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

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Boreas-1 Enez Wind Power Plant
Version number of the PDD	Version.8
Completion date of the PDD	17/07/2013
Project participant(s)	Boreas Enerji Üretim Sistemleri Sanayi ve Ticaret A.Ş.
Host Party(ies)	Turkey
Sectoral scope(s) and selected methodology(ies)	Type (i). Renewable Energy Projects Category I.D.: "Grid Connected Renewable Electricity Generation" AMS-1.D version 17.0
Estimated amount of annual average GHG emission reductions	32,330tCO_2eq

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

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

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

There are six Nordex N90 turbines, each having a capacity of 2.5 MWs. The turbines were purchased from Germany and shipped to Turkey for installation. The electricity is transmitted to substation Enez TM, 154 KV bara via 10 km transmission line.

The purpose of the Project is to produce renewable electricity using wind as the power source and to contribute to Turkey's growing electricity demand through a sustainable and low carbon technology. The project will displace the same amount of electricity generated by the grid dominated with fossil fired power plants. The annual emission reduction estimated by the project is **32,330 tonnes of CO2eq**.

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

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

Figure.1. Nordex N90 2500 HS

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

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

Turkey has ratified Kyoto Protocol on 26/08/2009 but did not give any emission reduction commitment. The project does not involve facilities under the European Union-Greenhouse Gas Emissions Trading Scheme.

A.2.2. Region/State/Province etc.

The project is located in Enez Township of Edirne Province, Turkey (Figure.2).

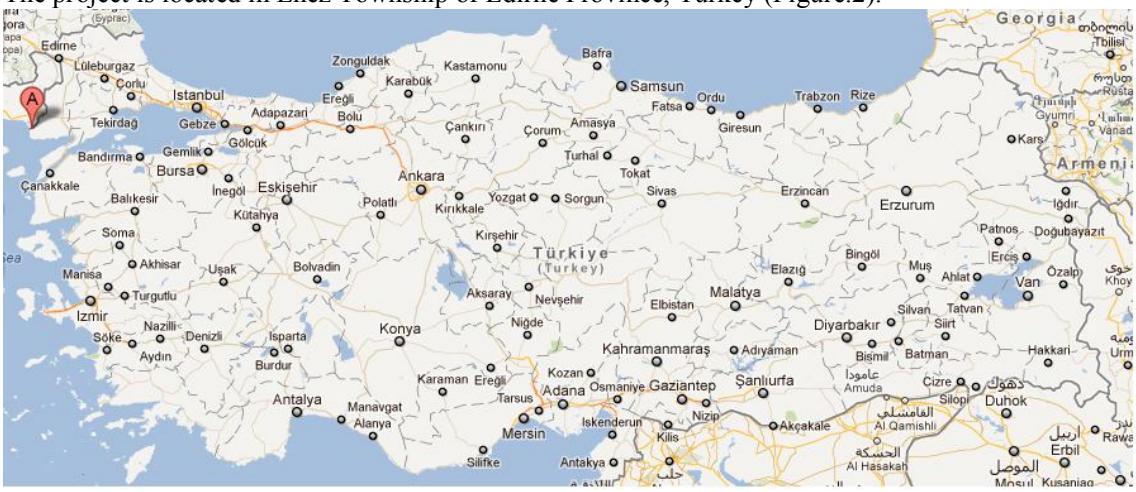
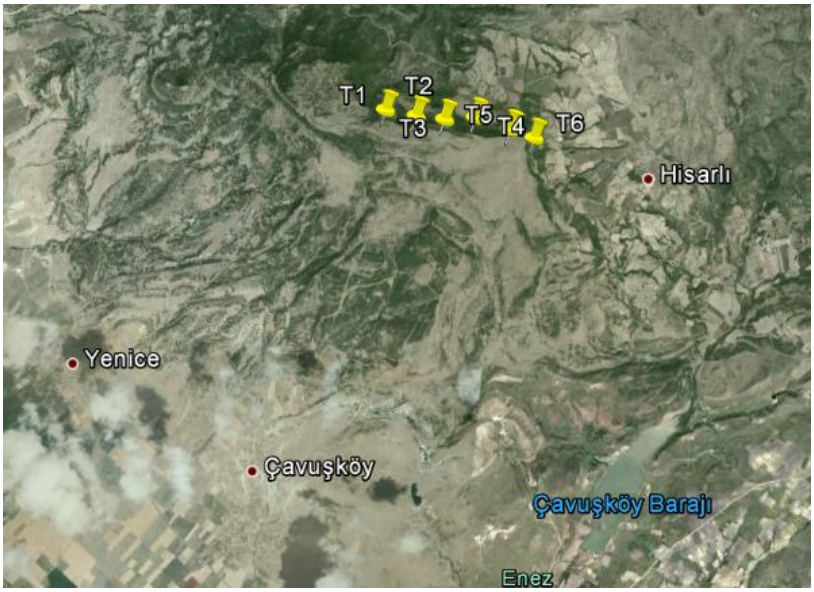


Figure.2. The project site marked with A.

A.2.3. City/Town/Community etc.

>>

The Turbine 6 is 1km away from Hisarlı Village, which is the nearest residential area. (Figure.3.)



A.2.4. Physical/ Geographical location

>>

Turbine No	Latitude (N)	Longitude (E)
T1	40° 43’ 19.2’’	26° 10’ 50.1’’
T2	40° 43’ 18.3’’	26° 11’ 2.8’’

T3	40° 43' 18.2"	26° 11' 13.7"
T4	40° 43' 19.6"	26° 11' 25.3"
T5	40° 43' 17.1"	26° 11' 39.2"
T6	40° 43' 15.3"	26° 11' 48.5"

A.3. Technologies and/or measures

>>

The project comprises installation of six NORDEX N90/2500HS kW wind turbine generators with 80 m hub height. As an all-round turbine in the 2.5 MW product line, the N90/2500 can be deployed at strong-wind sites. With different tower heights, it covers wind class IEC 1.

Rotor

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

Drive train

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

Gearbox

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

Generator

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

Cooling and filtration

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

Braking system

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

Nacelle

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

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

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

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

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

The lifetime of the turbines is 20 years.

A.4. Parties and project participants

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)	Boreas Enerji Üretim Sistemleri Sanayi ve Ticaret A.Ş. (private entity)	No

A.5. Public funding of project activity
>>
No public funding is applicable to the project activity

A.6. Debundling for project activity
>>
The following rule has been defined for debundling :

"A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point (4/CMP.1, Annex II, Appendix C, paragraph 2; EB 47, Annex 32, paragraph 2). "

The project is a standalone wind power plant, holding a separate generation licence. No other registered small-scale CDM project activity or an application to register another small-scale CDM project activity exists under the defined conditions above.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

>>

The emission reductions of the Project have been calculated in accordance with the approved small scale CDM-methodology AMS-I.D.: "Grid connected renewable electricity generation", version 17.0[1].

For baseline calculations the AMS-I.D refers to the

- "Tool to calculate the emission factor for an electricity system" version 02.2.1[2]
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion, version.2.0[3]

"Tool to calculate the emission factor for an electricity system" offers two options of which the Combined Margin (CM) approach has been chosen. The CM consists of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the above-mentioned tool.

B.2. Project activity eligibility

>>

The applicability criteria for CDM-methodology AMS-I.D. are listed and justified below:

1. *This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:1*
    a. *Supplying electricity to a national or a regional grid; or*
    b. *Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.*

The project is a renewable energy unit, wind power; supplying electricity to Turkish national grid.

2. *Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A2) applies is included in Table 2.*

Table 2: Applicability of AMS-I.D, AMS-I.F and AMS-I.A based on project types

	Project type	AMS-I.A	AMS-I.D	AMS-I.F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g. grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√
3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid17 system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√

[1] https://cdm.unfccc.int/UserManagement/FileStorage/TENOK8BM5U3AJIHQZ69YS7CPVDXG41
[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf
[3] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf

5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

The methodology is applicable to the projects supply electricity to a national/regional grid.

The project is a renewable energy generation unit utilizing wind power and supply to electricity to a national grid.

3. *This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition1; (c) involve a retrofit2 of (an) existing plant(s); or (d) involve a replacement3 of (an) existing plant(s).*

The project is installation of a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity.

4. *Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:*
    - *The project activity is implemented in an existing reservoir with no change in the volume of reservoir;*
    - *The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2;*
    - *The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.*

The project is not a hydropower plant.

5. *. In the case of biomass power plants, no other biomass types than renewable biomass are to be used in the project plant.*

The project is not a biomass power plant.

6. *If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.*

The project has only renewable component with an installed capacity equal to 15 MW.

7. *Combined heat and power (co-generation) systems are not eligible under this category.*

The project is not a combined heat and power system.

8. *In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.*

The project is not an additional to an existing renewable power generation facility.

9. *In case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.*

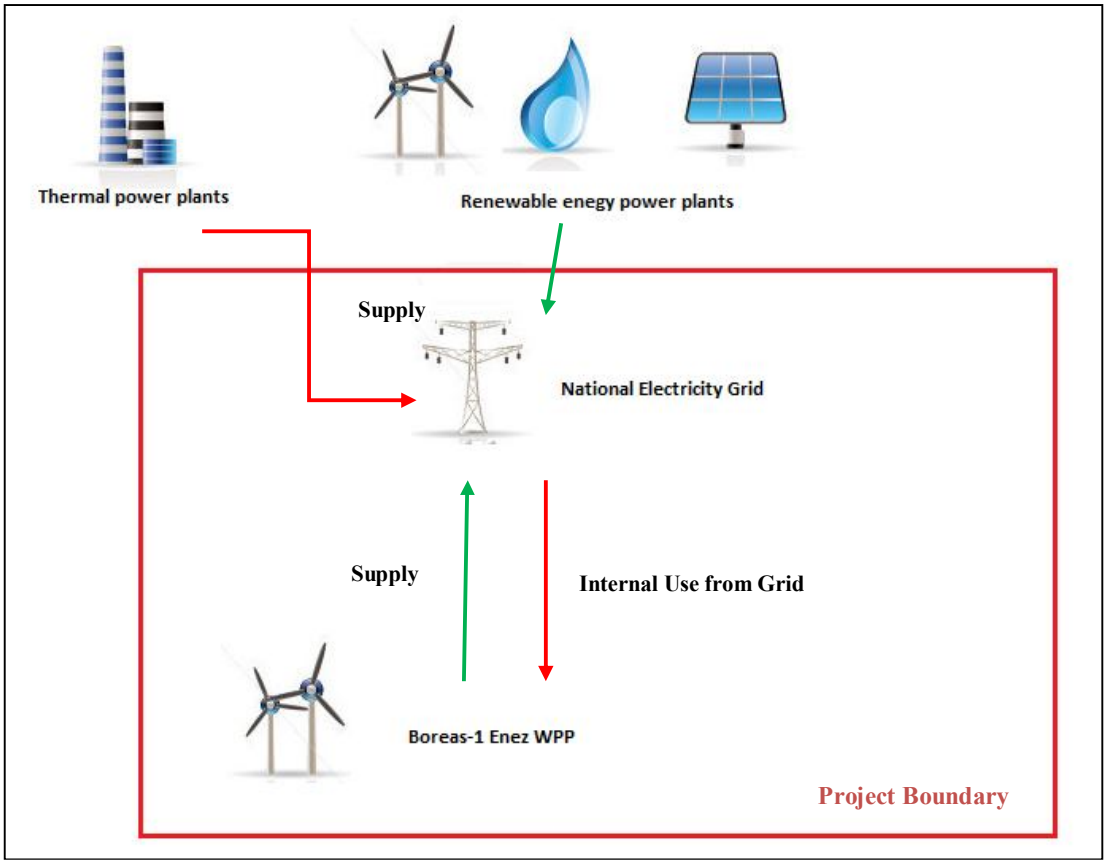
The project is not a retrofit or modification of an existing facility and is a newly built wind power plant.

B.3. Project boundary

>>

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

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



The greenhouse gases and emission sources included in or excluded from the Project boundary are compiled in Table.3. below:

Table.3. Emission sources included or excluded from the Project boundary.

Source		Gas	Included?	Justification / Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source. The dominant emissions from power plants are in the form of CO_2, therefore CO_2 emissions from fossil fuel fired power plants connected to the grid will be accounted for in baseline calculations.
		CH_4	No	Minor emission sources.

		N_2O	No	
Project Activity	Emissions as a result of Project Activity	CO_2	No	Not Applicable

B.4. Establishment and description of baseline scenario

>>

According to AMS I.D. (Version 17), if the project activity is the installation of a new grid-connected renewable power plant, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants and by the addition of new generation sources.

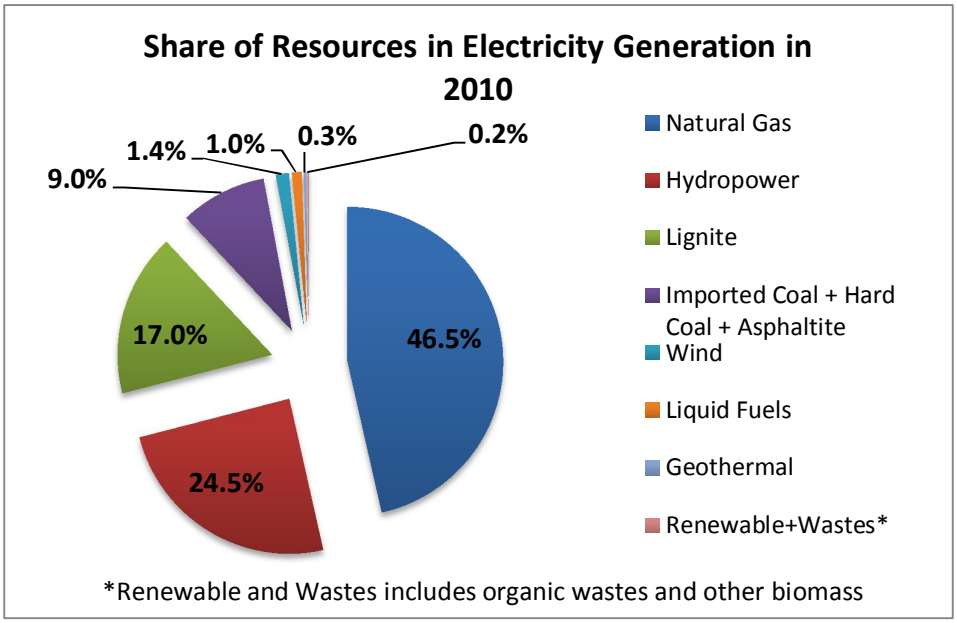
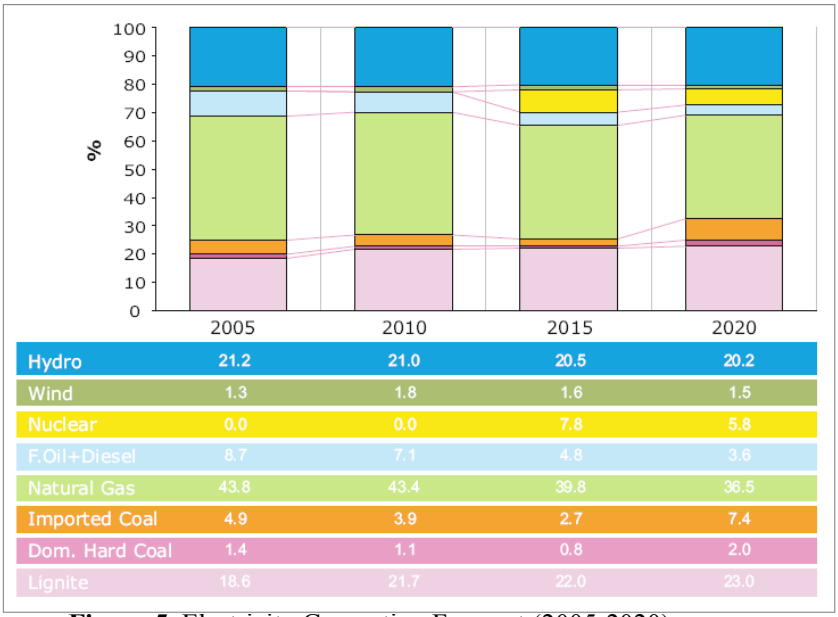


Figure.4. The share of resources for electricity generation.

The electricity generation is mainly done by fossil fuel fired power plants in Turkey. The share of resources in the electricity generation in Turkey has been shown in the Figure.4. 73.8% of the total electricity generation delivered by fossil fired power plants, i.e. natural gas, lignite, hard coal, imported coal, liquid fuels, renewables and wastes[4]. The contribution to annual electricity generation from wind power plants was only 1.4 %.

