdag
323	HE	MURGUL BAKIR	19.602	31.5	11.11.2010	Artvin
324	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	600.0	3,919.4	01.11.2010	Zonguldak
325	HE	SABUNSUYU II HES (ANG EN.)	7.4	12.0	28.10.2010	Osmaniye
326	HE	KAHTA I HES(ERDEMYILDIZ ELEK.)	7.1	20.0	14.10.2010	Adiyaman
327	NG	ENERJİ-SA (Bandırma)	930.8	7,540.0	07.10.2010	Balikesir
328	NG	UĞUR ENERJİ (TEKİRDAĞ)	12.0	100.9	07.10.2010	Tekirdag
329	HE	ERENKÖY REG.(TÜRKERLER)	21.5	49.0	07.10.2010	Artvin
330	HE	KAHRAMAN REG.(KATIRCIOĞLU ELEK.)	1.4	3.0	30.09.2010	Giresun
331	HE	NARİNKALE HES (EBD EN.)	3.1	5.6	30.09.2010	Kars
332	FO	KIRKA BORAKS (Kırka)	10.0	65.9	29.09.2010	Eskisehir
333	HE	KOZAN HES (SER-ER EN.)	4.0	5.0	21.09.2010	Adana
334	HE	TEKTUĞ-ANDIRIN	40.5	60.0	03.09.2010	K.Maras
335	HE	KARŞIYAKA HES (AKUA EN.)	1.6	5.0	28.08.2010	Gaziantep
336	NG	SÖNMEZ ELEKTRİK	33.242	256.2	26.08.2010	Usak
337	HE	GÜDÜL I (YAŞAM EN.)	2.4	8.0	25.08.2010	Malatya
338	NG	KURTOĞLU BAKIR KURŞUN	1.6	12.0	19.08.2010	Tekirdag
339	NG	CAN ENERJİ ELEK. ÜR.AŞ.(TEKİRDAĞ)	29.1	203.0	19.08.2010	Tekirdag

340	NG	BİNATOM ELEKTRİK ÜRT. A.Ş.	2.0	13.0	17.08.2010	Kutahya
341	NG	KESKİNOĞLU TAVUKÇULUK	3.5	26.2	11.08.2010	Manisa
342	HE	GÖK HES	10.0	24.0	06.08.2010	Mersin
343	NG	CENGİZ ENERJİ (Tekkeköy/SAMSUN)	101.950	819.4	31.07.2010	Samsun
344	NG	RB KARESİ TEKS. (BURSA)	8.6	64.5	23.07.2010	Bursa
345	NG	FLOKSER TEKSTİL (ÇERKEZKÖY)	5.2	42.0	17.07.2010	Tekirdag
346	IC	EREN ENERJİ ELEK.ÜR.A.Ş.	160.0	1,045.2	15.07.2010	Zonguldak
347	HE	YAVUZ HES (MASAT EN.)	22.5	47.0	14.07.2010	Amasya
348	HE	KİRPİLİK HES (ÖZGÜR ELEK.)	6.2	13.0	11.07.2010	Mersin
349	NG	ALTEK ALARKO	60.100	415.6	10.07.2010	Kirklareli
350	HE	DİM HES (DİLER ELEK.)	38.3	70.0	08.07.2010	Antalya
351	HE	DİNAR HES (ELDA ELEK.)	4.4	9.0	03.07.2010	Tunceli
352	NG	AKSA ENERJİ (Antalya)	25.0	173.9	01.07.2010	Antalya
353	HE	ÇAMLIKAYA	5.648	7.3	30.06.2010	Trabzon
354	NG	UĞUR ENERJİ (TEKİRDAĞ)	48.2	405.1	21.06.2010	Tekirdag
355	HE	ERENLER REG.(BME BİRLEŞİK EN.)	45.0	48.0	04.06.2010	Artvin
356	NG	CENGİZ ENERJİ (Tekkeköy/SAMSUN)	101.950	819.4	22.05.2010	Samsun
357	NG	ERDEMİR	78.4	473.3	21.05.2010	Zonguldak
358	HE	BİRİM (ERFELEK HES)	3.225	5.5	14.05.2010	Sinop
359	NT	ATAER ENERJİ (EBSO)	49.000	277.9	05.05.2010	Izmir
360	NG	YILDIZ ENTEGRE	12.368	92.7	22.04.2010	Kocaeli
361	BG	FRİTOLEY GIDA	0.065	0.5	21.04.2010	Kocaeli
362	HE	FIRTINA ELEK.(SÜMER HES)	21.6	39.0	16.04.2010	Giresun
363	HE	BİRİM (ERFELEK HES)	3.225	5.5	03.04.2010	Sinop
364	HE	NURYOL EN.(DEFNE HES)	7.2	13.0	26.03.2010	Duzce
365	NG	AKSA ENERJİ (Antalya)	25.0	173.9	20.03.2010	Antalya
366	HE	DOĞUBAY ELEK.(SARIMEHMET HES)	3.1	6.0	11.03.2010	Van
367	NG	RASA ENERJİ (VAN)	26.190	166.6	03.03.2010	Van
368	HE	HETAŞ HACISALİHOĞLU (YILDIZLI HES)	1.2	3.0	23.02.2010	Trabzon
369	HE	MURSAL II HES (PETA EN.)	4.5	11.0	19.02.2010	Sivas
370	NG	AKBAŞLAR	1.54	11.69	18.02.2010	Bursa
371	HE	ALAKIR (YURT EN.)	2.1	4.0	29.01.2010	Antalya
372	NG	ALTINMARKA	4.6	35.9	28.01.2010	Istanbul
373	NG	CAN TEKSTİL (Çorlu)	7.832	60.1	28.01.2010	Tekirdag
374	HE	BAYBURT HES	14.6	24.0	28.01.2010	Bayburt
375	LN	ETİ SODA	24.0	144.0	22.01.2010	Ankara
376	HE	CİNDERE DENİZLİ	9.573	16.7	21.01.2010	Denizli
377	HE	KULP IV HES (YILDIZLAR EN.)	12.3	23.0	13.01.2010	Diyarbakir
378	NG	TÜPRAŞ (Orta Anadolu-Kırıkkale)	34.0	240.2	25.12.2009	Kirikkale
379	HE	SARITEPE HES DİNAMİK SİSTEMLER	2.450	4.5	24.12.2009	Adana
380	NG	AKSA ENERJİ (Manisa)	10.500	83.2	18.12.2009	Manisa
381	NG	FALEZ ELEKTRİK	11.7	88.0	16.12.2009	Antalya
382	NG	ÇELİKLER RİXOS ANKARA OTEL	2.0	16.0	15.12.2009	Ankara
383	NG	TAV İSTANBUL	3.26	27.3	12.12.2009	Istanbul
384	HE	SARITEPE HES DİNAMİK SİSTEMLER	2.450	4.5	19.11.2009	Adana
385	HE	ÖZYAKUT GÜNEŞLİ HES	0.600	1.3	13.11.2009	K.Maras
386	NG	SELKASAN	9.9	73.0	11.11.2009	Manisa
387	HE	TÜM EN. PINAR	30.1	65.0	06.11.2009	Adiyaman
388	HE	ERVA KABACA HES	4.240	7.5	29.10.2009	Artvin
389	NG	MERSİN KOJEN. (SODA SAN.A.Ş.)	126.1	882.5	19.10.2009	Mersin
390	NG	AKGIDA PAMUKOVA	7.5	61.0	17.10.2009	Sakarya
391	NG	MAURİ MAYA	0.330	2.7	16.10.2009	Balikesir
392	FO	KIRKA BORAKS (Kırka)	8.2	54.1	15.10.2009	Eskisehir
393	NG	DALSAN ALÇI	1.2	9.0	14.10.2009	Kocaeli
394	IC	İÇDAŞ ÇELİK	135.000	961.7	13.10.2009	Canakkale
395	HE	ERVA KABACA HES	4.240	7.5	23.09.2009	Artvin
396	NG	DELTA ENERJİ	13.000	101.2	17.09.2009	Kirklareli