It is assumed that the energy generation profile of the country will not change and the weight of fossil fired power plants will remain the same during the crediting period. This assumption is based on the analysis presented in the First National Communication submitted by Turkey. The share of resources in generating capacity between 2005-2020 is shown in Figure.5.

[4] Annual report, Electricity Generation Company, 2009 (http:/www.euas.gov.tr/apk%20daire%20baskanligi%20kitapligi/YILLIK_RAPOR_2010.pdf)



	2005	2010	2015	2020
Hydro	21.2	21.0	20.5	20.2
Wind	1.3	1.8	1.6	1.5
Nuclear	0.0	0.0	7.8	5.8
F.Oil+Diesel	8.7	7.1	4.8	3.6
Natural Gas	43.8	43.4	39.8	36.5
Imported Coal	4.9	3.9	2.7	7.4
Dom. Hard Coal	1.4	1.1	0.8	2.0
Lignite	18.6	21.7	22.0	23.0

Figure.5. Electricity Generation Forecast (2005-2020)

The share of lignite and imported coal is expected to rise while the percentage of hydro power is also expected to slightly decreasing during the period. Thermal resources are expected to still comprise 72.5% of total capacity in 2020 in spite of the entrance of nuclear power into the calculation.[5]

B.5. Demonstration of additionality

The project went through first validation process started on 07-09/11/2009 with onsite audit untaken by ENÇEV and TÜVSÜD. The draft validation report was submitted to the project owner on 19/05/2011. The contracts with DOE and consultant were terminated on grounds that the project was not sufficiently analysed and the validation opinion was negative on additionality and prior consideration.

This version of the PDD discusses the additionality of the project on an Investment analysis basis, which is presented below. As it could be seen, the project is not financially attractive without VER revenue.

Prior consideration of the VER credits

The project was developed by Boreas Enerji and a feasibility study conducted for four different types of turbines on 2007 and Nordex N60 turbines, each having a capacity of 1300 kW, was selected to achieve a total installed capacity of 13 MWs. The electricity generation licence for the project was issued on 03/05/2007. The "EIA Not Required" decision per the submitted Project Description Report (pre-EIA) was issued on 17/07/2007 by Edirne Governance, Environment and Forest Directorate. The feasibility study was revised for the performance of the Nordex N90 turbines onsite on 19/03/2008, the installed capacity is increased to 15 MWs.

The loan proposal was given on 12/06/2008 and it would be effective only after the signature of turbine purchase agreement (EM contract) and finalization of reservation payment to the provider. The agreement includes a planned time schedule of the project implementation. According to this schedule, the turbine purchase agreement would be signed until 31/7/2008 and the first payment would be the reservation payment to Nordex on the same date. The construction was planned to begin on December 2008.

[5] Chapter.5.Projections and Mitigations Scenarios, First National Communication of Turkey on Climate Change, January 2007, (pg. 121-157) (http://www.undp.org.tr/Gozlem2.aspx?WebSayfaNo=627)

The project owner was aware of the carbon credits which most of wind power plants in Turkey benefitted. They got in contact with carbon consultants and made a meeting on 12/03/2008, however the meeting minutes was signed by one attendee as on 12/08/2008 by mistake. This was not submitted to DOE as evidence. No agreement has yet been finalized between the consultant and the project owner when the global financial crisis occurred on the last quarter of 2008. This caused delays in the planned time schedule of the project implementation. The board members re-considered the implementation of the project as the conditions of the loan proposal were to be revised by the bank in such a financial environment. They decided to speed up the carbon asset development to have the revenue from emission reduction credits (Board decision dated 04/09/2008). Again they got in contact with consultancy companies and ask for proposals.

The project owner signed the EM purchase agreement on 05/09/2008 before getting the bank loan in order to comply with the deadlines in the generation license. The completion date of the project was stated as 03/07/2009 on the generation license, which was lengthened to 03/09/2010 afterwards (approved by Energy Market Regulatory Authority on 28/01/2009). The turbine purchase contract was signed with the following financial conditions precedent:

1) A reservation payment for 5% of the Contract Price
2) A down payment for 15% of the Contract Price
3) An irrevocable stand-by bank letter of credit for 80% of the Contract Price

The reservation payment was done by the project owners' resources on 15/10/2008 to keep their turbine order active.

A proposal for carbon project development was received on 17/11/2008. However, no agreement for carbon asset development was signed until the loan was secured. The project owner could not realize the project with his own resources.

The bank made an amendment proposal with a higher interest rate (12%). The board of directors decided to sign the loan agreement on 15/12/2008. The down payment could be done on 26/01/2009 and then the EM contract was active (investment decision date). The project activities started afterwards (Table.4).

After evaluation of the proposals received, a consultancy agreement for VER development was signed on 10/04/2009. The local stakeholder meeting was held on 29/04/2009 in Enez. Another meeting for the stakeholder feedback consultation was held on 09/11/2009. There were no negative comments from the stakeholders during the period of construction. After all those obstacles, the project could be finalized and started operation on 09/04/2010.

The first consultancy agreement for carbon project development was signed on 10/04/2009 and the site visit with DOE was made on 07-09/11/2009. After a long evaluation period which has taken 19 months; the draft validation report was prepared with a negative opinion on 19/05/2011. The project owner objected to the report and requested a second review but it did not change the overall result. The contracts with DOE and consultant were terminated on grounds that the project was not sufficiently evaluated. The project status was "Listed" in GS registry and Stakeholder Feedback Round was run by the first consultant. Another consultant has been hired on 30/11/2011 and a new DOE was agreed on 19/04/2012. The second assessment of the additionality is based on investment analysis. The investment conditions are re-evaluated as the global financial crisis changed the project agenda and implementation chronology.

Table.4. Time schedule of the project development

	Activity	Date
1	Feasibility study completed	2007
2	License	03/05/2007
3	EIA exemption letter	17/07/2007
4	Feasibility study revised	19/03/2008
5	Proposal for loan agreement (active with EM contract)	12/06/2008
6	Board decision for carbon asset development	04/09/2008
7	Contract agreement with EM supplier –conditional (active with down payment)	05/09/2008
8	The reservation payment for EM supplier	15/10/2008
9	Proposal for carbon asset development	17/11/2008
10	Board decision to sign the loan agreement	15/12/2008
11	The down payment done and EM contract activated (investment decision date)	26/01/2009
12	The completion date of the project lengthened to 03/09/2010	28/01/2009
13	Micrositing report completed	January 2009
14	Construction agreement for switchyard	17/02/2009
15	Consultancy agreement for VER development	10/04/2009
16	Construction agreement for the site preparation	27/04/2009
17	Agreement for cabling works	30/04/2009
18	Stakeholder meeting	29/04/2009
19	Construction agreement for turbine foundations	01/06/2009
20	Four turbine locations changed	11/09/2009
21	Site visit with the first DOE	07-09/11/2009
22	Stakeholder Feedback Round Meeting	09/11/2009
23	Commissioning date	09/04/2010
24	Second consultancy agreement with another company	30/11/2011
25	Draft validation report by the first DOE.	19/05/2011
26	Agremeent with another DOE.	19/04/2012
27	Site visit with the second DOE.	09/07/2012

The project start date (investment decision date) is accepted as the date of the down payment made on 26/01/2009 which has validated the EM contract. As it could be seen from the time schedule presented Table.4. above, the real action of the project started afterwards. The Micro-siting report was finalized on January 2009. The first construction agreement was signed on 17/02/2009. The consultancy agreement for VER development was also signed on 10/04/2009. It could be concluded that the project owner has not the capacity to do the project by their own financial resources, i.e. to afford the turbine purchase agreement or construction expenses. Therefore, the down payment done and activation of EM contract should be taken the first real action for the project realization, i.e. investment decision date.

Demonstration of additionality

The small scale methodology refers to the guidelines in Attachment A to Appendix B for the assessment of additionality. According to the requirements of Gold Standard procedures, for the demonstration of additionality, "Tool to for the Demonstration and Assessment of Additionality Version 6.0.0" should be applied to the projects regardless of size, type and stream applied for (Toolkit, section 2.3. Additionality assessment). The tool also complies with Attachment A to Appendix B which is referred in the methodology (AMS-I.D).

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

Sub-step 1a: Define alternatives to the project activity:
The project owner is a small company who would like to focus on renewable energy projects and the project is their first investment. The alternatives are defined related to the investor as per footnote 7 of the version 6.0.0 of the additionality tool[6]:

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

2) *Building a new power plant utilizing other renewable resource:* The Electricity Market License Regulation gives priority to local resources with low environmental impact to generate electricity[7] and therefore other renewable resources are considered as alternatives to the project.

   No rivers with continuous flow regime exist in the project site. The nearest river to the project site is Meriç River which is 4.5 kms far away. The river flows through Bulgaria, Greece and Turkey (EIA study, page 18). The project proponent did not consider building a hydropower plant with the same capacity (15MW) as the flow regime is not stable. In addition, wind power plants are considered to be more environmental friendly as no land use activities are affected by their operation. There are 5 dams and a number of lagoons built and operated by government for the purpose of irrigation and regulating flow but no facility exists for electricity generation yet (State Hydraulic Works).[8]

   Geothermal resources eligible for electricity generation are located on the West of the country and there are three power plants operational in that region. Using solar power or biomass for electricity generation is still in the infancy state in Turkey. There are no solar or biomass power plants in Turkey[9] due to insufficient incentives.

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

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

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

Sub-step 1b: Consistency with mandatory laws and regulations:
All alternatives to the project activity are in compliance with the existing laws and regulations which are described below in Table .5.

[6] As per footnote 7 of the version 6.0.0 of the additionality tool
[7] Sub-clause (5 a) of Article.9 (http://www.epdk.gov.tr/index.php/elektrik-piyasasi/mevzuat?id=74)
[8] http://www2.dsi.gov.tr/bolge/dsi11/edirne.htm
[9] Ek-1: Mevcut Sistem (http://212.175.131.171/projeksiyon/KAPASITEPROJEKSIYONU2011.pdf)

Table.5. Relevant laws and regulations applicable to the project and alternatives

Relevant Laws	Number / Enactment Date	Aim and Scope
Environmental Law[10] *Environmental Impact Assessment Regulation[11]	Nr. 2872 / 17/07/2008	The approval is requested for power plants from Ministry of Environment and Forest as Electricity Licence Regulation requests project to be in line with the environmental law.
Electricity Market Law[12] *Electricity Licence Regulation[13] *Electricity Market Balancing and Conciliation Regulation[14]	Nr. 4628 / 03/03/2001	Regulating procedures of electricity generation, transmission, distribution, wholesale, retail for legal entities. Two regulations issued under the law; one for generation licence and the other for market price balancing and conciliation.
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy[15]	Nr. 5346 / 18/05/2005	Aims to extend the utilization of renewable energy for electricity generation and identifies method and principles for power generation from renewable resources in an economical and conservative manner as well as certification of the electricity generated from renewable resources.
Energy Efficiency Law[16]	Nr. 5627 / 02/05/2007	Identifies method and principles for industry, power plants, residential buildings and transport to imply necessary measures for energy efficiency during electricity generation, transmission, distribution and consumption.

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

Step 2 - Investment analysis

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

***Sub-step 2a* - Determine appropriate analysis method**

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

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

[10] http://www.mevzuat.adalet.gov.tr/html/631.html
[11] http://www.cedgm.gov.tr/CED/AnaSayfa/yonetmelikler.aspx?sflang=tr
[12] http://www2.epdk.gov.tr/mevzuat/kanun/elektrik/elektrik.html
[13] http://www.epdk.gov.tr/index.php/elektrik-piyasasi/mevzuat?id=74
[14] http://www.epdk.gov.tr/index.php/elektrik-piyasasi/mevzuat?id=36
[15] http://www.epdk.gov.tr/index.php/elektrik-piyasasi/mevzuat?id=143
[16] http://mevzuat.dpt.gov.tr/kanun/5627.htm

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

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

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

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

World Bank loan reports

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

Weighted Average Cost of Capital

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

Calculation of Cost of Equity:

In order to calculate the cost of equity, the approach presented in the paper "Estimating equity Risk Premiums" by Prof. Damodaran is taken[18]. He is a Professor of Finance at the Stern School of Business at Newyork University and well known as author of several widely used academic and practitioner texts on Valuation, Corporate Finance and Investment Management. Most of the parameter used in calculations are taken from the data presented in his web site.

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

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

[17] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/05/11/000333037_20090511030724/Rendered/PDF/468080PAD0P112101Official0Use0Only1.pdf (Annex.11, Article 29, page 80)

[18] http://pages.stern.nyu.edu/~adamodar/pdfiles/papers/riskprem.pdf

1) Choice of Risk free rate:

It is stated in the referenced paper that the risk free rate chosen should match up with the duration of the cashflows being discounted and long-term default free government bond rate are generally preferred in corporate finance and valuation. Therefore,the risk free rate is taken from the lowest yielding bonds in the particular market, i.e. government bonds. The rate of Eurobond XS0285127329 with a due date 02.04.2019 has been chosen as the duration of the cash flow is 10 years. The historical yield values are not available on the investment decision date 26/01/2009. The nearest yield rate could be found in Trust Bank (www.trust.ru) and dated 14/11/2008for [19]. The yield was 9.26 % at the time of the report and has been taken as the risk free rate.

2) Choice of beta:

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

3) Choice of Equity Risk Premium:

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

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

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

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

$$\text{Cost of Equity}_{\text{before tax}} = \text{Cost of Equity}_{\text{after tax}} / (1 - T_c)$$

Where T_c is average business revenue tax.

The following parameters are used for calculation:

Parameter	Value	Source
Risk free rate	9.26%	Long term Eurobond yield, (XS0285127329) on 14/11/2008
Beta	0.778	Beta for electricity market in Turkey in 2008, Bloomberg
Country Risk	12.88%	Prof. Damodaran, Risk Premium for Other Markets, 2008, Total Risk Premium for Turkey[20]
Expected Cost of Equity	19.28%	Calculated as after tax
T_c	20%	Average business revenue tax
Expected Cost of Equity	24.10%	Calculated as before tax

[19] http://www.isbank.com.tr/programs/fonlar/Aylik200901817.htm
[20] http://www.stern.nyu.edu/~adamodar/pc/archives/ctryprem08.xls s

Calculation of Cost of Debt:

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

Calculation of WACC:

The Weighted Average Cost of Capital (WACC) for the project has been calculated by the following formula[21]:

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

The parameters are defined below:

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

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

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

The "Guidance for the assessment of investment analysis"[22] implies that:
*"6. **Guidance:** Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant.* "

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

Table .6. Summary of financial data

Input Name	Input value	Reference document	Page number	Date of document
Expected electricity generation (P90 value for 20 years)	52,742 MWh	Micrositing report	12	January 2009
Total investment	21,300,000 EUR	Loan agreement -conditional	1	12/06/2008, amended on 24/10/2008
Own capital	3,200,000UR	Calculated		

[21] http://www.investopedia.com/terms/w/wacc.asp#axzz2CDF1Yzdb
[22] http://cdm.unfccc.int/Reference/Guidclarif/reg/reg_guid03.pdf

Debt	18,100,000 EUR	Loan agreement -conditional	1	Payback Schedule 26/01/2009
Interest rate	12%	Loan agreement-amendment	Article 6	24/10/2008
Operation Cost for 20 years	1.2 EUR/MWh	Wind Power Economics, EWEA Report[23]	4	2003
Feed-in tariff	5.5 EURcent	Renewable Energy Law Nr. 5346[24]	Article6 (c)	10/05/2005
Expected VER price	7 EUR/tonne[25]	State of Voluntary Carbon Markets 2012[26]	56	May 2012

In planning and financing stage of a wind farm project a risk assessment is required quantifying all risks related to the wind farm financing (technical due diligence). The result of an energy yield prediction in terms of an AEP (Annual Energy Production) is called the P50. The probability of reaching a higher or lower annual energy production is 50:50. A risk assessment includes the quantification of the project specific uncertainties and whole range of exceedance probabilities of the wind farm's annual energy production.P75 is the annual energy production which is reached with a probability of 75%. The risk that an annual energy production of P90 is not reached is 10%. Both values are widely used by banks and investors as base in their financing decisions[27].

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

The capacity factor for Edirne Province could also be found on webpage of General Directorate of Renewable Energy[28]. The highest capacity is 40% in the given map.

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

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

Sub-step 2d - Sensitivity Analysis

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

---

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

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

[25] The average VER price for Turkish credits was $8/tonne in 2011; which is approximately 6.5 EUR/tonne. As Boreas is a small scale project, the expected price has been taken a little bit higher as 7 EUR/tonne .

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

[27] http://www.dewi.de/dewi/fileadmin/pdf/publications/Magazin_28/07.pdf

[28] http://www.eie.gov.tr/YEKrepa/EDIRNE-REPA.pdf

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

For a range of ±10% fluctuations in parameters above, Table.7. below have been obtained.

Table.7.a Sensitivity analysis for the Project IRR with P90

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

Table.7.b Sensitivity analysis for the Project IRR with P75

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

The project IRR becomes 9.76% for P90 with a 10% decrease in investment costs. The investment cost should be 29% lower than the actual expenses to hit the benchmark of 13.82% which is not a realistic case.

The project IRR is 10.94% for P75 with 10% decrease in investment cost and 11.3% with 10% rise in the electricity price. It should be 22.5% lower to hit the benchmark.

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

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

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

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

Step 3: Barrier analysis

This step is not implemented for the project.

Step 4: Common practice analysis

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

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

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

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

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

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

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

Table.8. The power plants within the scope of common practice[29]

	Project Name	Type	Capacity	Project Generation	Firm Generation	Owner
1	Seyhan II	Hydropower	7.5	33	7	EUAS
2	Aksu (Çayköy)	Hydropower	16	35	35	BOT
3	Berdan (Alarko)	Hydropower	10	44	44	BOT
4	Fethiye	Hydropower	16.5	88	88	BOT
5	Gaziler (Iğdır)	Hydropower	11.2	51	51	BOT
6	Girvelik-II/Mercan	Hydropower	11	39	39	BOT
7	Gönen	Hydropower	10.6	48	48	BOT
8	Hasanlar (Alarko)	Hydropower	9.6	42	42	BOT
9	Kısık (Ayen Enerji)	Hydropower	9.6	34	34	BOT
10	Tohma Medik (Alarko)	Hydropower	12.5	58	58	BOT

[29] Capacity Projection Report, 2009-2018, pages (85-97), http://212.175.131.171/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf

11	Bores	Wind	10.2	31	31	BOT
12	Aksen (Gaziantep)	Fuel oil	21.1	168	168	Autoproducer
13	Akdeniz Sefa (Silifke)	Fuel oil	20	_	_	Autoproducer
14	Milda Kağıt (Aksu Seka)	Fuel oil	8	20	20	Autoproducer
15	Ak tekstil-1 (Gaziantep)	Fuel oil	13	87	87	Autoproducer
16	Albayrak Turizm (Balıkesir Seka)	Fuel oil	9.3	56	56	Autoproducer
17	Oyka Kağ. (Çaycuma Seka)	Fuel oil	10	70	70	Autoproducer
18	GAP İnş. (Çay Seka Afyon)	Fuel oil	8	60	60	Autoproducer
19	Habaş (Bilecik)	Fuel oil	18	144	144	Autoproducer
20	Isparta Mensucat	Fuel oil	10.7	85	85	Autoproducer
21	Kırka Boraks (kırka)	Fuel oil	8.2	32	32	Autoproducer
22	Polinas (Manisa)	Fuel oil	10	75	75	Autoproducer
23	Eti Alüminyum (S.Şehir)	Fuel oil	11.9	35	35	Autoproducer
24	Tüpraş (Batman)	Fuel oil	10.3	72	72	Autoproducer
25	Tire-Kutsan (Tire)	Fuel oil	8	37	37	Autoproducer
26	Tüpraş (Batman)	Diesel Oil	10.3	72	72	Autoproducer
27	Eti Maden (Bandırma Boraks)	Lignite	10.7	78	78	Autoproducer
28	Eti Bor (Emet)	LPG	10.4	82	82	Autoproducer
29	Ege Birleşik Enerji	LPG	12.8	107	107	Autoproducer
30	Goodyear (Adapazarı)	LPG	9.6	79	79	Autoproducer
31	Orta Anadolu Mensucat	LPG	10	65	65	Autoproducer
32	Menderes Teks. (Akça Enerji)	Naphta	18.7	140	140	Autoproducer
33	Desa (Işıklar)	Naphta	10.6	70	70	Autoproducer
34	Mensa Mensucat	Naphta	10.4	85	85	Autoproducer
35	Toros (Mersin)	Naphta	12.1	96	96	Autoproducer
36	Akbaşlar	Natural gas	8.7	73	73	Autoproducer
37	Amylum Nişasta (Adana)	Natural gas	14.3	80	80	Autoproducer
38	Arenko (Denizli)	Natural gas	12.7	101	101	Autoproducer
39	Aydın Örme	Natural gas	7.5	60	60	Autoproducer
40	Baydemirler (beylikdüzü)	Natural gas	9.3	77	77	Autoproducer
41	Denizli Çimento	Natural gas	14	113	113	Autoproducer
42	Hayat Kağıt San.	Natural gas	7.5	56	56	Autoproducer
43	Hayat temizlik	Natural gas	15	94	94	Autoproducer
44	İgsaş (Yarımca)	Natural gas	11	76	76	Autoproducer
45	İsko (İnegöl)	Natural gas	9.2	63	63	Autoproducer
46	Kaleseramik (Çan. Seramik+Kalebodur)	Natural gas	21.6	157	157	Autoproducer
47	Kastamonu Entegre	Natural gas	7.5	48	48	Autoproducer
48	Koruma Klor	Natural gas	9.6	77	77	Autoproducer
49	Küçükçalık Tekstil	Natural gas	8	64	64	Autoproducer
50	Maksi Enerji (Hamoğlu)	Natural gas	7.7	62	62	Autoproducer
51	Marmara Pamuk	Natural gas	8.7	71	71	Autoproducer
52	MB Şeker Nişasta San. (Aksaray)	Natural gas	8.8	60	60	Autoproducer
53	Mercedes Benz	Natural gas	8.3	68	68	Autoproducer

54	Sarkuysan (Tuzla)	Natural gas	7.7	60	60	Autoproducer
55	Yılfert (Tügsaş Gemlik Güb.)	Natural gas	8	50	50	Autoproducer
56	Yalova Elyaf	Natural gas	12.3	_	_	Autoproducer
57	Yongapan (Kastamonu)	Natural gas	9.7	61	61	Autoproducer
58	Yurtbay (Eskişehir)	Natural gas	7.8	62	62	Autoproducer
59	Bandırma Asit	Other	11.5	88	88	Autoproducer
60	Bandırma Bağfaş	Other	10	57	57	Autoproducer
61	Ak Enerji (Yalova) İzole	Naphta	21	173	173	Private Owner
62	Ak Enerji (Debla Denizli)	Naphta	15.6	_	_	Private Owner
63	Ak Enerji (Yalova Akal)	Natural gas	10.4	85	85	Private Owner
64	Ak Enerji (Uşak OSB)	Natural gas	15.2	_	_	Private Owner
65	Berk Enerji (Kurtköy)	Natural gas	14.8	104	104	Private Owner
66	Boz Enerji	Natural gas	8.7	60	60	Private Owner
67	Metem Enerji (Hacışıramat)	Natural gas	7.8	58	58	Private Owner
68	Metem Enerji (Peliklik)	Natural gas	11.7	89	89	Private Owner
69	Noren Enerji	Natural gas	8.7	70	70	Private Owner
70	Zorlu Enerji (Yalova)	Natural gas	15.9	122	122	Private Owner
71	ITC-KA Enerji Mamak	Waste	19.8	150	140	Private Owner
72	PS3-A-1	Fuel oil	11.4	80	80	Private Owner
73	Van Engil Gaz (Zorlu Enerji)	Diesel Oil	15	75	75	Private Owner
74	Bereket (Feslek)	Hydropower	9.5	41	41	Private Owner
75	Bereket (Gökyar)	Hydropower	11.6	43	43	Private Owner
76	Alp Elektrik (Tınaztepe)	Hydropower	7.7	29	17	Private Owner
77	Cansu Elektrik (Artvin)	Hydropower	9.2	47	31	Private Owner
78[a]	Çaldere Elektrik (Dalaman)	Hydropower	8.7	35	25	Private Owner
79[b]	Hamzalı HES (Turkon MNG)	Hydropower	16.7	117	66	Private Owner
80	HGM Enerji (Keklicek)	Hydropower	8.7	18	11	Private Owner
81	İç-En Elektrik (Çalkışla)	Hydropower	7.7	18	11	Private Owner
82	Kalen Enerji (Kalen II)	Hydropower	15.7	50	28	Private Owner
83	Sarmaşık I Hes (Fetaş Fethiye)	Hydropower	21	96	54	Private Owner
84	Sarmaşık II Hes (Fetaş Fethiye)	Hydropower	21.6	108	61	Private Owner
85	Enerjisa (Aksu-Şahmallar)	Hydropower	14	45	7	Private Owner
86	Enerjisa (Sugözü-Kızıldüz)	Hydropower	15.4	55	8	Private Owner
87	İçtaş Yukarı Mercan	Hydropower	14.2	44	20	Private Owner
88	Özgür Elek. K.Maraş Tahta Hes	Hydropower	12.5	54	54	Private Owner
89	Tektuğ-Kalealtı Hes	Hydropower	15	52	11	Private Owner
90	Yapısan Hacılar	Hydropower	13.3	90	54	Private Owner
91	Beyköy	Hydropower	16.8	87	87	Private Owner
92	Kuzgun	Hydropower	20.9	36	0	Private Owner
93	Tercan	Hydropower	15	51	28	Private Owner
94	Çıldır	Hydropower	15.4	30	20	Private Owner
95	İkizdere	Hydropower	18.6	110	100	Private Owner
96	Mercan	Hydropower	20.4	78	48	Private Owner

97[a]	Doğal Enerji (Burgaz)	Wind	14.9	48	43	Private Owner
98[a]	Denizli Elek. (Karakurt-Akhisar)	Wind	10.8	28	24	Private Owner
99[a]	Baki Elektrik Şamlı Rüzgar	Wind	21	104	92	Private Owner
100[a]	Datça RES	Wind	8.1	24	19	Private Owner
101[b]	Menderes Jeotermal	Geothermal	8	56	56	Private Owner
102	Zorlu Enerji Denizli Jeotermal	Geothermal	15	105	105	Private Owner

[a] VCS project
[b] GS project

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

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

- Energy Fund was established by the government in order to subsidise the financial difficulties faced by the companies.
- Guarantee Contract was signed between the Under-secretariat of Treasury and the investment companies on the terms that the electricity will be purchased by Treasury in case the producer could not sell it to any governmental institution.
- Those purchase contracts may be up to 99 years for BOTs and 20 years for BOs[30].

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

Bores WPP differs with investment climate. The plant was operational on June 2000 and had no chance to apply for any carbon scheme[31]. Therefore, the wind power plant was also eliminated from the list.

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

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

The F factor is smaller than 0.2 and $N_{all}-N_{diff}$ =95-95= 0, which is smaller than 3.

Outcome of Step 4: Boreas- is not a common practice in the country.

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

[30] http://www.mevzuat.adalet.gov.tr/html/699.html (Geçici Madde 2)
[31] http://www.demirer.com.tr/santral/bores/index.html

B.6. Emission reductions

B.6.1. Explanation of methodological choices

>>

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

$$ER_y = BE_y - (PE_y + LE_y) \quad (10)$$

Where:

ER_y: Emission reductions achieved by the project activity in year y (tCO_2e).

BE_y: Baseline Emission in year y (tCO_2e).

PE_y: Project Emission in year y (tCO_2e).

LEy: Leakage Emissions in year y (tCO_2e).

Baseline Emission

The baseline emissions are the product of electrical energy baseline *EGBL*, *y* expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor:

$$BE_y = EG_{BL,y} * EF_{CO2,grid,y} \quad (1)$$

where :

$EF_{CO2,grid,y}$: CO_2 emission factor of the grid connected power generation in year y (tCO_2/MWh)

$EG_{BL,y}$: Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

The Emission Factor can be calculated in a transparent and conservative manner as follows:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the 'Tool to calculate the emission factor for an electricity system'(version 02.2.0).

OR

(b) The weighted average emissions (in kg CO_2/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The data on the current generation mix is not available; therefore method (a) is adopted to calculate the combined margin emission factor.

The emission factors are calculated as described in the "Tool to calculate the emission factor for an electricity system" (version 02.2.1) as following seven steps:

Step 1. Identify the relevant electric power system

The project is connected to the national grid, so the project electricity system is the national grid which includes the project site and all power plants physically connected to the grid. Each power plant can be dispatched without significant transmission constraints from the central grid (Figure.8).

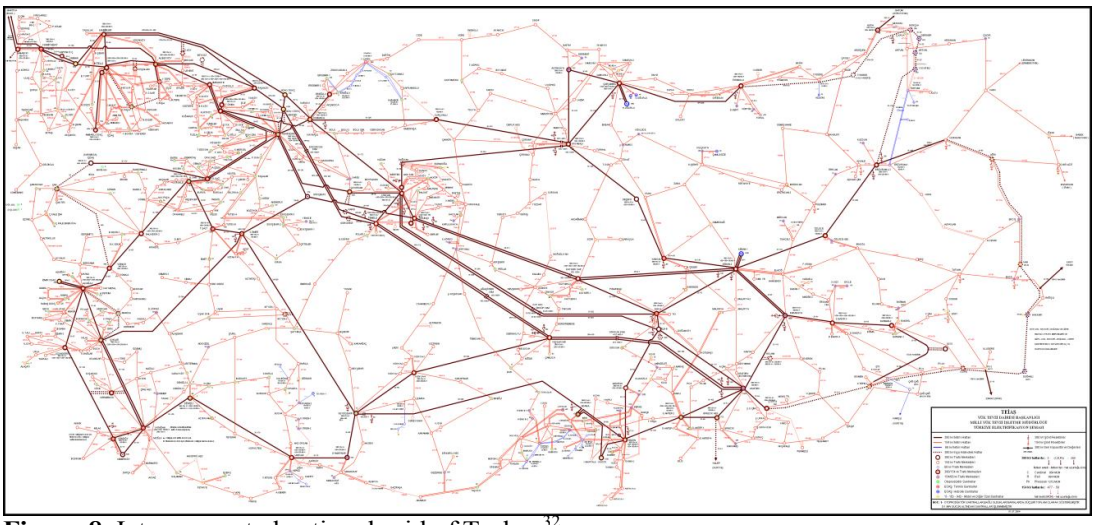


Figure.8. Interconnected national grid of Turkey[32]

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

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)
Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

Option I is chosen.

Step 3. Select an operating margin (OM) method
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM

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

The Simple OM method (a) can only be used if low-cost/must run resources constitute less than 50% of total grid generation in:
1) average of the five most recent years, or
2) based on long-term averages for hydroelectricity production.

There is no nuclear plant in Turkey and hydro, wind and geothermal facilities are only renewable sources utilized for electricity. There is no indication that the coal fired power plants are accepted as the low cost

[32] http://www.geni.org/globalenergy/library/national_energy_grid/turkey/turkishnationalelectricitygrid.shtml

/must run. Table.9. below shows the share of hydro and renewable resources in electricity generation for the five most recent years (2007-2011) and it is below 50% of the total grid generation.

Table.9. Share of primary sources in electricity generation, 2007 – 2011[33]

YEAR	THERMAL		HYDRO		GEOTHERM.WIND		TOTAL
	GWh	%	GWh	%	GWh	%	GWh
2007	155,196.2	81,0	35,850.8	18.7	511.1	0.3	191,558.1
2008	164,139.3	82.7	33,269.8	16.8	1,008.9	0.5	198,418.0
2009	156,923.4	80.5	35,958.4	18.5	1,931.1	1	194,812.9
2010	155,827.6	73.8	51,795.5	24.5	3,584.6	1.7	211,207.7
2011	171,638.3	74.8	52,338.6	22.8	5,418.2	2.4	229,395.1

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

- Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

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

Based on the most recent data available, ex- ante option is chosen.

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

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

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

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.

As the data on each power plant/unit is not publicly available and renewable power generation are considered as low-cost/must-run power sources, Option B is selected. Off-grid power plants are not included in the calculations.

[33] Annual Development of Turkey's Installed Capacity and Generation in Turkey (1970-2011), (www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls)s)

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y})}{EG_y} \quad (6)$$

Where:

$EF_{grid,OMsimple,y}$: Simple operating margin CO2 emission factor in year y (tCO2/MWh)
$FC_{i,y}$: Amount of fossil fuel type i consumed in the project electricity system in year y(mass or volume unit)
$NCV_{i,y}$: Net calorific value(energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$: CO2 emission factor of fossil fuel type i in year y(tCO2/GJ)
EG_y : Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y(MWh)
i : All fossil fuel types combusted in power sources in the project electricity system in year y
y : The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option).