397	FO	ALİAĞA PETKİM	52.0	364.0	28.08.2009	Izmir
398	HE	DENİZLİ EGE 1	0.9	2.0	27.08.2009	Denizli
399	NG	ENTEK (Köseköy) İztek	12.400	98.7	06.08.2009	Kocaeli
400	NG	GLOBAL ENERJİ (PELİTLİK)	8.553	64.1	31.07.2009	Tekirdag
401	NG	RASA ENERJİ (VAN)	78.570	499.9	31.07.2009	Van
402	HE	OBRUK I-II	210.8	337.0	29.07.2009	Corum
403	IC	İÇDAŞ ÇELİK	135.000	961.7	24.07.2009	Canakkale
404	HE	KAYEN ALFA EN.KALETEPE HES (tortum)	10.2	17.0	23.07.2009	Erzurum
405	NG	ZORLU ENERJİ (B.Karıştıran)	49.53	371.6	17.07.2009	Kirklareli
406	HE	AKUA KAYALIK	5.8	20.0	15.07.2009	Erzincan
407	NG	AKSA ENERJİ (Antalya)	300.0	2,087.0	10.07.2009	Antalya
408	HE	CİNDERE DENİZLİ	19.146	33.3	02.07.2009	Denizli
409	NG	MARMARA PAMUK	34.92	271.5	18.06.2009	Tekirdag
410	NG	ANTALYA ENERJİ	41.82	302.3	05.06.2009	Antalya
411	NG	AKSA ENERJİ (Antalya)	300.0	2,087.0	29.05.2009	Antalya
412	HE	ÖZYAKUT GÜNEŞLİ HES	1.200	2.7	29.05.2009	K.Maras
413	NG	MAURİ MAYA	2.000	16.3	28.05.2009	Balikesir
414	BG	CARGİLL TARIM	0.1	1.0	26.05.2009	Bursa
415	HE	TOCAK I HES (YURT ENERJİ ÜRETİM SAN.)	4.8	6.0	08.05.2009	Antalya
416	AS	SİLOPİ ASFALTİT	135.0	945.0	02.05.2009	Sirnak
417	NG	NUH ENERJİ (ENER SANT.2)	46.950	352.2	30.04.2009	Kocaeli
418	NG	TESKO KİPA İZMİR	2.3	17.5	27.04.2009	Izmir
419	NG	KEN KİPAŞ (KAREN)ELEKTRİK	17.460	75.2	23.04.2009	K.Maras
420	NG	DELTA ENERJİ	47.000	365.8	21.04.2009	Kirklareli
421	NG	AKSA ENERJİ (Antalya)	16.2	112.7	17.04.2009	Antalya
422	GT	GÜRMAT EN.	47.4	313.0	02.04.2009	Aydin
423	NG	SÖNMEZ ELEKTRİK	8.730	67.3	27.03.2009	Usak
424	NG	KASAR DUAL TEKS.ÇORLU	5.7	38.0	26.03.2009	Tekirdag
425	NG	TAV İSTANBUL	6.52	54.7	06.03.2009	Istanbul
426	LN	ALKİM (ALKALİ KİMYA) (Konya)	0.4	3.0	26.02.2009	Konya
427	NG	ERDEMİR	39.2	236.7	06.02.2009	Zonguldak
428	NG	TÜPRAŞ ALİAĞA	24.7	170.0	30.01.2009	Izmir
429	HE	TAŞOVA YENİDEREKÖY	2.0	6.0	30.01.2009	Amasya
430	NG	AKSA ENERJİ (Manisa)	52.380	414.9	15.01.2009	Manisa
431	NG	AKSA ENERJİ (Antalya)	46.7	324.9	29.12.2008	Antalya
432	FO	KARKEY (SİLOPİ)	14.780	95.8	19.12.2008	Sirnak
433	HE	SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	21.0	54.0	28.11.2008	Trabzon
434	HE	SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	21.6	61.0	28.11.2008	Trabzon
435	HE	AKKÖY ENERJİ (AKKÖY HES)	33.980	87.7	26.11.2008	Gumushane
436	NG	AKSA ENERJİ (Antalya)	46.7	324.9	07.11.2008	Antalya
437	NG	AKSA ENERJİ (Antalya)	46.7	324.9	17.10.2008	Antalya
438	HE	TORUL	103.2	130.0	16.10.2008	Gumushane
439	NG	AKSA ENERJİ (Manisa)	17.460	138.3	10.10.2008	Manisa
440	HE	YEŞİL ENERJİ (TAYFUN HES)	0.8	4.0	10.10.2008	K.Maras
441	HE	SEYRANTEPE HES (SEYRANTEPE BARAJI)	24.85	70.4	25.09.2008	Elazig
442	HE	AKKÖY ENERJİ (AKKÖY HES)	67.960	175.3	18.09.2008	Gumushane
443	HE	SEYRANTEPE HES (SEYRANTEPE BARAJI)	24.85	70.4	17.09.2008	Elazig
444	NG	AKSA ENERJİ (Manisa)	34.920	276.6	16.09.2008	Manisa
445	NG	AKSA ENERJİ (Antalya)	43.7	304.0	04.09.2008	Antalya
446	HE	H.G.M.ENER.(KEKLİCEK HES)	8.7	11.0	29.08.2008	Malatya
447	NG	ANTALYA ENERJİ	17.46	126.2	08.08.2008	Antalya
448	NG	POLAT RÖNESANS	1.6	11.0	01.08.2008	Istanbul
449	HE	HİDRO KONTROL YUKARI MANAHOZ	22.4	45.0	31.07.2008	Trabzon
450	NG	SÖNMEZ ELEKTRİK	8.730	67.3	25.07.2008	Usak
451	HE	CANSU ELEKTRİK (ARTVİN)	9.2	31.0	19.07.2008	Artvin
452	NG	MODERN ENERJİ	9.520	66.9	04.07.2008	Tekirdag
453	NG	BAHÇIVAN GIDA (LÜLEBURGAZ)	1.2	8.0	03.07.2008	Kirklareli
454	NG	MELİKE TEKSTİL G.ANTEP	1.6	11.0	03.07.2008	Gaziantep