Step 5: Identify the group of power units to be included in the build margin

1) Identification of the available data

The sample group of power units *m* used to calculate the build margin consists of either:
a) The set of five power units that have been built most recently, or
b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

There is not sufficient data available about the power plants built most recently. Annual capacity addition are reported as whole sum of thermal, geothermal+wind and hydro power in MWs with estimated annual electricity generation for the recent three years (2009[34], 2010[35] and 2011[36]) but no plant based information on the net electricity generated for operating years is available. The annual projection reports prepared by TEIAS includes the list of power plants operational with project annual generations, however the exact generation achieved by the power plants are different. The annual electricity generation expected from a power unit depend on various factors like the demand, fuel prices or weather conditions and therefore differs from the projected generation stated in the mentioned report.

The deficiency in the data has been eliminated by a methodology deviation has been proposed for China and accepted by the Executive Board[37]. As Executive Board accepted the following deviations:

1. Use of capacity additions during last 1~3 years for estimating the build margin emission factor for grid electricity;
2. Use of weights estimated using installed capacity in place of annual electricity generation.

The Board suggest the following when applying the deviation:

[34] Generation Units Put Into Operation and Out of Operation in 2009 (http://www.teias.gov.tr/istatistik2009/8.xls)
[35] Generation Units Put Into Operation and Out of Operation in 2010 (http://www.teias.gov.tr/istatistik2010/%C4%B0statistik%202010.htm)
[36] Generation Units Put Into Operation and Out of Operation 2011 (http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kguc(1-12)/8.xls)
[37] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

- Use of efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM)

The tool to calculate the emission factor for an electricity system states to select either the 5 most recent power units or the units that comprise at least 20% of the system generation, excluding registered CDM projects. As the use of weights estimated using installed capacity in place of annual electricity generation will be implemented, 20% of the total installed power units in 2011 will be included in BM calculations.

2) Exclusion of the registered VER projects

As per the tool, the projects registered as voluntary emission reduction are excluded from the group of projects:

"Power plant registered as CDM project activities should be excluded from the sample group m."

The following projects, operational between 2006-2011, are excluded from the list[38]:

No	Project Name	Capacity (MW)	Operation date	Registered as
1	Kemerburgaz Wind Farm	24	2008	GS503
2	Dares Datça Wind Farm	29.6	2008	GS438
3	Akbük Wind Farm	31.5	2009	GS436
4	Alize Camseki Wind Farm	20.8	2009	GS399
5	Keltepe Wind Farm	20.7	2009	GS437
6	Mazi-3 Wind Farm	30.0	2009	GS388
7	Anemon Intepe Wind Farm	30.4	2007	GS347
8	Burgaz Wind Farm	14.9	2007	GS439
9	Sayalar Wind Farm	34.2	2008	GS369
10	Catalca Wind Power	60	2008	GS367
11	Mare Manastir Wind Farm	39.2	2006	GS368
12	24 MW Bandırma 3 WPP	24	2010	GS683
13	Belen WPP	30	2010	GS390
14	Düzova 30 MW WPP	30	2010	GS672
15	Senbuk 15 MW WPP	15	2010	GS733
16	Turguttepe 24 MW WPP	24	2010	GS610
17	Ziyaret 57.5 MW WPP	57.5	2010	GS617
18	Yuntdağ WPP	42.5	2010	GS352

[38] GS registry (https://gs2.apx.com/myModule/rpt/myrpt.asp?r=111)
Markit registry (http://mc.markit.com/br-reg/public/index.jsp?s=cp)

19	Ayyıldız WPP	15	2010	GS634
20	Kores Kocadağ WPP	15	2010	GS601
21	Kuyucak WPP	25.6	2010	GS576
22	Sarıkaya WPP	28.8	2010	GS577
23	Dora II 9.5 MWe GES	9.5	2010	GS445
24	Selimoğlu HEPP	9.3	2009	GS635
25	Hamzali HEPP	16.7	2010	GS633
26	Kale HPP	9.75	2010	GS637
27	Tuzla 7.5 MW GES	7.5	2010	GS353
28	Mamak Landfill Waste Management Project	19.8	2007	GS440
29	Yavuz HEPP	22.5	2010	GS651
30	Seyitali WPP	30	2011	GS578
31	Samurlu WPP	30	2012	GS579
32	Kozbeyli WPP	30	2012	GS580
33	Karaburun WPP	120	2010	GS597
34	Geycek WPP	150	Under construction	GS608
35	Sayan HEPP	14.9	2011	GS730
36	Günayse HEPP	8.45	2009	GS636
37	Darca HEPP	9.6	2011	GS887
38	Çanakkkale WPP	30	2010	GS906
39	Bulam HEPP	7	2010	GS642
40	Reşadiye-1 HEPP	16	2010	GS643
41	Zeytineli WPP	50	2012	GS845
42	Maren GES	39	2011	GS861
43	Çataloluk HEPP	9.5	2010	GS872
44	Çataltepe WPP	16	2011	GS574
45	Poyraz WPP	54.9	2012	GS575
46	Akres WPP	43.75	2011	GS955
47	Söke –Çatalbük WPP	30	2010	GS653
48	Soma WPP	90	2010	GS655
49	Samsun Landfill gas to energy	4.8	2011	GS935
50	Aliağa WPP	90	2010	GS735
51	Karakurt Wind Farm	10.8	2007	VCS66
52	OsmaniyeWPP	135	2010	GS474
53	Soma-Polat WPP	140.1	2012	GS398
54	Alize-Çamseki	20.8	2009	GS399
55	Bares-II Wind Farm	30.0	2006	VER + 52-1
56	Sebenoba Wind Farm	20.0	2008	VER + 0002 (being transferred to VCS

57	Ayrancılar HEPP	28	2011	VCS610
58	Doğançay HEPP	30.24	2012	VCS942
59	Doruk HEPP	28.28	Under construction	VCS943
60	Feke-1 HEPP	29.4	2011	VCS538
61	Güllübağ HEPP	96	2011	VCS043
62	Keban HEPP	5	2007	VCS573
63	Koyulhisar HEPP	63	2009	VCS855
64	Menge HEPP	85	2011	VCS616
65	Otluca HEPP	46	2011	VCS858
66	Pirinçlik HEPP	21.3	2012	VCS969
67	Saraçbendi HEPP	23.67	2011	VCS941
68	Sariguzel HEPP	98.88	Under construction	VCS962
69	Sefaköy HEPP	33.11	2011	VCS910
70	Yeşil HEPP	14	2010	VCS977
71	Yokuşlu-Kalkandere HEPP	42.33	2011	VCS1296
72	Yazı HEPP	1.1	2010	VCS613
73	Yaylabel HEPP	5.1	2010	VCS612
74	Çaldere HEPP	8.9	2008	VCS363
75	Kargilik Hydropower Plant	24	2006	VCS264
76	Kalealti Hydropower Plant	15	2006	VCS111
77	Darıca-1 Hydropower Plant	99	2009	VCS506
78	Menderes Geothermal Power plant (Dora-1 GES)	8.0	2008	VCS120
79	Ulubat HEPP	97	2010	VCS540
80	Cevizlik HEPP	91.4	2010	VCS891
81	Sirma HEPP	5.9	2010	VCS649
82	Lamas HEPP	35.7	2010	VCS841
83	Değirmenüstü HEPP	38.6	2010	VCS594
84	Akocak HEPP	82.5	2010	VCS537
85	Burçbendi HEPP	27.3	2010	VCS363
86	Çakit HEPP	20.2	2010	VCS777
87	Çamlıca 3 HEPP	84	2010	VCS940
88	Feke 2 HEPP	69.3	2010	VCS541
89	Bağişli HEPP	29.6	2010	VCS637
90	Uzunçayır HEPP	82	2010	VCS931
	Total Capacity	**2,803.46**		

	Excluded in MWs (2006-2011)	

The installed capacity is 52,911.1 MW in 2011[39]and 20% of the capacity is calculated as 10,582.2 MW. The capacity addition lists are could be found in Capacity projection reports prepared every year[40]. Please see Appendix 4 for the list of power plants included in the calculation. Summing up the capacity additions through 2008-2011 and subtracting registered VER projects; an amount of 10,651.9MW is reached.

3) Determining the efficiency level of the best technology commercially available

As per the suggestion of the Board to use of efficiency level of the best technology commercially available, proportional weights that correlate to the distribution of installed capacity in place during the selected period above should be applied.

The efficiency data for power plants are not available for best practice technologies utilized in Turkey. Therefore, the default values from the tool have been applied.

4) Determining the vintage

In terms of vintage, there two options defined:

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

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

Option 1 is selected for the data vintage.

STEP 6. Calculate the build margin emission factor.

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} x EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (12)$$

Where:

$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y (tCO2/MWh)

[39] Annual Development of Turkey's Installed Capacity and Generation in Turkey (1970-2011), (www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/kgucunkullan%C4%B1m(13-21)/13.xls)

[40] Capacity Projection reports for years, 2009-2012 are used for the list of power plants. (http://www.teias.gov.tr/KapasiteProjeksiyonu.aspx)

$EG_{m,y}$: 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 (tCO2/MWh)
m: Power units included in the build margin
y: Most recent historical year for which power generation data is available

The BM calculation adopts the modifications methods agreed by the CDM EB. The weighted average of the installed capacity of each fossil fuel type; rather than power plant based data, should be used instead of EG values. Therefore the equation is regenerated as :

$$EF_{grid,BM,y} = \frac{\sum_{m} CAP_{m,y} x EF_{EL,m,y}}{\sum_{m} CAP_{m,y}}$$

$CAP_{m,y}$: Incrementally installed capacity of power unit m in year y.

The generation capacities for coal-fired, oil-fired and gas- fired technology are available for the calculation. However; there are multi-fuel fired capacity additions utilizing solid+liquid fuel or liquid+natural gas fuel mixtures. Therefore; first the fuel consumption data are used to calculate the proportion of CO2 emissions from each fossil fuel type. Second, the emission factors for the best commercially available technology of power generation for each fossil fuel are calculated. Third, the emission factor for thermal power is calculated as a weighted average of all emission factors calculated in the Step 1. Finally, this thermal emission factor is multiplied by the proportion of thermal power added capacity in the additional 20% capacity.

Sub-step 6(a) Calculate the percentages of CO2 emissions from each type of fossil fuel-fired power plants in total CO2 emissions from all thermal power plants.

According to the methodology; the ratio of tCO_2 produced by each fossil fuel type for power generation is calculated with the following formulas:

$$\lambda_{Coal} = \frac{\sum_{i \in COAL,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

$$\lambda_{Lignite} = \frac{\sum_{i \in Lignite,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

$$\lambda_{FuelOil} = \frac{\sum_{i \in FuelOil,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

$$\lambda_{DieselOil} = \frac{\sum_{i \in DieselOil,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

$$\lambda_{LPG} = \frac{\sum_{i \in LPG,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

$$\lambda_{Naphta} = \frac{\sum_{i \in Naphta, j, y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j, y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j,y} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

λ_i : Ratio of CO_2 produced by fossil fuel i to the total emissions.

$F_{i,j,y}$: Amount of fuel i consumed by power sources j in year y [kt or m^3]

$NCV_{i,y}$: Net calorific value for fossil fuel i in year y [TJ/kt]

$EF_{i,j}$: CO_2 emission factor of fuel type i used in power unit j in (tCO_2/TJ)

j : Power units included in the build margin

y : Most recent historical year for which power generation data is available

Sub-step 6(b) Calculating fossil fuel fired emission factor ($EF_{Thermal}$)

Thermal emission factor is calculated with the formula:

$$EF_{Thermal} = \sum_i \lambda_i * EF_{i,Adv}$$

$EF_{Thermal}$: Weighted emissions factor of thermal power generation with the efficiency level of the best commercially available technology in Turkey (tCO_2/MWh).

λ_i : Ratio of CO_2 produced by fossil fuel i to the total emissions.

$EF_{i,Adv}$: Emission factors with efficiency levels of the best commercially available technology in Turkey (tCO_2/MWh).

$EF_{i,Adv}$ is calculated with the formula in accordance with Option A2 for calculating EF in the tool:

$$EF_{i,Adv} = \frac{EF_{CO2,m,i,y} * 3.6}{\eta_{m,y}} \quad (3)$$

$EF_{CO2,m,i,y}$: Average CO2 emission factor of fuel type *i* used in power unit *m* in year *y* (tCO2/GJ)

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

m : All power units serving the grid in year *y* except low-cost/must-run power units

y : The relevant year as per the data vintage chosen

Sub-step 6(c) Calculating Build Margin Emission Factor

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} * EF_{Thermal}$$

$EF_{grid,BM,y}$: Build Margin CO_2 emission factor in year y (tCO_2/MWh).

$CAP_{Thermal}$: Total thermal power capacity addition of the selected period [MW]

CAP_{Total} : Total power capacity addition of the selected period [MW]

$EF_{Thermal}$: Emission factors with efficiency levels of the best commercially available technology in Turkey (tCO_2/MWh).

Step7. Calculate the combined margin emission factor

The combined margin emissions factor $EF_{grid,CM,y}$ is calculated as follows:

$$EF_{grid,CM,y}=EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM} \quad (13)$$

$EF_{grid,BM,y}$: Build margin CO2 emission factor in year y (tCO2/MWh)
$EF_{grid,OM,y}$: Operating margin CO2 emission factor in year y (tCO2/MWh)
w_{OM} :Weighting of operating margin emissions factor (%)
w_{BM} :Weighting of build margin emissions factor (%)

The combined margin emissions factor $EF_{grid,CM,y}$ should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OMsimple,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$), where w_{OM} = 0.75 and w_{BM} = 0.25 for wind power plant project for the first crediting period and for subsequent crediting periods.

Project Emission
Project emissions are taken as zero as per the methodology.

Leakage
According to the AMS-I.D. (version 17), leakage should be considered if the energy generating equipment is transferred from another activity. The project is a new power plant and therefore the leakage is taken as zero.

B.6.2. Data and parameters fixed ex ante
(Copy this table for each piece of data and parameter.)

Data / Parameter	$EG_{gross,y}$
Unit	MWh
Description	Gross electricity generated by all power plants connected to the national grid including low-cost must run power plants between years 2009-2011
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	$EG_{net,y}$
Unit	MWh
Description	Net electricity generated by all power plants connected to the national grid excluding low-cost must run power plants between years 2009-2011
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	$EG_{imported,y}$
Unit	MWh
Description	Electricity imported to the national grid between years 2009-2011.
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	$FC_{i,y}$
Unit	Tonnes/m^3
Description	Fossil fuel consumed by thermal power plants between years 2008-2011
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	NCV
Unit	TJ/mass or volume
Description	Net calorific value of each fossil fuel type between years 2008-2011
Source of data	TEIAS (Turkish Electricity Transmission Company) annual data
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	EF_{CO2}
Unit	tCO_2/TJ
Description	CO_2 emission factor of fossil fuel type i between years 20082011
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	$\eta_{m,y}$
Unit	-
Description	Average net energy conversion efficiency of thermal power units connected to the grid
Source of data	Default values in Annex.1 in "Tool to calculate the emission factor for an electricity system"
Value(s) applied	Detailed in Appendix. 4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

Data / Parameter	$CAP_{y,total}$
Unit	MWh
Description	Capacity addition to the national grid between years 2008-2011
Source of data	Capacity Projection reports for 2009-2012 by TEIAS (Turkish Electricity Transmission Company)
Value(s) applied	Detailed in Appendix.4
Choice of data or Measurement methods and procedures	Official data
Purpose of data	Calculation of CM
Additional comment	

B.6.3. Ex-ante calculation of emission reductions

>>

Calculation of Operating Margin

The following data are available on the Turkish Electricity Transmission Company (TEİAŞ) web site:

- Annual fuel consumption by fuel type (tons or m^3)[41],
- Annual heating values for fuels consumed for electricity generation (Tcal)[42]
- Annual electricity generation by fuel type, import and export (GWh)[43]

Annual heating values for each fuel type are directly related with the fuel consumption and are used to calculate Net Calorific Values (TJ/kt) for each year (Table.10). The annual heating values are converted to TJ and divided by the fossil fuel consumption for that year.

Table.10. Net Calorific Values for each fuel type for Turkey.

Fuel Type	**NCV (TJ/kt)**		
	2009	**2010**	**2011**
Hard Coal + Imported Coal	22.21	22.32	22.79
Lignite	6.43	7.13	7.30
Fuel Oil	39.81	40.23	41.58
Diesel Oil	42.37	43.09	43.15
LPG	46.47	0.00	0.00
Naphtha	43.65	33.50	0.00
Natural Gas	37.17	37.38	37.10

The coefficients required for calculation of CO_2 emission factor (tCO_2/TJ) have been obtained through IPCC 2006 guidelines for GHG inventories[44]. Using the available data and the formula given in section B6.1, overall CO_2 production by electricity generation is calculated as given in Table.11. below.

[41] (http://www.teias.gov.tr/istatistik2008/index.htm/43.xls)&(http://www.teias.gov.tr/istatistik2008/index.htm/44.xls)
[42] (http://www.teias.gov.tr/istatistik2008/45.xls)& (http://www.teias.gov.tr/istatistik2008 /46.xls)
[43] (http://www.teias.gov.tr/istatistik2008/istatistik2008/36(01-05).xls)&(http://www.teias.gov.tr/istatistik2008/37(06-08).xls)
[44] Table 2.2.Default Emission Factors for Stationary Combustion in the Energy Industries, Vol.2. Energy, 2006 IPCC Guidelines for National Greenhouse Gas Inventories, (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf)

Table.11. Calculation of total emission by electricity generation

	COEF (tCO_2/TJ) (Lower)	Fuel Consumption (2009-2011) (tons or $1000m^3$)	Total Emission (2009 - 2011) (tCO_2)
Hard Coal+ Imported Coal	94.600	20,310,888	42,770,251.07
Lignite	90.933	24,615,314	52,377,859.05
Fuel Oil	67.833	181,817,220	114,711,445.96
Diesel Oil	72.600	3,017,711	9,169,811.60
LPG	61.6	216,258	667,131.45
Naphtha	69.300	111	317.74
Natural Gas	54.267	21,217	54,932.62
Total Emissions			**309,481,040.35**

Net electricity generated and supplied to the grid by thermal plants has been calculated using data obtained from the TEİAŞ web page[45]. The ratio between gross and net generation has been calculated first, and assuming that the same ratio is valid for thermal plants; gross generation by thermal power plants has been multiplied by this ratio in order to find net generation by thermal plants. Summing up this with the imported electricity, total supply excluding low cost / must run sources are determined as given in Table.12. below.

Table.12. Net Electricity Generation from thermal power plants (units in GWh)

Year	Gross generation	Net generation	Net/Gross (1)	Gross Gen. Thermal (2)	Net Gen Thermal (1x2)	Import	Total Supply to the grid
2009	194,812.9	186619.3	0.958	156,923.4	150,323.4	812.0	151,135
2010	211,207.7	203,046.1	0.961	155,827.6	14,806.0	1,143.8	150,950
2011	229,395.1	217,557.7	0.948	171,638.3	162,781.3	4,555.8	167,337.1
Total					**462,910.7**	**6,512.6**	**469,422.3**

Finally, using the data tabulated in the previous two tables, the OM emission factor considering years 2008 -2010 has been calculated as generation weighted average from equation for OM above;

$$\mathbf{EF_{grid,\,OMsimple,\,y} = 0,\,659\ tCO_2/\ MWh}$$

The Operating Margin emission factor calculated above will be constant throughout the 7 years crediting period.

Calculation of Build Margin

Sub-step 6(a) Calculate the percentages of CO2 emissions from each type of fossil fuel-fired power plants in total CO2 emissions from all thermal power plants.

The annual fuel consumption data for each fuel type for 2008-2011 are gathered from TEIAS web page. Net calorific value (in TJ/kt) are calculated as described above for the same period. The lower values for CO_2 emission coefficient (tCO_2/TJ) from IPCC 2006 guidelines for GHG inventories have been used.

The following ratios have been obtained:

[45] Annual Development of Electricity Generation-Consumption and Losses in Turkey (http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2010/front%20page%202010-%C3%A7i%C3%A7ek%20kitap/uretim%20tuketim(22-45)/33(84-10).xls)

Table.13. Ratio of CO_2 by each fossil fuel type to the total emissions

Fuel Type	λi	Fuel Type	λi
Coal	0.1512	Lpg	0.0000
Lignite	0.380	Naphta	0.0002
Fuel Oil	0.038	Natural Gas	0.428
Diesel Oil	0.003		

Sub-step 6(b) Calculate the operating margin emission factor of fuel-based generation.

The data for the best available technology for thermal power plants are not available for Turkey. Therefore, the default efficiency factors given in Annex.1 of the tool are used for the calculation.

The coal power plants are classified as subcritical in Turkey. The thermal efficiency ranges between 30-39% for coal and lignite fired power plants during the period 2003-2010 as stated in the article "Energy Efficiency Studies in Thermal Power plants and Acquirements" presented in III. Energy Effciency Congress on 02.April.2011[46].
The rest of the power plants are accepted to run under Combined Cycle technology as the best available one in the country.

Table.14. Efficiency factors

Fossil fuel type	Efficiency (%)
Coal	39
Lignite	39
Fuel-oil	46
Diesel-oil	46
LPG	46
Naphtha	46
Natural gas	60

$EF_{Thermal}$ is calculated as 0.607 tCO_2/MWh

Sub-step 6(c) Calculating Build Margin Emission Factor

The Build Margin has been calculated as **0.475tCO_2/MWh**.

Calculation of the Combined Margin

$EF_{grid, CM, y}$ = 0.75 * 0.659 + 0.25 * 0.475= 0.613

The combined margin emission factor is therefore **0.613 tCO_2/MWh,** which will be used as the baseline factor in calculation of emission reduction by project activity.
Project Emissions

PE= 0

Emission reduction (ERy*)* by the project activity

For the first crediting period of seven years, annual emission reduction will be;

[46] http://www.mmo.org.tr/resimler/dosya_ekler/de57221d69ac155_ek.pdf?dergi=113

$$ER_y = BE_y - (PE_y + LE_y)$$

BE_y=(52,742 MWh * 0.613 tCO_2e/ MWh) = **32,330 tCO_2**
PE_y= **0 tCO_2**
LE_y= **0 tCO_2**

The total emission reduction will be **32,330tCO_2**

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

The emission reduction for the first crediting period is summarized below:

Table.15. Emission reduction by the project activity

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
09/04/2010	24,248	0	0	24,248
2011	32,330	0	0	32,330
2012	32,330	0	0	32,330
2013	32,330	0	0	32,330
2014	32,330	0	0	32,330
2015	32,330	0	0	32,330
2016	32,330	0	0	32,330
09/04/2017	8,083	0	0	8,083
Total	**226,310**	0	0	**226,310**
Total number of crediting years	7			
Annual average over the crediting period	32,330	0	0	32,330

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

(Copy this table for each data and parameter.)

Data / Parameter	EG_y
Unit	MWh/yr
Description	Net electricity exported to the grid in the year y
Source of data	Meter Reading Forms issued by governmental officers and signed by both parties.
Value(s) applied	The annual electricity fed to the grid is estimated as 52,742 MWh.
Measurement methods and procedures	The net electricity is measured continuously by a power meter at the grid interface and recorded monthly.
Monitoring frequency	Monthly
QA/QC procedures	• A spare meter is used for crosschecking the accuracy and both meters are calibrated if required. • Data measured by meters and will be crosschecked with the data uploaded to PMUM.
Purpose of data	Calculation of emission reductions
Additional comment	

B.7.2. Sampling plan

>>

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

Hourly readings are done and noted to a log book by the personnel. At the same time, readings are automatically transferred to the website of "Market Financial Settlement Center" or PMUM. Project owner can also access the readings by using a secured ID and password identified for each user. PMUM serves as an official unit to balance real time electricity demand with production. Each electricity producer has to report their daily generation forecasts and realized generation to the database run by PMUM.

Monthly power meter readings will be basis for monitoring net electricity fed into the grid. Those readings are done by governmental officers accompanied with an observer from the project owner company at the end of each month. A report is prepared including day, peak and night hour electricity generation of the plant and signed and approved by both parties.

In addition to metering devices every single wind turbine generation will be monitored and the data will be stored through a SCADA system. Through this SCADA system, also other technical specifications of the turbines can be monitored such as temperature, voltage, current, frequency, vibration etc.

B.7.3. Other elements of monitoring plan

>>

The objective of the monitoring plan is to ensure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions during the whole crediting period. The Project Owner is responsible for the implementation of the monitoring plan.

Monitoring parameters

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

Data Management and Quality Control

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

The data is hourly recorded by the personnel on the plant. There is a log book for the purpose. The readings are sent to Trakya Load Dispatching Center beginning at hours 05, 07,09 ,12,15,19,21,23,00 during 24 hour period. At the end of the month, the readings are faxed to Babaeski TEIAS office and Trakya Load Center to be compared and approved. The data could be remotely accessed by PMUM.

The capacity of the transmission line connected is 154 kVA, the accuracy class for main power meter has been defined in the Communiqué for Power Meters[47] as 0.5S class. The back-up meter has the same accuracy class of 0.5S. The calibration will be implemented in accordance with the related standard procedures (IEC-EN 60687) by either TEIAS or the provider company in the name of TEIAS. Both power meters are ELSTER A-1500 model. The serial number for main power meter is 00395381 and the back-up power meter is 00395382. They were calibrated on 18/01/2010.

The power meters have the communication hardware which enables PMUM to reach the data stored and report the errors in reading. If there is need for calibration, governmental officers will be doing it.

When the main meter has a breakdown, the readings of the back-up meter will be used. If both meters failed, conservative data substitution procedures based on the internal SCADA data will be used.

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

Please see Appendix.5. Monitoring Information for more information.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

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

C.1.2. Expected operational lifetime of project activity

>>
49 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
Renewable Crediting Period

C.2.2. Start date of crediting period

>>
09/04/2010

[47] http://www2.epdk.gov.tr/mevzuat/teblig/elektrik/sayac/sayac.pdf

C.2.3. Length of crediting period
>>
7 years, renewed twice

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
The Environmental Impact Assessment (EIA) study for the project was made on April 2007 and the "EIA Not Required" decision per the submitted Project Description Report has been issued on 17/07/2007 by Edirne Governance, Environment and Forest Directorate. The environmental impacts of the project have evaluated and the following mitigation measures are proposed in the environmental management plan.

The project will contribute to improve the environmental situation in the region and in the country. Avoiding fossil fuel-based electricity will enhance the air quality and help to reduce the adverse affects on the climate. Renewable technologies and wind based electricity will be introduced and sustainable development will be promoted. The project activity itself will not have any significant negative impacts on humans, plants, animal life and biodiversity.

No environmental impact has been considered significant as a result of the preliminary environmental impact assessment and "EIA Not Required" decision has been issued by Edirne Governance, Environment and Forest Directorate.

SECTION E. Local stakeholder consultation
E.1. Solicitation of comments from local stakeholders
>>
Two stakeholder meetings were carried out by ENÇEV Energy Environmental Investments Consultancy L.C. and summarized below. The consultant to the project has changed on November 2011 as Ceres EnvE Consultancy L.C. , Zeynep Pınar Öztürk.

Local Stakeholder Consultation Meeting
According to the Gold Standard requirements, local stakeholders were identified including local people, local and national NGOs, project developers and entities involved in implementation and operation of the project activity. A list of project participants invited for the stakeholder consultation meeting is presented in the stakeholder meeting report. According to the guidelines in the Gold Standard Toolkit, the project proponent EN-ÇEV Energy Environmental Investments Consultancy L.C. invited local residents, local/national policy makers, and local/national/international NGOs via mail and follow-up calls. An invitation letter was sent out in Turkish via email/mail to the above mentioned stakeholders mentioned above. Furthermore, an invitation letter was published in Turkish in the regional newspaper "Uzunköprü Gürses" on 22/04/2009.

The stakeholder meeting was held on 29/04/2009 at Hisarlı Village Coffeehouse, Enez / Edirne. At the meeting besides project developers and local citizens, there were two representatives of Enez Municipality and two headmen of neighbouring villages.

The number of total participants was more than 30; however, only 22 of them signed the participation list. Supporter of Gold Standard Organizations i.e. WWF, Greenpeace and REC Turkey has been informed about project.

The meeting location was determined as the coffeehouse of the closest settlement to the project region and all local people were informed about meeting in advance by municipality announcements and local newspaper announcements. Before presentation, agenda of the meeting was explained, the non-technical project summary and evaluation form were distributed to the participants for broader view.

Agenda of the meeting was as follows:

- Opening of the meeting
- Explanation of the project
- Questions for clarification about project explanation
- Blind sustainable development assessment
- Discussion on monitoring sustainable development
- Closure of the meeting

Project presentation and description was made by EN-CEV Energy & Environmental Investments Consultancy Company including information about the project developers, the technology and operation of the power plant, the estimated emission reduction amount of the plant, the importance of revenue from emission reduction, information about Gold Standard.
Moreover, the project was also introduced by a poster with pictures describing the project more simply, in order to reach the analphabetic people.

Prior to blind sustainable development exercise, questions and comments were taken from participants about further clarification of project. The questions and comments raised by participants were addressed in the assessment of comments part.

In brief, the meeting was ended after the project was explained and discussed with the participants. The support of the participant for the project was easily observed.

The Stakeholder Feedback Round is a two month period, where all necessary documents will be made publicly available. As a part of stakeholder feedback round, a meeting which is also introduced as second stakeholder meeting was held on 09/11/2009 with the local stakeholders in Hisarlı Village close to the Boreas wind power plant. The purpose of the Stakeholder Feedback Round is covering and evaluating all issues rose in the first local stakeholder consultation meeting.

Stakeholder Feedback Round Meeting
All people invited for the Local Stakeholder Consultation were contacted and invited for the second meeting as well. The following documents were made available before the meeting: ·

- PDD submitted for validation,
- GS Passport
- Non-technical project summary (in Turkish and English Version),
- Initial Local stakeholder consultation report (in Turkish and English Version)

Several hard copies of the documentation were available at, for example, the district governorship, the municipality, the directorate and the village headman for two months. All this public information was uploaded to the GS Registry as well.

The invitation letter was sent out in Turkish via email/mail to the governmental agency, the GS Foundation and stakeholders. The announcement included that, the meeting aimed to take the responses regarding the project, stakeholder's suggestions and opinions. As the Gold Standard offering that, all stakeholders have been invited for participation in the Local Stakeholder Consultation have to be included in the Stakeholder Feedback Round.

Local citizens, representatives of the Enez Municipality, the Headmen of neighbouring villages, the project developers and two experts from TÜV-SÜD were also attended to the meeting. The supporters of Gold Standard Organizations i.e. WWF, Greenpeace, REC Turkey, Mercy Corps and Helio International have been informed regarding the project and the stakeholder feedback round. The number of total

participants was around 48. The project was also introduced to the women and their opinions and suggestions about the project were considered.

All local people were informed about meeting by municipality announcements and local newspaper announcements. Before presentation, agenda of the meeting was explained; the nontechnical project summary and evaluation forms were distributed to the participants.

Project presentation and description was made by EN-CEV Energy & Environmental Investments Consultancy Company including information about the project developers, the technology and operation of the power plant, the estimated emission reduction amount of the plant, the importance of revenue from emission reduction, information about Gold Standard.

Moreover, the project was also introduced by a poster with pictures describing the project simply for analphabetic stakeholders.

Prior to blind sustainable development exercise, questions and comments were taken from participants about further clarification of project. In addition to these, during the meeting, impact on birds, particularly migrating birds and noise were also expressed clearly. As the nearest village is approximately 1km far from the Project field; there won't be any noise problem for the villagers. The impact on migrating birds have been evaluated by a specialist and presented in context of Project Introduction File (PIF) to General Directorate of Environment and Forest in Edirne. It is stated that the project location is not place for breeding, birth, copulation, i.e. for bird population living nearby. The research indicated that, there won't be a negative impact on bird life as the migration direction of the birds is north to south and the project area is at the east of their route. Nevertheless, the blades are painted in order to decrease the risk of collation. In addition, the ducks and other similar birds fly between 40m and 200m high. Despite that the project's altitude is higher than 400m. Therefore Boreas has effects on neither the migratory bird nor water birds.[48]

The nearest village is approximately 1 km away from the project area, in addition there are several hills existing between the turbines and village. Therefore it is impossible to mention a shadow flicker effect where the potential shadow flicker effect could be felt up to 800 meters from a turbine which has 80m diameter blades[49].

Briefly, the meeting was ended after the project was explained, discussed and taking the suggestions of the stakeholders.

E.2. Summary of comments received

>>

Generally, the stakeholders are pleasant about the project. Since they have informed regardingthe project at the first stakeholder consultation process they have no negative comments on the project. However, a stakeholder wanted to inform if there will be any impact of radiation or not.

The project owner has kindly replied him and answered as necessary. The details regarding the radiation impacts are available in the F.2 part of the final Passport.

E.3. Report on consideration of comments received

>>

[48] Project Introduction File, page 33

[49] Retrieved from http://www.communities.gov.uk/documents/planningandbuilding/pdf/147447.pdf, page 178

Although no negative comments have been received during the stakeholders' process, Boreas Enerji is aware of the importance of the project for the region and wants to further contribute to the social and sustainable development of the region. As an outcome of the close communication and relation with people in Hisarlı, Umurbey and Büyükevren Villages, which is the closest residential area to the project site, Boreas Enerji had decided to implement several measures and provide beneficial contributions to the region. These measures and contributions are;

Employment: During construction and operational period, the project has created employment opportunities for the local community.
Repairing the roads: The repair of roads is at the expense of Boreas Enerji
Cemetery walls: Cemetery walls has been repaired by Boreas Enerji
Restoration of the Basins: The basins at the Umurbey and Büyükevren villages which the animals use for drinking purpose, is restored by Boreas Enerji concrete poured to the front face of the basin to prevent the animals from mud.