455	HE	İÇ-EN ELEK. ÇALKIŞLA	7.7	11.0	22.05.2008	Erzincan
456	NG	FOUR SEASONS OTEL	1.2	7.0	17.05.2008	Istanbul
457	NG	CAN ENERJİ	34.920	202.9	02.04.2008	Tekirdag
458	NG	CAN ENERJİ	17.460	101.4	07.03.2008	Tekirdag
459	NG	FRİTOLEY GIDA	0.06	0.4	23.02.2008	Kocaeli
460	NG	YILDIZ SUNTA (Köseköy)	22.6	146.3	22.02.2008	Kocaeli
461	NG	MİSİS APRE TEKSTİL ADANA	2.0	14.0	21.02.2008	Adana
462	NG	ATAÇ İNŞSAN. ANTALYA	5.4	37.0	30.01.2008	Antalya
463	HE	TEMSA ELEKTRİK (GÖZEDE HES)	2.4	6.0	29.01.2008	Bursa
464	HE	ALP ELEKTRİK (TINAZTEPE)	7.7	17.0	24.01.2008	Antalya
465	NG	KESKİN KILIÇ SULTANHANI	8.8	60.0	04.01.2008	Aksaray
466	GT	SARAYKÖY JEOTERMAL	6.9	50.0	04.01.2008	Denizli
467	HE	MERCAN ZORLU	1.275	3.0	01.01.2008	Tunceli
468	FO	KARKEY (SİLOPİ)	29.560	191.6	13.12.2007	Sirnak
469	NG	SÜPERBOY BOYA	1.0	8.0	06.12.2007	Istanbul
470	NG	FLOKSER TEKSTİL (Poliser)	2.1	17.0	04.12.2007	Istanbul
471	HE	KURTEKS (Karasu Andırın HES)	2.4	19.0	29.11.2007	K.Maras
472	NG	ACIBADEM Kadıköy 2	0.6	5.0	24.10.2007	Istanbul
473	NG	TAV Esenboğa	3.9	33.0	20.09.2007	Ankara
474	NG	ALİAĞA Çakmaktepe Enerji	34.84	262.3	14.09.2007	Izmir
475	NG	BİS ENERJİ (Bursa San.)	28.3	213.2	11.09.2007	Bursa
476	NG	BİS ENERJİ (Bursa San.)	48.0	361.6	31.08.2007	Bursa
477	NG	ACIBADEM Bursa	1.3	11.0	29.08.2007	Bursa
478	NG	SWISS OTEL (İstanbul)	1.6	11.0	02.08.2007	Istanbul
479	NG	AKATEKS Çorlu	1.8	14.0	31.07.2007	Tekirdag
480	NG	SAYENERJİ (Kayseri OSB)	5.9	47.0	12.07.2007	Kayseri
481	NG	ACIBADEM Kadıköy 1	0.5	4.0	20.06.2007	Istanbul
482	NG	ENTEK (Demirtaş)	10.750	81.1	15.06.2007	Bursa
483	NG	BİS ENERJİ (Bursa San.)	43.0	323.9	31.05.2007	Bursa
484	HE	ÖZGÜR ELEKTR.K.Maraş Tahta HES	6.250	27.0	25.05.2007	K.Maras
485	HE	ÖZGÜR ELEKTR.K.Maraş Tahta HES	6.250	27.0	04.05.2007	K.Maras
486	NG	HABAŞ (Aliağa)	23.000	184.0	03.05.2007	Izmir
487	NG	T. ENERJİ TURCAS	1.6	13.0	05.04.2007	Istanbul
488	FO	ORS (Polatlı)	7.4	52.0	23.03.2007	Ankara
489	NG	KIVANÇ TEKSTİL	3.900	21.3	21.03.2007	Adana
490	HE	BORÇKA	300.6	600.0	28.02.2007	Artvin
491	NG	KİL-SAN	3.2	25.0	20.02.2007	Istanbul
492	NG	FRİTOLEY GIDA	0.54	3.6	24.01.2007	Kocaeli
493	NG	BOSEN (Bursa San.)	11.80	88.6	19.01.2007	Bursa
494	NG	AKMAYA (Lüleburgaz)	6.9	48.0	23.12.2006	Kirklareli
495	NG	BURGAZ ELEKTRİK	6.9	55.0	23.12.2006	Kirklareli
496	WD	ERTÜRK ELEKT. (TEPE)	0.9	2.0	22.12.2006	Istanbul
497	HE	BEREKET (MENTAŞ)	13.300	46.7	13.12.2006	Adana
498	NG	ÇIRAĞAN SARAYI	1.3	11.0	01.12.2006	Istanbul
499	HE	ENERJİ-SA-AKSU-ŞAHMALLAR	14.0	7.0	16.11.2006	Antalya
500	LN	ELBİSTAN B 1-4	360.0	2,207.5	13.11.2006	K.Maras
501	NG	ENTEK (Köseköy) İztek	37.000	294.6	03.11.2006	Kocaeli
502	NG	ÇERKEZKÖY ENERJİ	49.2	403.0	06.10.2006	Tekirdag
503	NG	YILDIZ ENTEGRE	6.184	46.3	21.09.2006	Kocaeli
504	LN	ELBİSTAN B 1-4	360.0	2,207.5	17.09.2006	K.Maras
505	NG	MERSİN KOJEN. (SODA SAN.A.Ş.)	126.1	882.5	13.09.2006	Mersin
506	HE	ENERJİ SA-SUGÖZÜ-KIZILDÜZ	15.4	8.0	08.09.2006	Antalya
507	HE	EKİN ENERJİ (BAŞARAN HES)	0.6	0.0	11.08.2006	Aydin
508	NG	EROĞLU GİYİM	1.2	9.0	01.08.2006	Tekirdag
509	HE	BEREKET (MENTAŞ)	26.600	93.3	31.07.2006	Adana
510	NG	HAYAT TEMİZLİK	15.0	94.0	30.06.2006	Kocaeli
511	NG	ANTALYA ENERJİ	34.92	252.4	29.06.2006	Antalya
512	HE	SU ENERJİ (ÇAYGÖREN HES)	4.6	4.0	27.06.2006	Balikesir
513	LN	ELBİSTAN B 1-4	360.0	2,207.5	23.06.2006	K.Maras
514	NG	ŞIK MAKAS	1.6	12.6	22.06.2006	Tekirdag
515	NG	AMYLUM NİŞASTA (Adana)	8.10	45.31	09.06.2006	Adana

516	BG	ADANA ATIK	0.8	6.0	09.06.2006	Adana
517	HE	MOLU ENERJİ (BAHÇELİK HES)	4.2	30.0	31.05.2006	Kayseri
518	NG	KASTAMONU ENTEGRE	7.5	48.0	24.05.2006	Balikesir
519	HE	BEREKET (GÖKYAR)	11.6	23.0	05.05.2006	Mugla
520	NG	SÖNMEZ ELEKTRİK	17.460	134.5	03.05.2006	Usak
521	NG	ELSE TEKSTİL	3.2	25.0	15.04.2006	Tekirdag
522	NG	ENTEK (Köseköy) İztek	47.620	379.2	14.04.2006	Kocaeli
523	NG	MARMARA PAMUK	8.73	67.9	13.04.2006	Tekirdag
524	NG	NUH ENERJİ (ENER SANT.2)	26.080	195.6	02.03.2006	Kocaeli
525	HE	ŞANLI URFA	51.0	85.0	01.03.2006	Sanliurfa
526	NG	AYDIN ÖRME	7.5	60.0	25.02.2006	Sakarya
527	NG	ALTEK ALARKO	21.890	151.4	23.02.2006	Kirklareli
528	NG	ERAK GİYİM	1.4	12.0	22.02.2006	Tekirdag
529	NG	EKOTEN TEKSTİL	1.9	15.0	16.02.2006	Izmir
530	NG	BOSEN (Bursa San.)	51.02	383.0	30.12.2005	Bursa
531	FO	KARKEY (SİLOPİ)	6.750	43.8	23.12.2005	Sirnak
532	NT	MENDERES TEKS. (AKÇA ENERJİ)	8.73	63.9	14.12.2005	Denizli
533	IC	KAHRAMANMARAŞ KAĞIT	6.0	45.0	08.12.2005	K.Maras
534	NG	PAKGIDA (Kemalpaşa)	5.7	43.0	07.12.2005	Izmir
535	NG	KORUMA KLOR	9.6	77.0	03.12.2005	Kocaeli
536	IC	İÇDAŞ ÇELİK	135.000	961.7	30.11.2005	Canakkale
537	NG	KÜÇÜKÇALIK TEKSTİL	8.0	64.0	27.11.2005	Bursa
538	NG	ZORLU ENERJİ (Yalova)	15.9	122.0	26.11.2005	Yalova
539	NG	HABAŞ (Aliağa)	23.000	184.0	24.11.2005	Izmir
540	NG	GRANİSER GRANİT	5.5	42.0	14.11.2005	Manisa
541	NG	MANİSA O.S.B.	84.834	634.7	11.11.2005	Manisa
542	NG	AK ENERJİ (Kemalpaşa)	40.0	328.3	09.11.2005	Izmir
543	NG	ZORLU ENERJİ (Kayseri)	38.630	294.9	26.10.2005	Kayseri
544	NG	ALTEK ALARKO	60.100	415.6	14.10.2005	Kirklareli
545	NG	HABAŞ (Aliağa)	44.615	357.0	21.09.2005	Izmir
546	NG	EVYAP	5.1	30.0	27.08.2005	Istanbul
547	NG	ÇEBİ ENERJİ	21.000	164.8	27.08.2005	Tekirdag
548	NG	CAN ENERJİ	3.900	22.7	25.08.2005	Tekirdag
549	NG	NOREN ENERJİ	8.7	70.0	24.08.2005	Nigde
550	NG	ÇEBİ ENERJİ	43.366	340.2	23.08.2005	Tekirdag
551	HE	YAMULA	100.0	422.0	30.07.2005	Kayseri
552	NG	ZORLU ENERJİ (Kayseri)	149.871	1,144.1	22.07.2005	Kayseri
553	BG	BANDIRMA ASİT(ETİ MADEN)	11.5	88.0	15.07.2005	Balikesir
554	HE	BEREKET (DALAMAN)	7.5	35.8	15.07.2005	Mugla
555	NG	ZEYNEP GİYİM	1.2	9.0	07.07.2005	Tekirdag
556	FO	KARKEY (SİLOPİ)	6.150	39.9	30.06.2005	Sirnak
557	NG	AKBAŞLAR	5.04	38.25	24.06.2005	Bursa
558	NG	MODERN ENERJİ	10.240	72.0	13.06.2005	Tekirdag
559	HE	MURATLI	115.0	253.0	02.06.2005	Artvin
560	NG	HABAŞ (Aliağa)	44.615	357.0	02.06.2005	Izmir
561	NG	TEZCAN GALVANİZ GR I-II	3.5	28.0	27.05.2005	Kocaeli
562	NG	HAYAT KAĞIT SAN.	7.2	56.0	27.05.2005	Corum
563	NG	YONGAPAN (Kastamonu)	5.20	37.8	25.05.2005	Kocaeli
564	NG	NUH ENERJİ (ENER SANT.2)	46.950	352.2	24.05.2005	Kocaeli
565	HE	İÇTAŞ YUKARI MERCAN	14.2	20.0	21.05.2005	Erzincan
566	NG	AK ENERJİ (Kemalpaşa)	87.2	715.7	30.04.2005	Izmir
567	WD	SUNJÜT	1.2	2.0	22.04.2005	Istanbul
568	NG	KAREGE ARGES	17.460	138.9	07.04.2005	Izmir
569	NG	BİS ENERJİ (Bursa San.)	43.7	329.2	18.03.2005	Bursa
570	LN	ÇAN 1-2	160.0	1,040.0	15.03.2005	Canakkale
571	LN	ÇAN 1-2	160.0	1,040.0	15.02.2005	Canakkale
572	LN	ELBİSTAN B 1-4	360.0	2,207.5	15.02.2005	K.Maras
573	NG	ENTEK (KOÇ Üniversite)	2.3	19.0	07.02.2005	Istanbul
574	NG	BAYDEMİRLER (Beylikdüzü)	6.210	51.5	04.02.2005	Istanbul
575	NG	MERCEDES BENZ	8.3	68.0	04.02.2005	Istanbul
576	NG	GLOBAL ENERJİ (PELİTLİK)	11.748	88.0	29.01.2005	Tekirdag
577	NG	GLOBAL ENERJİ (HACIŞİRAHMET)	7.8	58.0	29.01.2005	Tekirdag