SECTION F. Approval and authorization
>>

- - - - -

Appendix 1: Contact information of project participants

Organization	Boreas Enerji Üretim Sistemleri San. ve Tic. A.Ş.
Street/P.O. Box	Ahmet Adnan Saygun Caddesi, Orkide Sokak, Ulus
Building	Orkide Apt.No.1/15
City	İstanbul
State/Region	Beşiktaş
Postcode	
Country	Turkey
Telephone	+902122657801
Fax	
E-mail	
Website	
Contact person	Sabri Ozan Orsan
Title	Board member
Salutation	Mr.
Last name	Orsan
Middle name	Ozan
First name	Sabri
Department	
Mobile	+905334124160
Direct fax	
Direct tel.	+902122657801
Personal e-mail	ozanorsan@hotmail.com

Appendix 2: Affirmation regarding public funding

Appendix 3: Applicability of selected methodology

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

Data Used in calculation of OM and BM for Turkish Electricity Grid

Table.A. Heating Values of Fuels Consumed in Thermal Power Plants in Turkey by the Electric Utilities (Tcal)[50]

Fuel	2008	2009	2010	2011
Hard Coal	33,310	35,130	39,546	57,567
Imported Coal				
Lignite	108,227	97,652	96,551	107,210
Total	**141,537**	**132,781**	**136,097**	**164,777**
Fuel Oil	20,607	15,160	8,569	5,280

[50] www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/49.xls

Diesel Oil	1,328	1,830	209	155
Lpg	0	1	0	0
Naphta	113	84	105	0
TOTAL	**22,048**	**17,076**	**8,884**	**5,435**
Natural Gas	**189,057**	**186,266**	**194,487**	**202,064**
TOTAL	**352,642**	**336,123**	**339,468**	**372,276**

Table.B. Fuel Consumed in Thermal Power Plants in Turkey by the Electric Utilities (ton /m3)[51]

Fuel	2008	2009	2010	2011
Hard Coal				
Imported Coal	6,270,008	6,621,177	7,419,703	10,574,434
Lignite	66,374,120	63,620,518	56,689,392	61,507,310
Total	**72,644,128**	**70,241,695**	**64,109,095**	**72,081,744**
Fuel Oil	2,173,371	1,594,321	891,782	531,608
Diesel Oil	131,206	180,857	20,354	15,047
Lpg	0	111	0	0
Naphta	10,606	8,077	13,140	0
TOTAL	**2,315,183**	**1,783,366**	**925,276**	**546,655**
Natural Gas	**21,607,635**	**20,978,040**	**21,783,414**	**22,804,587**

Table.C. Net Electricity supply to the grid by thermal plants and imports[52]

Year	Gross generation	Net generation	Import
2009	194,812.9	186,619.3	812.0
2010	211,207.7	202,159.1	860.3
2011	229,395.1	217,557.7	4555.8

Table.D. Default Emission Factors for Stationary Combustion in the Energy Industries (kg of greenhouse gas per TJ on a Net Calorific Basis)[53]

Fuel	CO_2		
	Default Emission Factor	Lower	Upper
Residual Fuel Oil	77,400	**75,500**	78,800
Gas/Diesel Oil	74,100	**72,600**	74,800
Residual Fuel Oil	77,400	**75,500**	78,800
Liquefied Petroleum Gases	63,100	**61,600**	65,600
Naptha	73,300	**69,300**	76,300

[51] www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/yak%C4%B1t46-49/47.xls
[52] www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2011/uretim%20tuketim(22-45)/33(84-11).xls
[53] Table 1.4 (http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf)

Anthracite	98,300	**94,600**	101,000
Lignite	101,000	**90,900**	115,000
Natural Gas	56,100	**54,300**	58,300

Table.E. Annual development of Turkey's installed capacity (MW)[54]

YEARS	*Thermal*	*Capacity Add.*	*TOTAL*
2008	355.97	1,038.61	41,817.2
2009	2,622.80	4,037.20	44,761.2
2010	3,147.03	4,216.08	49,524.1
2011	2,203.90	4,163.47	52,911.1

Table.F: Capacity addition in 2008[55]

Name of the plant	Type	Capacity (MW)
MB ŞEKER NİŞASTA SAN. A.Ş. (Sultanhanı)	NATURAL GAS	8.800
AKSA ENERJİ (Antalya)	NATURAL GAS	183.800
AKSA ENERJİ (Manisa)	NATURAL GAS	52.380
ANTALYA ENERJİ (İlave)	NATURAL GAS	17.460
ATAÇ İNŞAAT SAN. A.S.B.(ANTALYA)	NATURAL GAS	5.400
BAHÇIVAN GIDA (LÜLEBURGAZ)	NATURAL GAS	1.165
CAN ENERJİ (Çorlu-TEKİRDAĞ) (İlave)	NATURAL GAS	52.380
FOUR SEASONS OTEL (ATİK PASHA TUR.A.Ş)	NATURAL GAS	1.165
FRİTOLAY GIDA SAN.VE TİC.AŞ.(İlave)	NATURAL GAS	0.060
ITC-KA Enerji Üretim A.Ş.(Mamak)(İlave)	WASTE	14.130
KARKEY(SİLOPİ-5) (154 kV) (İlave)	FUEL OIL	14.780
MELİKE TEKSTİL (GAZİANTEP)	NATURAL GAS	1.584
MİSİS APRE TEKSTİL BOYA EN. SAN.	NATURAL GAS	2.000
MODERN ENERJİ (LÜLEBURGAZ)	NATURAL GAS	13.400
ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İST.)	WASTE	2.830
POLAT TURZ. (POLAT RENAISSANCE İST.OT.)	NATURAL GAS	1.600
SARAYKÖY JEOTERMAL (Denizli)	GEOTHERMAL	6.850
YILDIZ SUNTA (Uzunçiftlik-Köseköy)(Düzeltme)		
SÖNMEZ Elektrik (İlave)	NATURAL GAS	8.730
AKKÖY ENERJİ (AKKÖY I HES)	HYDRO	101.940
ALP ELEKTRİK (TINAZTEPE) ANTALYA	HYDRO	7.689
CANSU ELEKTRİK (Murgul/ARTVİN)	HYDRO	9.180
ÇALDERE ELK.(ÇALDERE HES)Dalaman-MUĞLA	HYDRO	8.740
DAREN HES ELKT. (SEYRANTEPE BARAJI VE HES)	HYDRO	49.700
DEĞİRMENÜSTÜ EN. (KAHRAMANMARAŞ)	HYDRO	25.700

[54] Capacity Projection Reports for years 2006-2012(http://www.teias.gov.tr/KapasiteProjeksiyonu.aspx)
[55] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2009.pdf

GÖZEDE HES (TEMSA ELEKTRİK) BURSA	HYDRO	2.400
H.G.M. ENERJİ (KEKLİCEK HES) (Yeşilyurt)	HYDRO	8.674
HAMZALI HES (TURKON MNG ELEKTRİK)	HYDRO	16.700
HİDRO KNT.(YUKARI MANAHOZ REG.VE HES)	HYDRO	22.400
İÇ-EN ELK.(ÇALKIŞLA REGÜLATÖRÜ VE HES)	HYDRO	7.660
KALEN ENERJİ (KALEN II REGÜLAT. VE HES)	HYDRO	15.650
MARAŞ ENERJİ (FIRNIS REGÜLATÖRÜ VE HES)	HYDRO	7.220
SARMAŞIK I HES (FETAŞ FETHİYE ENERJİ)	HYDRO	21.040
SARMAŞIK II HES (FETAŞ FETHİYE ENERJİ)	HYDRO	21.580
TORUL	HYDRO	105.600
YEŞİL ENERJİ ELEKTRİK (TAYFUN HES)	HYDRO	0.820
BAKİ ELEKTRİK ŞAMLI RÜZGAR	WIND	21.000
DATÇA RES (Datça)	WIND	8.100
ERTÜRK ELEKTRİK Çatalca RES	WIND	60.000
İNNORES ELK YUNTDAĞ RÜZG. (Aliağa)	WIND	42.500
LODOS RES (Taşoluk)(G.O.P./İSTANBUL)	WIND	24.000
SAYALAR RÜZGAR (Doğal Enerji)	WIND	30.600
SEBENOBA (DENİZ ELK.) (Samandağ-HATAY)	WIND	31.200

GRAND TOTAL	**1,038.61**
THERMAL TOTAL	**355.974**

Table.G: Capacity addition in 2009[56]

Name of the plant	Capacity (MW)	Type
AK ENERJİ (AYYILDIZ RES)	15	WIND
AK GIDA SAN. VE TİC. A.İ. (Pamukova)	7.5	NATURAL GAS
AKÇAY HES ELEKTRİK ÜR. (AKÇAY HES)	28.8	HYDRO
AKSA AKRİLİK KİMYA SN. A.İ. (YALOVA)	70	NATURAL GAS
AKSA ENERJİ (Antalya) (İlave)	300	NATURAL GAS
AKSA ENERJİ (Antalya) (İlave)	300	NATURAL GAS
AKSA ENERJİ (MANİSA) (İlave)	10.5	NATURAL GAS
AKSA ENERJİ (MANİSA) (İlave)	52.4	NATURAL GAS
AKUA ENERJİ (KAYALIK REG. VE HES)	5.8	HYDRO
ALİZE ENERJİ (ÇAMSEKİ RES)	20.8	WIND
ALİZE ENERJİ (KELTEPE RES)	18.9	WIND
ALİZE ENERJİ (SARIKAYA RES) (İarköy)	28.8	WIND
ALKİM ALKALİ KİMYA (Cihanbeyli/KONYA)	0.4	LIGNITE
ANADOLU ELEKTRİK (ÇAKIRLAR HES)	16.2	HYDRO
ANTALYA ENERJİ (İlave)	41.8	NATURAL GAS
ARENKO ELEKTRİK ÜRETİM A.İ. (Denizli)	12	NATURAL GAS

[56] http://www.teias.gov.tr/KAPASITE PROJEKSIYONU 2010.pdf

AYEN ENERJİ A.İ. AKBÜK RÜZGAR	16.8	WIND
AYEN ENERJİ A.İ. AKBÜK RÜZGAR (İlave)	14.7	WIND
BAĞIİLI REG. VE HES (CEYKAR ELEKT.)	9.9	HYDRO
BAĞIİLI REG. VE HES (CEYKAR ELEKT.)	19.7	HYDRO
BAKİ ELEKTRİK ŞAMLI RÜZGAR	36	WIND
BAKİ ELEKTRİK ŞAMLI RÜZGAR	33	WIND
BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15	WIND
BELEN ELEKTRİK BELEN RÜZGAR-HATAY	15	WIND
BEREKET ENERJİ (KOYULHİSAR HES)	42	HYDRO
BEYOBASI EN. ÜR. A.İ. (SIRMA HES)	5.9	HYDRO
BİL ENERJİ (DG+M)(Balgat)	36.6	NATURAL GAS
BORASKO ENERJİ (BANDIRMA RES)	21	WIND
BORASKO ENERJİ (BANDIRMA RES)	24	WIND
CAM İŞ ELEKTRİK (Mersin) (İlave)	126.1	NATURAL GAS
CARGILL TARIM VE GIDA SAN. TİC. A.İ.	0.1	BIOGAS
CİNDERE HES (Denizli)	19.1	HYDRO
ÇELİKLER TAAH. İNİ. (RİXOX GRAND)	2	NATURAL GAS
DALSAN ALÇI SAN. VE TİC. A.Ş.	1.2	NATURAL GAS
DATÇA RES (Datça)	0.8	WIND
DATÇA RES (Datça)	8.9	WIND
DATÇA RES (Datça) (İlave)	11.8	WIND
DEĞİRMENÜSTÜ EN. (KAHRAMANMARAİ)	12.9	HYDRO
DELTA ENERJİ ÜRETİM VE TİC.A.Ş.	47	NATURAL GAS
DELTA ENERJİ ÜRETİM VE TİC.A.Ş. (İlave)	13	NATURAL GAS
DENİZLİ ELEKTRİK (EGE I HES)	0.9	HYDRO
DESA ENERJİ ELEKTRİK ÜRETİM A.Ş.	9.8	NATURAL GAS
E.ŞEHİR END. ENERJİ (DG+M)(EskiGehir-2)	59	NATURAL GAS
EGE BİRLEİİK ENERJİ (LPG+DG+M)(Aliağa)	12.8	N.G.+LPG+D
ELESTAŞ ELEKTRİK (YAYLABEL HES)	5.1	HYDRO
ELESTAŞ ELEKTRİK (YAZI HES)	1.1	HYDRO
ERDEMİR(Ereğli-Zonguldak)	39.2	FUELOIL
ERVA ENERJİ (KABACA REG. VE HES)	4.2	HYDRO
ERVA ENERJİ (KABACA REG. VE HES)	4.2	HYDRO
FALEZ ELEKTRİK ÜRETİMİ A.Ş.	11.7	NATURAL GAS
FİLYOS ENERJİ (YALNIZCA REG. VE HES)	14.4	HYDRO
GLOBAL ENERJİ (PELİTLİK)	8.6	NATURAL GAS
GÜL ENERJİ ELKT. ÜRET. SN. VE TİC. A.İ.	24.3	NATURAL GAS
GÜRMAT ELEKT. (GÜRMAT JEOTERMAL)	47.4	GEOTHERMAL
HABAİ ALİAĞA	224.5	NATURAL GAS
HABAİ(BİLECİK)(PaÇalar)	18	FUELOIL
HABAİ(İZMİR)(HabaÇ)	36	FUELOIL

HAYAT KAĞIT	7.5	NATURAL GAS
ITC-KA ENERJİ (SİNCAN)	2.8	WASTE
ITC-KA ENERJİ MAMAK KATI ATIK TOP.MERK.	2.8	WASTE
İÇDAŞ ÇELİK (İlave)	135	IMP. COAL
İÇDAŞ ÇELİK (İlave)	135	IMP. COAL
KALEN ENERJİ (KALEN I - II HES)	15.7	HYDRO
KAREL ENERJİ (Pamukova)	9.3	HYDRO
KASAR DUAL TEKSTİL SAN. A.İ. (Çorlu)	5.7	NATURAL GAS
KAYEN ALFA ENERJİ (KALETEPE HES)	10.2	HYDRO
KEN KİPAİ ELEKTRİK ÜRETİM (KAREN)	41.8	NATURAL GAS
KEN KİPAİ ELKT. ÜR.(KAREN) (K.MaraĞ)	17.5	NATURAL GAS
KISIK	9.6	HYDRO
KONYA İEKER SAN. VE TİC. A.İ.	1.6	LIGNITE
KORES KOCADAĞ RES (Urla/İZMİR)	15	WIND
LAMAS III - IV HES (TGT ENERJİ ÜRETİM)	35.7	HYDRO
MAKSİ ENERJİ ELEKTRİK ÜRETİM A.İ.	7.7	NATURAL GAS
MARMARA PAMUKLU MENS. SN.TİC.A.İ.	34.9	NATURAL GAS
MAURİ MAYA SAN. A.İ.	0.3	NATURAL GAS
MAURİ MAYA SAN. A.İ.	2	NATURAL GAS
MAZI-3 RES ELEKT.ÜR. A.İ. (MAZI-3 RES)	10	WIND
MAZI-3 RES ELEKT.ÜR. A.İ. (MAZI-3 RES)	12.5	WIND
MODERN ENERJİ (B.KarıÇtıran)	96.8	NATURAL GAS
MOSB Enerji Elektrik Üretim Ltd. İti.	84.8	NATURAL GAS
NUH ÇİMENTO SAN. TİC. A.İ.(Nuh Çim.) (İlave)	47	NATURAL GAS
OBRUK HES	212.4	HYDRO
ORTADOĞU ENERJİ (KÖMÜRCÜODA)	5.8	WASTE
ORTADOĞU ENERJİ (ODA YERİ) (İlave)	4.2	WASTE
ORTADOĞU ENERJİ (ODA YERİ) (İlave)	5.7	WASTE
ÖZGÜR ELEKTRİK (AZMAK II REG.VE HES)	24.4	HYDRO
ÖZTAY ENERJİ (GÜNAYİE REG.VE HES)	8.3	HYDRO
ÖZYAKUT ELEK. ÜR.A.İ. (GÜNEŞLİ HES)	0.6	HYDRO
ÖZYAKUT ELEK. ÜR.A.İ. (GÜNEŞLİ HES)	1.2	HYDRO
PETKİM ALİAĞA(Aliağa)	222	FUEL OIL
PETKİM ALİAĞA(Aliağa) (Düzeltme-İlave)	52	FUEL OIL
RASA ENERJİ (VAN)	78.6	NATURAL GAS
REŞADİYE 3 HES (TURKON MNG ELEKT.)	22.3	HYDRO
ROTOR ELEKTRİK (OSMANİYE RES)	17.5	WIND
ROTOR ELEKTRİK (OSMANİYE RES)	17.5	WIND
ROTOR ELEKTRİK (OSMANİYE RES)	22.5	WIND
SARITEPE HES (GENEL DİNAMİK SİS.EL.)	2.5	HYDRO
SARITEPE HES (GENEL DİNAMİK SİS.EL.)	2.5	HYDRO