578	FO	TÜPRAŞ (Batman)	1.5	10.5	31.12.2004	Batman
579	NG	BAHARİYE MENSUCAT	1.0	7.0	31.12.2004	Istanbul
580	NG	ALTINMARKA	3.6	28.1	17.12.2004	Istanbul
581	FO	KARKEY (SİLOPİ)	54.300	351.9	12.11.2004	Sirnak
582	NG	STANDARD PROFİL	6.7	49.0	22.10.2004	Duzce
583	NG	HABAŞ (Aliağa)	89.230	714.0	08.10.2004	Izmir
584	NG	AYEN OSTİM	9.890	84.0	01.10.2004	Ankara
585	NG	KOMBASSAN AMBALAJ (Konya)	5.5	40.0	24.09.2004	Konya
586	HE	BEREKET (FESLEK)	9.5	25.0	05.08.2004	Aydin
587	NG	ÇELİK ENERJİ (Uzunçiftlik)	2.4	19.0	09.07.2004	Kocaeli
588	NG	BERK ENERJİ (BESLER - KURTKÖY)	4.4	30.9	07.07.2004	Istanbul
589	NG	ŞAHİNLER ENERJİ(ÇORLU/TEKİRDAĞ)	3.200	22.8	29.06.2004	Tekirdag
590	NG	ENERJİ-SA (Adana)	49.770	350.6	23.06.2004	Adana
591	NG	BİS ENERJİ (Bursa San.)	73.0	549.9	16.06.2004	Bursa
592	NG	AYEN OSTİM	31.077	264.0	11.06.2004	Ankara
593	NG	KOMBASSAN AMBALAJ (Tekirdağ)	5.5	38.0	09.06.2004	Tekirdag
594	NG	TEKBOY TEKSTİL	2.2	16.0	18.05.2004	Kirklareli
595	IC	ÇOLAKOĞLU-2	45.0	337.5	05.05.2004	Kocaeli
596	HE	İŞKUR (SÜLEYMANLI HES)	4.6	4.0	28.04.2004	K.Maras
597	HE	ELTA (DODURGA)	4.1	12.0	26.04.2004	Denizli
598	LPG	ETİ BOR (EMET)	10.4	77.5	22.04.2004	Kutahya
599	NG	TANRIVERDİ	4.7	38.7	24.03.2004	Tekirdag
600	HE	ENERJİ-SA BİRKAPILI	48.5	17.0	11.03.2004	Mersin
601	NG	ATATEKS	5.6	45.0	20.02.2004	Tekirdag
602	NG	ENTEK (Demirtaş)	31.132	234.7	12.02.2004	Bursa
603	NG	ANKARA	798.0	5,209.0	08.01.2004	Ankara
604	NG	ECZACIBAŞI BAXTER	1.0	6.0	31.12.2003	Istanbul
605	NG	SÖNMEZ FLAMENT	4.1	29.0	31.12.2003	Bursa
606	IC	İSKENDERUN	1,320.0	7,706.0	22.11.2003	Hatay
607	NG	ENERJİ-SA (Mersin)	21.575	177.4	22.11.2003	Mersin
608	HE	BATMAN	198.5	200.0	14.11.2003	Batman
609	NG	ENERJİ-SA (Çanakkale)	21.575	175.0	12.11.2003	Canakkale
610	NG	BATIÇİM EN.	14.50	119.3	26.10.2003	Izmir
611	HE	PAMUK (Toroslar)	23.3	28.0	18.10.2003	Mersin
612	HE	MERCAN ZORLU	19.100	45.0	08.10.2003	Tunceli
613	NG	ENERJİ-SA (Mersin)	41.650	342.6	05.10.2003	Mersin
614	HE	KÜRTÜN	85.0	140.0	26.09.2003	Gumushane
615	FO	ANADOLU EFES BİRA I	3.8	32.0	05.09.2003	Ankara
616	NG	ZORLU ENERJİ (Sincan)	10.66	90.8	18.07.2003	Ankara
617	NG	BAYDEMİRLER (Beylikdüzü)	2.066	17.1	11.07.2003	Istanbul
618	NG	TÜBAŞ	1.4	8.6	11.07.2003	Tekirdag
619	NG	PAKGIDA (Düzce-Köseköy)	2.1	16.8	02.07.2003	Duzce
620	NG	ÖZAKIM ENERJİ (Gürsu)	7.0	60.0	19.06.2003	Bursa
621	NG	KEN KİPAŞ (KAREN)ELEKTRİK	24.340	104.8	14.06.2003	K.Maras
622	HE	YAPISAN HACILAR DARENDE	13.3	54.0	14.06.2003	Malatya
623	NG	ZORLU ENERJİ (Sincan)	39.70	338.2	31.05.2003	Ankara
624	NG	CAN TEKSTİL (Çorlu)	0.900	6.9	17.05.2003	Tekirdag
625	NG	YURTBAY (Eskişehir)	6.9	50.0	16.05.2003	Eskisehir
626	NT	ALKİM KAĞIT	3.385	26.7	03.05.2003	Afyonkarahisar
627	NG	İZMİR	1,590.7	10,780.0	28.03.2003	Izmir
628	NG	BATIÇİM EN.	25.40	208.9	13.03.2003	Izmir
629	NG	HAYAT KİMYA (İzmit)	5.2	32.0	11.03.2003	Kocaeli
630	FO	ALİAĞA PETKİM	21.7	151.9	24.02.2003	Izmir
631	HE	EŞEN-II (GÖLTAŞ)	21.7	40.0	31.01.2003	Mugla
632	NG	BATIÇİM EN.	5.08	41.8	27.01.2003	Izmir
633	LN	ETİ MADEN (BANDIRMA BORAKS)	10.7	78.0	10.01.2003	Balikesir
634	NG	BURSA D.GAZ	1,432.0	1,051.0	01.01.1998	Bursa
635	DO	VAN ENGİL GAZ (ZORLU ENERJİ)	15.0	75.0	01.01.1996	Van
636	LN	KEMERKÖY	630.0	3,311.0	01.01.1993	Mugla
637	LN	ORHANELİ	210.0	1,288.0	01.01.1992	Bursa
638	HC	ÇATALAĞZI-B	300.0	1,721.0	01.01.1989	Zonguldak

639	LN	KANGAL	457.0	2,802.0	01.01.1989	Sivas
640	NG	AMBARLI-D.GAZ	1,350.9	9,000.0	01.01.1988	Istanbul
641	LN	ÇAYIRHAN PARK HOLD.	620.0	3,640.0	01.01.1987	Ankara
642	LN	YENİKÖY	420.0	2,730.0	01.01.1986	Mugla
643	NG	HAMİTABAT	1,156.0	7,653.0	01.01.1985	Kirklareli
644	LN	ELBİSTAN A	1,355.0	4,150.0	01.01.1984	K.Maras
645	LN	DENİZLİ JEOTERMAL (Zorlu)	15.0	105.0	01.01.1984	Denizli
646	LN	YATAĞAN	630.0	3,679.0	01.01.1982	Mugla
647	LN	SOMA B	990.0	5,125.0	01.01.1981	Manisa
648	NG	ALİAĞA-ÇEVRİM	180.0	9,267.0	01.01.1975	Izmir
649	FO	HOPA	50.0	325.0	01.01.1973	Artvin
650	LN	SEYİTÖMER	600.0	3,679.0	01.01.1973	Kütahya
651	FO	AMBARLI	630.0	2,145.0	01.01.1967	Istanbul
652	LN	SOMA A	44.0	0.0	01.01.1957	Manisa
653	HE	BİLGİN ELEK. (HAZAR 1-2)	30.1	0.0	01.01.1957	Elazig
654	LN	TUNÇBİLEK	365.0	2,078.0	01.01.1956	Kütahya
655	DO	HAKKARİ ÇUKURCA	1.0	0.0		Hakkari
656	HE	ADIGÜZEL	62.0	80.0		Denizli
657	HE	ALMUS	27.0	30.0		Tokat
658	HE	ALTINKAYA	702.6	740.0		Samsun
659	HE	ASLANTAŞ	138.0	320.0		Osmaniye
660	HE	ATATÜRK	2,405.0	5,230.0		Sanliurfa
661	HE	BERDAN	10.2	15.0		Mersin
662	HE	ÇATALAN	168.9	330.0		Adana
663	HE	ÇAMLIGÖZE	32.0	68.0		Sivas
664	HE	DEMİRKÖPRÜ	69.0	32.0		Manisa
665	HE	DERBENT	56.4	150.0		Samsun
666	HE	DİCLE	110.0	220.0		Diyarbakir
667	HE	DOĞANKENT	74.5	200.0		Giresun
668	HE	GEZENDE	159.4	130.0		Mersin
669	HE	GÖKÇEKAYA	278.4	240.0		Eskisehir
670	HE	HASAN UĞURLU	500.0	820.0		Samsun
671	HE	HASANLAR	9.4	9.0		Bolu
672	HE	HİRFANLI	128.0	140.0		Kirsehir
673	HE	KAPULUKAYA	54.0	120.0		Kirikkale
674	HE	KARACAÖREN-1	32.0	60.0		Burdur
675	HE	KARAKAYA	1,800.0	5,310.0		Diyarbakir
676	HE	KARKAMIŞ	189.0	320.0		Gaziantep
677	HE	KEBAN	1,330.0	4,120.0		Elazig
678	HE	KEMER	48.0	45.0		Aydin
679	HE	KESİKKÖPRÜ	76.0	80.0		Ankara
680	HE	KILIÇKAYA	120.0	277.0		Sivas
681	HE	KÖKLÜCE	90.0	300.0		Tokat
682	HE	KRALKIZI	94.5	90.0		Diyarbakir
683	HE	KISIK	9.3	20.0		K.Maras
684	HE	MENZELET	124.0	360.0		K.Maras
685	HE	ÖZLÜCE	170.0	290.0		Elazig
686	HE	SARIYAR	160.0	180.0		Ankara
687	HE	SUAT UĞURLU	69.0	250.0		Samsun
688	HE	TORTUM	26.2	85.0		Erzurum
689	HE	YENİCE	37.9	50.0		Ankara
690	HE	BERKE	510.0	790.0		Osmaniye
691	HE	SEYHAN I	60.0	212.0		Adana
692	HE	SEYHAN II	7.5	7.0		Adana
693	HE	SIR	283.5	500.0		K.Maras
694	HE	KARACAÖREN II	46.4	90.0		Burdur
695	HE	MANAVGAT	48.0	110.0		Antalya
696	HE	KADINCIK I	70.0	180.0		Mersin
697	HE	KADINCIK II	56.0	165.0		Mersin
698	HE	YÜREĞİR	6.0	4.0		Adana
699	HE	KEPEZ I-II	32.4	55.0		Antalya
700	HE	OTHERS	45.0	100.0		
701	HE	ADİLCEVAZ(MOSTAR EN.)	0.4	1.0		Bitlis