SAYALAR RÜZGAR (Doğal Enerji)	3.6	WIND
SELKASAN KAĞIT PAKETLEME MALZ. İM.	9.9	NATURAL GAS
SİLOPİ ELEKTRİK ÜRETİM A.Ş.	135	FUEL OIL
SİLOPİ ELEKTRİK ÜRETİM A.Ş.(ESENBOĞA)	44.8	FUEL OIL
SOMA ENERJİ ÜRETİM (SOMA RES)	18	WIND
SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	10.8	WIND
SOMA ENERJİ ÜRETİM (SOMA RES)(İlave)	16.2	WIND
SÖNMEZ ELEKTRİK(UÇak) (İlave)	8.7	NATURAL GAS
SÜPER FİLM (G.antep)	25.3	FUEL OIL
ŞAHİNLER ENERJİ (Çorlu/TEKİRDAĞ)	26	NATURAL GAS
ŞİRİKÇİOĞLU EL.(KOZAK BENDİ VE HES)	4.4	HYDRO
TAİOVA YENİDEREKÖY HES (HAMEKA A.İ.)	2	HYDRO
TAV İSTANBUL TERMİNAL İİLETME. A.İ.	3.3	NATURAL GAS
TAV İSTANBUL TERMİNAL İİLETME. A.İ.	6.5	NATURAL GAS
TEKTUĞ (Erkenek)	6	HYDRO
TEKTUĞ (Erkenek) (İlave)	6.5	HYDRO
TESKO KİPA KİTLE PAZ. TİC. VE GIDA A.İ.	2.3	NATURAL GAS
TİRE-KUTSAN(Tire)	8	FUEL OIL
TOCAK I HES (YURT ENERJİ ÜRETİM SN.)	4.8	HYDRO
TÜM ENERJİ (PINAR REG. VE HES)	30.1	HYDRO
TÜPRAİ RAFİNERİ(Aliağa/İzmir)	24.7	FUEL OIL
UZUNÇAYIR HES (Tunceli)	27.3	HYDRO
ÜTOPYA ELEKTRİK (DÜZOVA RES)	15	WIND
YAPISAN (KARICA REG. ve DARICA I HES)	48.5	HYDRO
YAPISAN (KARICA REG. ve DARICA I HES)	48.5	HYDRO
YEŞİLBAŞ ENERJİ (YEŞİLBAŞ HES)	14	HYDRO
YPM GÖLOVA HES (SuÇehri/SİVAS)	1.1	HYDRO
YPM SEVİNDİK HES (SuÇehri/SİVAS)	5.7	HYDRO
YURTBAY ELEKTRİK ÜRETİM A.İ. (D.G.+M)	6.9	N:G. +Diesel
ZORLU ENERJİ (B.KarıÇtıran) (İlave)	49.5	NATURAL GAS

GRAND TOTAL	**4,037.20**
THERMAL TOTAL	**2,622.80**

Table.H: capacity addition 2010[57]

Name of the plant	Capacity (MW)	Type
ETİ SODA ÜRE.PAZ.NAK.VE ELK.ÜRE.SAN.	24	LIGNITE
CAN TEKSTİL (Çorlu/TEKİRDAĞ)	7.832	NATURAL GAS
ALTINMARKA	4.6	NATURAL GAS
CEV ENERJİ ÜRETİM (GAZİANTEP ÇÖP BİOGAZI)	1.131	BIOGAS

[57] http://www.teias.gov.tr/KAPASITEPROJEKSIYONU2011.pdf

AKBAİLAR (İlave)	1.54	NATURAL GAS
ORTADOĞU ENERJİ (ODA YERİ) (Eyüp/İST.)	4.245	WASTE GAS
GLOBAL ENERJİ (PELİTLİK)	3.544	NATURAL GAS
KONYA ŞEKER SAN. VE TİC. A.İ.	6	LIGNITE
RASA ENERJİ (VAN)	26.19	NATURAL GAS
AKSA ENERJİ (ANTALYA)	25	NATURAL GAS
FRİTOLAY GIDA SAN.VE TİC A.İ.	0.065	BIOGAS
YILDIZ ENTEGRE AĞAÇ (Kocaeli)	12.368	NATURAL GAS
ITC-KA ENERJİ (SİNCAN)	1.416	WASTE GAS
ATAER ENERJİ ELEKTRİK ÜRETİM A.İ.	49	LIQ+N.G.
CENGİZ ENERJİ SAN. VE TİC. A.İ. (Tekkeköy)	101.95	NATURAL GAS
UĞUR ENERJİ ÜRETİM TİC. VE SAN. A.İ.	48.2	NATURAL GAS
AKSA ENERJİ (ANTALYA)	25	NATURAL GAS
ALTEK ALARKO ELEKTRİK SANTRALLARI	60.1	NATURAL GAS
EREN ENERJİ ELEKTRİK ÜRETİM A.İ.	160	IMP.COAL
FLOKSER TEKSTİL (Çerkezköy/TEKİRDAĞ)	5.172	NATURAL GAS
RB KARESİ İTHALAT İHRACAT TEKSTİL	8.6	NATURAL GAS
CENGİZ ENERJİ SAN. VE TİC. A.İ. (Tekkeköy)	101.95	NATURAL GAS
KESKİNOĞLU TAVUKÇULUK VE DAM. İİL.	3.495	NATURAL GAS
BİNATOM ELEKTRİK ÜRETİM A.İ.	2	NATURAL GAS
CAN ENERJİ ELEKTRİK ÜR. A.İ.(Tekirdağ)	29.1	NATURAL GAS
KURTOĞLU BAKIR KURİUN SAN. A.İ.	1.585	NATURAL GAS
SÖNMEZ ENERJİ ÜRETİM (UİAK)	33.242	NATURAL GAS
ITC ADANA BİOKÜTLE SANT.	11.32	WASTE GAS
KIRKA BORAKS(Kırka) (Eti Maden İÇl.) (İlave)	10	LIQ.+N.G.
ENERJİ-SA (BANDIRMA)	1000	NATURAL GAS
UĞUR ENERJİ ÜR. TİC.VE SAN. A.İ. (İlave)	12	NATURAL GAS
EREN ENERJİ ELEKTRİK ÜR. A.İ. (İlave)	600	IMP.COAL
MARMARA PAMUKLU MENSUCAT (İlave)	26.19	NATURAL GAS
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	69.84	NATURAL GAS
FRİTOLAY GIDA SAN.VE TİC A.İ. (İlave)	0.33	BIOGAS
SÖNMEZ ENERJİ ÜRETİM (UİAK) (İlave)	2.564	NATURAL GAS
TÜPRAİ RAFİNERİ (İZMİT) (İlave)	40	LIQ.+N.G.
POLYPLEX EUROPA POLYESTER FİLM	7.808	NATURAL GAS
ALTEK ALARKO ELEKTRİK SANTRALLARI	21.89	NATURAL GAS
RASA ENERJİ (VAN) (İlave)	10.124	NATURAL GAS
EREN ENERJİ ELEKTRİK ÜR. A.İ. (İlave)	600	IMP.COAL
INTERNATIONAL HOSPITAL İSTANBUL Aİ.	0.77	NATURAL GAS
SELİMOĞLU REG. VE HES	8.8	HYDRO
KULP IV HES (YILDIZLAR EN.ELK.ÜR.Aİ.)	12.298	HYDRO

CİNDERE HES (İlave)	9.065	HYDRO
BAYBURT HES (BAYBURT ENERJİ ÜRET.)	14.631	HYDRO
UZUNÇAYIR HES (Tunceli) (İlave)	27.33	HYDRO
ALAKIR HES (YURT ENERJİ ÜRETİM)	2.06	HYDRO
PETA MÜHENDİSLİK EN. (MURSAL II HES)	4.5	HYDRO
ASA ENERJİ (KALE REG.ve HES)	9.57	HYDRO
HETAİ HACISALİHOĞLU (YILDIZLI HES)	1.2	HYDRO
DOĞUBAY ELEKTRİK (SARIMEHMET HES)	3.1	HYDRO
NURYOL ENERJİ (DEFNE REG. VE HES)	7.23	HYDRO
ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.913	HYDRO
BİRİM HİDR. ÜRETİM Aİ. (ERFELEK HES)	3.225	HYDRO
BEYTEK EL. ÜR. A.İ. (ÇATALOLUK HES)	9.54	HYDRO
NİSAN E.MEKANİK EN. (BAİAK REG. HES)	6.85	HYDRO
UZUNÇAYIR HES (Tunceli) (İlave)	27.33	HYDRO
FIRTINA ELEKTRİK ÜR. A.İ. (SÜMER HES)	21.6	HYDRO
KAR-EN KARADENİZ EL.A.İ. ARALIK HES	12.41	HYDRO
BİRİM HİDR. ÜRETİM Aİ. (ERFELEK HES)	3.225	HYDRO
KARADENİZ EL.ÜRET. (UZUNDERE-1 HES)	31.076	HYDRO
AKIM ENERJİ (CEVİZLİK REG. VE HES)	91.4	HYDRO
ÇAKIT HES (ÇAKIT ENERJİ A.İ.)	20.18	HYDRO
CEYHAN HES (OİKAN HES) (ENOVA EN.)	23.889	HYDRO
ERENLER REG. ve HES (BME BİR.MÜT.EN.)	45	HYDRO
PAİA REG. VE HES (ÖZGÜR ELEKTRİK)	8.68	HYDRO
GÜZELÇAY-I HES (İLK ELEKTRİK ENERJİ)	3.14	HYDRO
KALE REG. VE HES (KALE ENERJİ ÜR.)	34.14	HYDRO
ERİKLİ-AKOCAK REG. ve AKOCAK HES	41.25	HYDRO
ÇAMLIKAYA REG. VE HES	5.648	HYDRO
DİNAR HES (ELDA ELEKTRİK ÜRETİM)	4.44	HYDRO
DAMLAPINAR HES (CENAY ELEKTRİK ÜR.)	16.424	HYDRO
DİM HES (DİLER ELEKTRİK ÜRETİM)	38.25	HYDRO
ÖZGÜR ELEKTRİK (AZMAK I REG.VE HES)	5.913	HYDRO
KİRPİLİK REG. VE HES (ÖZGÜR ELEKTRİK)	6.24	HYDRO
YAVUZ REG. VE HES (MASAT ENERJİ)	22.5	HYDRO
KAYABÜKÜ REG. VE HES (ELİTE ELEKT.)	14.58	HYDRO
ERİKLİ-AKOCAK REG. ve AKOCAK HES	41.25	HYDRO
GÖK REG. ve HES (GÖK ENERJİ EL. SAN.)	10.008	HYDRO
BULAM REG. VE HES (MEM ENERJİ ELK.)	7.03	HYDRO
KARİIYAKA HES (AKUA ENERJİ ÜRET.)	1.592	HYDRO
CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.605	HYDRO
GÜDÜL I REG. VE HES (YAİAM ENERJİ)	2.36	HYDRO

CEYHAN HES (BERKMAN HES)(ENOVA EN.)	12.605	HYDRO
TEKTUĞ ELEKTRİK (ANDIRIN HES)	40.5	HYDRO
SELEN ELEKTRİK (KEPEZKAYA HES)	28	HYDRO
REİADİYE 2 HES (TURKON MNG ELEKT.)	26.14	HYDRO
KOZAN HES (SER-ER ENERJİ)	4	HYDRO
KAHRAMAN REG. VE HES (KATIRCIOĞLU)	1.42	HYDRO
NARİNKALE REG. VE HES (EBD ENERJİ)	3.1	HYDRO
ERENKÖY REG. VE HES (TÜRKERLER)	21.456	HYDRO
KAHTA I HES (ERDEMYILDIZ ELEK. ÜRT.)	7.12	HYDRO
ULUABAT KUVVET TÜNELİ VE HES	48.51	HYDRO
SABUNSUYU II HES (ANG ENERJİ ELK.)	7.35	HYDRO
BURÇ BENDİ VE HES (AKKUR ENERJİ)	27.33	HYDRO
KARADENİZ EL. (UZUNDERE-1 HES)(İlave)	31.076	HYDRO
MURGUL BAKIR (Ç.Kaya) (İlave)	19.602	HYDRO
GÜZELÇAY-II HES (İLK ELEKTRİK ENERJİ)	4.96	HYDRO
ULUABAT KUVVET TÜNELİ VE HES (İlave)	48.51	HYDRO
REİADİYE 1 HES (TURKON MNG ELEKT.)	15.68	HYDRO
EGEMEN 1 HES (ENERSİS ELEKTRİK)	8.82	HYDRO
YEDİGÖZE HES (YEDİGÖZE ELEKTRİK)	155.33	HYDRO
UMUT III REG. VE HES (NİSAN ELEKTR.)	12	HYDRO
FEKE 2 BARAJI VE HES (AKKUR ENERJİ)	69.34	HYDRO
EGEMEN 1B HES (ENERSİS ELEKTRİK)	11.1	HYDRO
KALKANDERE REG. VE YOKUİLU HES	14.54	HYDRO
ROTOR ELEKTRİK (OSMANİYE RES)	20	WIND
ASMAKİNSAN (BANDIRMA 3 RES)	20	WIND
SOMA ENERJİ ÜRETİM (SOMA RES)	4.5	WIND
ROTOR ELEKTRİK (OSMANİYE RES)	17.5	WIND
DENİZ ELEKTRİK (SEBENOBA RES)	10	WIND
AKDENİZ ELEKTRİK (MERSİN RES)	33	WIND
ASMAKİNSAN (BANDIRMA 3 RES)	4	WIND
BOREAS ENERJİ (BOREAS I ENEZ RES)	15	WIND
ROTOR ELEKTRİK (OSMANİYE RES)	17.5	WIND
BERGAMA RES EN. ÜR. A.İ. ALİAĞA RES	52.5	WIND
BAKRAS EN. ELKT.ÜR. A.İ. İENBÜK RES	15	WIND
ALİZE ENERJİ (KELTEPE RES)	1.8	WIND
ROTOR ELEKTRİK (GÖKÇEDAĞ RES)	20	WIND
SOMA ENERJİ ÜRETİM (SOMA RES)	7.2	WIND
BERGAMA RES EN. ÜR. A.İ. ALİAĞA RES	37.5	WIND
MAZI-3 RES ELEKTRİK (MAZI-3 RES)	7.5	WIND
BORASKO ENERJİ (BANDIRMA RES)	12	WIND

ZİYARET RES (ZİYARET RES ELEKTRİK)	12.5	WIND
SOMA ENERJİ ÜRETİM (SOMA RES)	7.2	WIND
SOMA RES (BİLGİN RÜZGAR SAN. EN.ÜR.)	32.5	WIND
SOMA ENERJİ ÜRETİM (SOMA RES)	6.3	WIND
BELEN ELEKTRİK (BELEN RES) (İlave)	6	WIND
ÜTOPYA ELEKTRİK (DÜZOVA RES) (İlave)	15	WIND
SOMA RES (BİLGİN RÜZGAR SAN) (İlave)	27.5	WIND
SOMA ENERJİ ÜRETİM (SOMA RES) (İlave)	9	WIND
ZİYARET RES (ZİYARET RES ELEK.)(İlave)	22.5	WIND
ROTOR ELEKTRİK (GÖKÇEDAĞ RES) (İlave)	2.5	WIND
SOMA RES (BİLGİN RÜZGAR SAN.)(İlave)	30	WIND
KUYUCAK RES (ALİZE ENERJİ ÜRET.)	8	WIND
KUYUCAK RES (ALİZE ENERJİ ÜR.) (İlave)	17.6	WIND
SARES RES (GARET ENERJİ ÜRETİM)	15	WIND
TURGUTTEPE RES (SABAİ ELEKTRİK ÜR.)	22	WIND

GRAND TOTAL	**4,216.08**
THERMAL TOTAL	**3,147.03**

Table I: Capacity addition in 2011[58]