702	HE	AHLAT(MOSTAR EN.)	0.2	1.0		Bitlis
703	HE	ATAKÖY(ZORLU)	5.5	11.0		Tokat
704	HE	BAYBURT(BOYDAK EN.)	0.4	2.0		Bayburt
705	HE	BESNİ(KAYSERİ VE CİVARI EN.ÜR.)	0.3	0.0		Adiyaman
706	HE	BEYKÖY(ZORLU)	16.8	87.0		Eskisehir
707	HE	BÜNYAN(KAYSERİ VE CİVARI)	1.2	3.0		Kayseri
708	HE	ÇAĞ-ÇAĞ(NAS EN.)	14.4	22.0		Mardin
709	HE	ÇAMARDI(KAYSERİ VE CİVARI EN.ÜR.)	0.1	0.0		Nigde
710	HE	ÇEMİŞKEZEK(BOYDAK EN.)	0.1	1.0		Tunceli
711	HE	ÇILDIR ZORLU	15.4	20.0		Kars
712	HE	DEĞİRMENDERE(KA-FNIH EL.)	0.5	1.0		Osmaniye
713	HE	DERME(KAYSERİ VE CİVARI EN.ÜR.)	4.5	7.0		Malatya
714	HE	ERKENEK(KAYSERİ VE CİVARI EN.ÜR.)	0.3	1.0		Malatya
715	HE	GİRLEVİK(BOYDAK EN.)	3.0	19.0		Erzincan
716	HE	HAKKARİ (OTLUCA)((NAS EN.)	1.3	5.0		Hakkari
717	HE	İKİZDERE ZORLU	18.6	100.0		Rize
718	HE	İNEGÖL(CERRAH)(KENT SOLAR EL.)	0.3	1.0		Bursa
719	HE	İZNİK (DEREKÖY)(KENT SOLAR EL.)	0.2	1.0		Bursa
720	HE	KARAÇAY(OSMANİYE)(KA-FNIH EL.)	0.4	2.0		Osmaniye
721	HE	KAYADİBİ(BARTIN)(İVME ELEKTROMEKANİK	0.5	2.0		Bartin
722	HE	KERNEK(KAYSERİ VE CİVARI EN.ÜR.)	0.8	1.0		Malatya
723	HE	KOVADA-I(BATIÇİM EN.)	8.3	2.0		Isparta
724	HE	KOVADA-II(BATIÇİM EN.)	51.2	24.0		Isparta
725	HE	KUZGUN ZORLU	20.9	0.0		Erzurum
726	HE	KUZUCULU (DÖRTYOL)(KA-FNIH EL.)	0.3	1.0		Hatay
727	HE	M.KEMALPAŞA(SUUÇTU)(KENT SOLAR EL.)	0.5	1.0		Bursa
728	HE	MALAZGİRT(MOSTAR EN.)	1.2	3.0		Mus
729	HE	PINARBAŞI(KAYSERİ VE CİVARI EN.ÜR.)	0.1	0.0		Kayseri
730	HE	SIZIR(KAYSERİ VE CİVARI EN.ÜR.)	5.8	35.0		Kayseri
731	HE	TERCAN ZORLU	15.0	28.0		Erzincan
732	HE	TURUNÇOVA(FİNİKE)(TURUNÇOVA EL.)	0.5	1.0		Antalya
733	HE	ULUDERE(NAS EN.)	0.6	3.0		Sirnak
734	HE	VARTO(MOSTAR EN.)	0.3	1.0		Mus
735	NG	GEBZE D.GAZ	1,595.4	10,951.0		Sakarya
736	NG	ADAPAZARI	797.7	5,473.0		Sakarya
737	NG	TRAKYA ELEKTRİK ENRON	498.7	3,797.0		Tekirdag
738	NG	ESENYURT (DOĞA)	188.5	1,400.0		Istanbul
739	NG	OVA ELEK.	258.4	2,019.0		Kocaeli
740	NG	UNİMAR	504.0	3,797.0		Tekirdag
741	HE	BİRECİK	672.0	2,092.0		Sanliurfa
742	HE	AHİKÖY I-II	4.2	21.0		Sivas
743	HE	AKSU (ÇAYKÖY)	16.0	35.0		Burdur
744	HE	ÇAL (LİMAK) (Denizli)	2.5	12.0		Denizli
745	HE	ÇAMLICA (AYEN ENERJİ)	84.0	429.0		Kayseri
746	HE	DİNAR-II (METAK)	3.0	16.0		Afyonkarahisar
747	HE	FETHİYE	16.5	89.0		Mugla
748	HE	GAZİLER (Iğdır)	11.2	48.0		Igdir
749	HE	GİRLEVİK-II / MERCAN	11.0	39.0		Erzincan
750	HE	GÖNEN	10.6	47.0		Balıkesir
751	HE	SUÇATI (ERE EN.)	7.0	28.0		K.Maras
752	HE	SÜTCÜLER	2.3	13.0		Isparta
753	HE	TOHMA MEDİK (ALARKO)	12.5	59.0		Malatya

754	WD	ARES (ALAÇATI)	7.2	19.0		Izmir
755	WD	BORES (BOZCAADA)	10.2	31.0		Canakkale
756	FO	AKSU SEKA (MİLDA KAĞIT)	8.0	20.0		Giresun
757	FO	ALİAĞA PETKİM	148.3	1,038.1		Izmir
758	FO	ALBAYRAK TURİZM(BALIKESİR SEKA)	9.3	56.0		Balikesir
759	FO	BOR ŞEKER	9.6	6.0		Nigde
760	FO	OYKA KAĞ.(CAYCUMA SEKA)	10.0	70.0		Zonguldak
761	FO	ERDEMİR	73.5	478.8		Zonguldak
762	FO	HALKALI KAĞIT	5.1	39.0		Istanbul
763	FO	MED UNİON A.Ş. (EBSO)	3.4	27.0		Izmir
764	FO	MOPAK (Dalaman)	26.2	106.0		Mugla
765	FO	S.ŞEHİR (ETİ) ALÜMİNYUM	11.9	35.0		Konya
766	FO	TÜPRAŞ İZMİR (ALİAĞA RAF.)	44.0	306.0		Izmir
767	FO	TÜPRAŞ (İzmit-Yarımca)	45.0	291.2		Kocaeli
768	FO	TÜPRAŞ (Batman)	8.8	61.5		Batman
769	FO	TİRE-KUTSAN (Tire)	8.0	37.0		Izmir
770	FO	OTHERS (Isolated)	96.0	300.0		
771	DO	TÜPRAŞ (Batman)	10.3	72.0		Batman
772	DO	OTHERS	0.1	1.0		
773	IC	ÇOLAKOĞLU-2	145.0	1,087.5		Kocaeli
774	HC	İSDEMİR	220.4	772.0		Hatay
775	HC	KARDEMİR	35.0	300.0		Zonguldak
776	LN	ALKİM (ALKALİ KİMYA) (Dazkırı)	2.5	17.0		Afyonkarahisar
777	LN	PETLAS	6.0	40.0		Kirsehir
778	LN	MARMARA KAĞIT (Bilorsa)	2.0	9.0		Bilecik
779	LN	OTHERS	147.5	285.0		
780	LPG	ETİ BOR (EMET)	0.6	4.5		Kutahya
781	LPG	GOODYEAR (Adapazarı)	9.6	79.0		Sakarya
782	LPG	MOPAK KAĞIT (Işıklar)	4.6	33.0		Izmir
783	LPG	ORTA ANADOLU MENSUCAT	10.0	65.0		Kayseri
784	NT	MENDERES TEKS. (AKÇA ENERJİ)	10.40	76.1		Denizli
785	NT	ALKİM KAĞIT	1.815	14.3		Afyonkarahisar
786	NT	DENTAŞ (Denizli)	5.0	38.0		Denizli
787	NT	MENSA MENSUCAT	10.4	85.0		Adana
788	NT	TOROS (Ceyhan)	4.7	38.0		Adana
789	NT	TOROS (Mersin)	12.1	96.0		Mersin
790	NG	AKIN ENERJİ (B.Karıştıran)	4.9	37.0		Kirklareli
791	NG	ARÇELİK (Eskişehir)	6.3	49.0		Eskisehir
792	NG	ARÇELİK (Çayırova)	6.5	48.0		Kocaeli
793	NG	ATLAS HALICILIK (Çorlu)	1.0	7.0		Tekirdag
794	NG	BAYDEMİRLER (Beylikdüzü)	1.000	8.3		Istanbul
795	NG	CAN TEKSTİL (Çorlu)	4.300	33.0		Tekirdag
796	NG	ÇOLAKOĞLU-1	123.4	1,047.0		Kocaeli
797	NG	DOĞUŞ (B.Karıştıran)	1.0	8.0		Tekirdag
798	NG	EGE SERAMİK	13.1	90.0		Izmir
799	NG	GÜLLE ENTEGRE (Çorlu)	6.300	29.0		Tekirdag
800	NG	İGSAŞ (Yarımca)	11.0	76.0		Kocaeli
801	NG	SANKO (İSKO) (İnegöl)	9.2	63.0		Bursa
802	NG	KALESERAMİK (Çan Seramik+Kalebodur)	21.6	157.0		Canakkale
803	NG	KARTONSAN (İzmit)	24.0	192.0		Kocaeli
804	NG	NUR YILDIZ (GEM-TA)*	1.4	7.0		Tekirdag
805	NG	PİSA TEKSTİL SAN.A.Ş.(İSTANBUL)	1.0	7.0		Istanbul
806	NG	SARKUYSAN (Tuzla)	7.7	60.0		Kocaeli
807	NG	SAMUR HALI A.Ş.	4.3	33.0		Ankara
808	NG	TERMAL SERAMİK (Söğüt)	4.6	34.2		Bilecik
809	NG	TRAKYA İPLİK (Çerkezköy)	4.2	29.0		Tekirdag
810	NG	YILFERT (TÜGSAŞ GEMLİK GÜB.)	8.0	50.0		Bursa
811	NG	TÜP MERSERİZE (B.Karıştıran)	1.0	7.0		Tekirdag
812	NG	YILDIZ SUNTA (Köseköy)	5.2	33.7		Kocaeli
813	NG	YONGAPAN (Kastamonu)	5.20	37.8		Kocaeli
814	NG	OTHERS	88.5	296.0		

815	BG	BELKA (Ankara)	3.2	22.0		Ankara
816	BG	KEMERBURGAZ	4.0	7.0		Istanbul
817	BG	BANDIRMA BAĞFAŞ	10.0	57.0		Balikesir
818	HE	OYMAPINAR (ETİ ALİMİNYUM)	540.0	1,170.0		Antalya
819	HE	BAĞCI SU ÜRÜNLERİ	0.3	1.7		Mugla
820	HE	MOLU	3.4	10.6		Kayseri
821	HE	YEŞİLLİLER (Kırşehir)	0.5	1.0		Kirsehir
822	NT	ATAER ENERJİ (EBSO)	70.200	398.1		Izmir
823	NG	AK ENERJİ (Bozüyük)	126.6	817.0		Bilecik
824	NG	AK ENERJİ (Çerkezköy)	98.0	805.0		Tekirdag
825	NG	ARENKO ELEKTRİK DENİZLİ	12.0	84.0		Denizli
826	NG	AKIM EN. BAŞPINAR(SÜPER FİLM)G.ANTEP	25.3	177.0		Gaziantep
827	NG	AKSA AKRİLİK KİMYA (YALOVA)	42.5	298.0		Yalova
828	NG	BERK ENERJİ (BESLER - KURTKÖY)	10.4	73.1		Istanbul
829	NG	BİS ENERJİ (Bursa San.)	174.0	1,310.7		Bursa
830	NG	BOSEN (Bursa San.)	80.00	600.5		Bursa
831	NG	BİL ENERJİ (Ankara)	36.6	255.0		Ankara
832	NG	CAM İŞ ELEKTRİK (B.Karıştıran)	32.9	270.0		Kirklareli
833	NG	CENGİZ ENERJİ ÇİFT YAK.	131.3	985.0		Samsun
834	NG	DESA ENERJİ	9.8	70.0		Izmir
835	NG	ENERJİ-SA (Adana)	80.400	566.4		Adana
836	NG	ENERJİ-SA (Çanakkale)	42.525	345.0		Canakkale
837	NG	ENERJİ-SA (Kentsa) Köseköy	120.0	930.0		Kocaeli
838	NG	ENTEK (Köseköy) İztek	60.100	478.5		Kocaeli
839	NG	ENTEK (Demirtaş)	104.000	784.2		Bursa
840	NG	MAKSİ ENERJİ	7.7	55.0		Istanbul
841	NG	MODERN ENERJİ	77.000	541.1		Tekirdag
842	NG	NUH ENERJİ 1 (Nuh Çimento)	38.0	326.0		Kocaeli
843	NG	SAMSUN TEKKEKÖY (AKSA EN.)	131.3	980.0		Samsun
844	NG	ŞAHİNLER ENERJİ(ÇORLU/TEKİRDAĞ)	22.800	162.2		Tekirdag
845	NG	YENİ UŞAK ENERJİ	8.70	63.7		Usak
846	NG	ZORLU ENERJİ (Bursa)	90.0	752.0		Bursa
847	NG	ZORLU ENERJİ (B.Karıştıran)	65.80	493.6		Kirklareli
848	NG	ESKİŞEHİR ENDÜSTRİ ENERJİ(OSB)	59.0	452.0		Eskisehir
849	WS	İZAYDAŞ (İzmit çöp)	5.20	34.8		Kocaeli
850	FO	AKSA ENERJİ (Hakkari)	24.0	175.0		Hakkari
851	FO	HABAŞ (Bilecik)	18.0	144.0		Bilecik
852	FO	HABAŞ (İzmir)	36.0	288.0		Izmir
853	FO	KIZILTEPE	33.0	250.0		Mardin
854	FO	PS3-1 (SİLOPİ)	44.100	285.8		Sirnak
855	FO	PS3-2 (SİLOPİ)	29.500	191.2		Sirnak
856	FO	PS3-A -1	11.0	80.0		Sirnak
857	FO	PS3-A -2 (İDİL)	24.0	180.0		Sirnak
858	FO	SİİRT	24.0	190.0		Siirt
859	HE	BEREKET HES (DENİZLİ)	3.7	12.0		Denizli
860	HE	BEREKET (DALAMAN)	30.0	143.2		Mugla
861	HE	EŞEN-II (GÖLTAŞ)	21.7	40.0		Mugla
862	HE	KAREL (PAMUKOVA)	9.3	55.0		Sakarya
863	HE	MURGUL BAKIR	4.700	7.5		Artvin
864	WD	ALİZE ENERJİ (DELTA PLASTİK)	1.5	4.0		Izmir
TOTAL			**57,577.7**	**284,643.5**		
				56,928.7	**20%**	

AEG_{total}	**284,643,549**	MWh
$AEG_{SET-=20\ per\ cent}$	**56,928,710**	MWh

Abbreviations: AS: Asphaltite, BG: Biogas, DO: Diesel Oil, FO: Fuel Oil, GT: Geothermal, HC: Hard Coal, HE: Hydroelectric, IC: Imported Coal, LN: Lignite, LPG: Liquefied Petroleum Gas, NG: Natural Gas, NT: Naphta, WD. Wind, WS: Waste

Appendix 5: Further background information on monitoring plan

Not available.

Appendix 6: Summary of post registration changes

Not available.

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for CDM project activities" (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
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