Name of the plant	Capacity (MW)	Type
AKIM ENERJİ BAŞPINAR (SÜPER FİLM)	25.32	NATURAL GAS
AKSA AKRİLİK (İTHAL KÖM.+D.G)	25	IMP.COAL+N:G.
AKSA ENERJİ (Antalya) (İlave)	300	NATURAL GAS
ALDAŞ ALTYAPI YÖNETİM DANIŞMANLIK	1.95	NATURAL GAS
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	130.95	NATURAL GAS
ALİAĞA ÇAKMAKTEPE ENERJİ (İlave)	8.73	NATURAL GAS
BEKİRLİ TES (İÇDAŞ ELEKTRİK EN.)	600	IMP. COAL
BOLU BELEDİYESİ ÇÖP TOP. TES. BİYOGAZ	1.131	BIOGAS
BOSEN ENERJİ ELEKTRİK ÜRETİM AŞ.	93	NATURAL GAS
BOYTEKS TEKSTİL SAN. VE TİC. A.Ş.	8.6	NATURAL GAS
CENGİZ ÇİFT YAKITLI K.Ç.E.S.	131.335	NATURAL GAS
CENGİZ ENERJİ SAN.VE TİC.A.Ş.	35	NATURAL GAS
CEV ENERJİ ÜRETİM(GAZİANTEP ÇÖP BİOGAZ)	4.524	BIOGAS
FRAPORT IC İÇTAŞ ANTALYA HAVALİMANI	8	NATURAL GAS
GLOBAL ENERJİ (PELİTLİK)	4	NATURAL GAS
GORDİON AVM (REDEVCO ÜÇ EMLAK)	2.014	NATURAL GAS
GOREN-1 (GAZİANTEP ORGANİZE SAN.)	48.65	NATURAL GAS

[58] http://www.teias.gov.tr/KapasiteProjeksiyonuARALIK2012.pdf

GÜLLE ENERJİ(Çorlu) (İlave)	3.904	NATURAL GAS
HASIRCI TEKSTİL TİC. VE SAN. LTD. ŞTİ.	2	NATURAL GAS
HG ENERJİ ELEKTRİK ÜRET. SAN.TİC. A.Ş.	52.38	NATURAL GAS
ISPARTA MENSUCAT (Isparta)	4.3	NATURAL GAS
ITC ADANA ENERJİ ÜRETİM (İlave)	1.415	WASTE
ITC-KA EN. (ASLIM BİYOKÜTLE) KONYA	4.245	BIOMASS
ITC-KA EN. (ASLIM BİYOKÜTLE) KONYA	1.415	BIOMASS
ITC-KA ENERJİ (SİNCAN) (İlave)	1.416	WASTE
ITC-KA ENERJİ MAMAK KATI ATIK TOP.	2.826	BIOGAS
İSTANBUL SABİHA GÖKÇEN UL.AR. HAV.	4	NATURAL GAS
KARKEY (SİLOPİ 1)	100.44	FUEL OIL
KAYSERİ KATI ATIK DEPONİ SAHASI	1.56	BIOGAS
KNAUF İNŞ. VE YAPI ELEMANLARI SN.	1.558	NATURAL GAS
LOKMAN HEKİM ENGÜRÜ SAĞ.(SİNCAN)	0.514	NATURAL GAS
MARDİN-KIZILTEPE (AKSA ENERJİ)	32.1	FUEL OIL
MOSB Enerji Elektrik Üretim Ltd. Şti.(İlave)	43.5	NATURAL GAS
NUH ENERJİ EL. ÜRT.A.Ş. (ENERJİ SANT.-2)	119.98	NATURAL GAS
ODAŞ DOĞALGAZ KÇS (ODAŞ ELEKTRİK)	54.96	NATURAL GAS
POLYPLEX EUROPA POLYESTER FİLM	3.904	NATURAL GAS
SAMSUN TEKKEKÖY EN. SAN. (AKSA EN.)	131.335	NATURAL GAS
SAMUR HALI A.Ş.	4.3	NATURAL GAS
SARAY HALI A.Ş.	4.29	NATURAL GAS
ŞANLIURFA OSB (RASA ENERJİ ÜR. A.Ş.)	116.76	NATURAL GAS
ÇEŞMEBAŞI REG. VE HES (GİMAK EN.)	8.2	HYDRO
ÇUKURÇAYI HES (AYDEMİR ELEKTRİK ÜR.)	1.8	HYDRO
DARCA HES (BÜKOR ELEKTRİK ÜRETİM)	8.91	HYDRO
DEĞİRMENDERE (Kadirli) (KA-FNİH ELEK.)	0.5	HYDRO
DERME (KAYSERİ VE CİVARI ENERJİ)	4.5	HYDRO
DURU 2 REG. VE HES (DURUCASU ELEK.)	4.49	HYDRO
ERENKÖY REG. VE HES (NEHİR ENERJİ)	21.456	HYDRO
ERKENEK (KAYSERİ VE CİVARI ENERJİ)	0.32	HYDRO
EŞEN-1 HES (GÖLTAŞ ENERJİ ELEKTRİK)	30	HYDRO
EŞEN-1 HES (GÖLTAŞ ENERJİ ELEKTRİK)	30	HYDRO
GİRLEVİK (BOYDAK ENERJİ)	3.04	HYDRO
GÖKMEN REG. VE HES (SU-GÜCÜ ELEKT.)	2.869	HYDRO
HACININOĞLU HES (ENERJİ-SA ENERJİ)	71.14	HYDRO
HACININOĞLU HES (ENERJİ-SA ENERJİ)	71.14	HYDRO
HAKKARİ (Otluca) (NAS ENERJİ A.Ş.)	1.28	HYDRO
HASANLAR	9.35	HYDRO
HASANLAR HES (DÜZCE ENERJİ BİRLİĞİ)	4.68	HYDRO
İNCİRLİ REG. VE HES (LASKAR ENERJİ)	25.2	HYDRO
İNEGÖL(Cerrah) (KENT SOLAR ELEKTRİK)	0.272	HYDRO
İZNİK (Dereköy) (KENT SOLAR ELEKTRİK)	0.24	HYDRO

KALKANDERE REG. VE YOKUŞLU HES	23.36	HYDRO
KARAÇAY (Osmaniye) (KA-FNİH ELEKTRİK)	0.4	HYDRO
KARASU 4-2 HES (İDEAL ENERJİ ÜRETİMİ)	10.35	HYDRO
KARASU 4-3 HES (İDEAL ENERJİ ÜRETİMİ)	4.6	HYDRO
KARASU 5 HES (İDEAL ENERJİ ÜRETİMİ)	4.1	HYDRO
KARASU I HES (İDEAL ENERJİ ÜRETİMİ)	3.84	HYDRO
KARASU II HES (İDEAL ENERJİ ÜRETİMİ)	3.08	HYDRO
KAYADİBİ (BARTIN) (İVME ELEKTROMEK.)	0.464	HYDRO
KAZANKAYA REG. VE İNCESU HES (AKSA)	15	HYDRO
KERNEK (KAYSERİ VE CİVARI ENERJİ)	0.832	HYDRO
KESME REG. VE HES (KIVANÇ ENERJİ)	2.305	HYDRO
KESME REG. VE HES (KIVANÇ ENERJİ)	2.305	HYDRO
KIRAN HES (ARSAN ENERJİ A.Ş.)	9.74	HYDRO
KORUKÖY HES (AKAR ENERJİ SAN. TİC.)	3.03	HYDRO
KOVADA-I (BATIÇİM ENERJİ ELEKTRİK)	8.25	HYDRO
KOVADA-II (BATIÇİM ENERJİ ELEKTRİK)	51.2	HYDRO
KOZDERE HES (ADO MADENCİLİK ELKT.)	3.145	HYDRO
KÖYOBASI HES (ŞİRİKOĞLU ELEKTRİK)	1.07	HYDRO
KULP I HES (YILDIZLAR ENERJİ ELK.ÜR.)	22.92	HYDRO
KUMKÖY HES (AES-IC İÇTAŞ ENERJİ)	17.49	HYDRO
KUZUCULU (Dörtyol) (KA-FNİH ELEKTRİK)	0.272	HYDRO
M.KEMALPAŞA (Suuçtu) (KENT SOLAR)	0.472	HYDRO
MALAZGİRT (MOSTAR ENERJİ ELEKTRİK)	1.216	HYDRO
TEKİRDAĞ-ÇORLU TEKS.TES.(NİL ÖRME)	2.677	NATURAL GAS
TİRENDA TİRE ENERJİ ÜRETİM A.Ş.	58.38	NATURAL GAS
TOROS TARIM (MERSİN) (NAFTA+D.GAZ)	12.136	NATURAL GAS
TÜPRAŞ O.A. RAFİNERİ (Kırıkkale) (İlave)	12	FUELOIL
YENİ UŞAK ENERJİ ELEKTRİK SANTRALI	8.73	NATURAL GAS
ZORLU ENERJİ (B.Karıştıran)	7.2	NATURAL GAS
AYDIN/GERMENCİK JEOTERMAL	20	GEOTHERMAL
ADİLCEVAZ (MOSTAR ENERJİ ELEKTRİK)	0.394	HYDRO
AHLAT (MOSTAR ENERJİ ELEKTRİK)	0.201	HYDRO
AKSU REG. VE HES (KALEN ENERJİ)	5.2	HYDRO
ALKUMRU BARAJI VE HES (LİMAK HİD.)	174.18	HYDRO
ALKUMRU BARAJI VE HES (LİMAK HİD.)	87.09	HYDRO
AYRANCILAR HES (MURADİYE ELEKTRİK)	18.718	HYDRO
AYRANCILAR HES (MURADİYE ELEKTRİK)	13.377	HYDRO
ŞELALE HES (MURADİYE ELEKTRİK ÜR.)	13.377	HYDRO
BALKONDU I HES (BTA ELEKTRİK ENERJİ)	9.191	HYDRO
BATMAN	0.475	HYDRO
BAYBURT (BOYDAK ENERJİ)	0.396	HYDRO
BAYRAMHACILI BARAJI VE HES	47	HYDRO
BERDAN	10.2	HYDRO

BESNİ KAYSERİ VE CİVARI ENERJİ)	0.272	HYDRO
BOĞUNTU HES (BEYOBASI ENERJİ)	3.801	HYDRO
BÜNYAN (KAYSERİ VE CİVARI EL. T.A.Ş)	1.156	HYDRO
CEVHER I-II REG. VE HES (ÖZCEVHER EN.)	16.36	HYDRO
ÇAĞ-ÇAĞ (NAS ENERJİ A.Ş.)	14.4	HYDRO
ÇAKIRMAN REG. VE HES (YUSAKA EN.)	6.98	HYDRO
ÇAMARDI (KAYSERİ VE CİVARI EL. T.A.Ş)	0.069	HYDRO
ÇAMLICA III HES (ÇAMLICA ELEKTRİK)	27.618	HYDRO
ÇAMLIKAYA REG.VE HES (ÇAMLIKAYA EN)	2.824	HYDRO
ÇANAKÇI HES (CAN ENERJİ ENTEGRE)	4.633	HYDRO
ÇANAKÇI HES (CAN ENERJİ ENTEGRE)	4.633	HYDRO
ÇEMİŞKEZEK (BOYDAK ENERJİ)	0.116	HYDRO
AKRES (AKHİSAR RÜZGAR EN. ELEKT.)	20	WIND
AKRES (AKHİSAR RÜZGAR EN. ELEKT.)	20	WIND
AKRES (AKHİSAR RÜZGAR EN. ELEKT.)	3.75	WIND
AYVACIK RES (AYRES AYVACIK RÜZG.)	5	WIND
BAKİ ELEKTRİK ŞAMLI RÜZGAR (İlave)	24	WIND
BANDIRMA ENERJİ (BANDIRMA RES)	3	WIND
ÇANAKKALE RES (ENERJİ-SA ENERJİ)	25.3	WIND
ÇANAKKALE RES (ENERJİ-SA ENERJİ)	4.6	WIND
ÇATALTEPE RES (ALİZE ENERJİ ELEKTRİK)	16	WIND
İNNORES ELEKTRİK YUNTDAĞ RÜZGAR	10	WIND
KİLLİK RES (PEM ENERJİ A.Ş.)	20	WIND
KİLLİK RES (PEM ENERJİ A.Ş.) (İlave)	15	WIND
KİLLİK RES (PEM ENERJİ A.Ş.) (İlave)	5	WIND
MENGE BARAJI VE HES (ENERJİSA ENERJİ)	44.71	HYDRO
MOLU ENERJİ (Zamantı-Bahçelik HES)	4.17	HYDRO
MURATLI REG. VE HES (ARMAHES EL.)	26.7	HYDRO
NARİNKALE REG. VE HES (EBD ENERJİ)	30.4	HYDRO
OTLUCA I HES (BEYOBASI ENERJİ ÜR.)	37.539	HYDRO
OTLUCA II HES (BEYOBASI ENERJİ ÜR.)	6.36	HYDRO
ÖREN REG. VE HES (ÇELİKLER ELEKTRİK)	6.644	HYDRO
PINARBAŞI (KAYSERİ VE CİVARI EL.T.A.Ş)	0.099	HYDRO
POYRAZ HES (YEŞİL ENERJİ ELEKTRİK)	2.66	HYDRO
SARAÇBENDİ HES (ÇAMLICA ELEKTRİK)	25.48	HYDRO
SARIKAVAK HES (ESER ENERJİ YAT. AŞ.)	8.06	HYDRO
SAYAN HES (KAREL ELEKTRİK ÜRETİM)	14.896	HYDRO
SEFAKÖY HES (PURE ENERJİ ÜRETİM AŞ.)	33.11	HYDRO
DAREN HES ELEKTRİK (SEYRANTEPE)	49.7	HYDRO
SIZIR (KAYSERİ VE CİVARI EL. T.A.Ş)	5.763	HYDRO
SÖĞÜTLÜKAYA (POSOF III) HES	6.13	HYDRO
TEFEN HES (AKSU MADENCİLİK SAN.)	22	HYDRO
TEFEN HES (AKSU MADENCİLİK SAN.)	11	HYDRO

TEKTUĞ (Erkenek)	0.514	HYDRO
TURUNÇOVA(Finike) (TURUNÇOVA EN.)	0.552	HYDRO
TUZTAŞI HES (GÜRÜZ ELEKTRİK ÜR.)	1.605	HYDRO
ULUDERE (NAS ENERJİ A.Ş.)	0.64	HYDRO
ÜZÜMLÜ HES (AKGÜN ENERJİ ÜRETİM)	11.358	HYDRO
VARTO (MOSTAR ENERJİ ELEKTRİK)	0.292	HYDRO
YAMAÇ HES (YAMAÇ ENERJİ ÜRETİM A.Ş.)	5.46	HYDRO
YAPISAN (KARICA REG. ve DARICA I HES)	13.32	HYDRO
YAPRAK II HES (NİSAN ELEKTROMEK.)	5.4	HYDRO
YAPRAK II HES (NİSAN ELEKTROMEK.)	5.4	HYDRO
YAŞIL HES (YAŞIL ENERJİ ELEKTRİK)	1.518	HYDRO
YAŞIL HES (YAŞIL ENERJİ ELEKTRİK)	2.276	HYDRO
YEDİGÖL REG. VE HES (YEDİGÖL HİDR.)	21.9	HYDRO
YEDİGÖZE HES (YEDİGÖZE ELEK.) (İlave)	155.35	HYDRO
SARES RES (GARET ENERJİ ÜRETİM)	7.5	WIND
SEYİTALİ RES (DORUK ENERJİ ELEKTRİK)	30	WIND
SOMA RES (SOMA ENERJİ) (İlave)	20	WIND
SOMA RES (SOMA ENERJİ) (İlave)	16.9	WIND
SUSURLUK RES (ALANTEK ENERJİ ÜRET.)	12.5	WIND
SUSURLUK RES (ALANTEK ENERJİ ÜRET.)	10	WIND
SUSURLUK RES (ALANTEK ENERJİ ÜRET.)	12.5	WIND
SUSURLUK RES (ALANTEK ENERJİ ÜRET.)	10	WIND
ŞAH RES (GALATA WİND ENERJİ LTD. ŞTİ)	63	WIND
ŞAH RES (GALATA WİND ENERJİ LTD. ŞTİ)	27	WIND
ŞAH RES (GALATA WİND ENERJİ LTD. ŞTİ)	3	WIND
TURGUTTEPE RES (SABAŞ ELEKTRİK)	2	WIND
ZİYARET RES (ZİYARET RES ELEKTRİK)	22.5	WIND

GRAND TOTAL	**4,163.47**
THERMAL TOTAL	**2,203.90**

Appendix 5: Further background information on monitoring plan

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

Monitoring data is collected in accordance with the agreement[59] done between the project owner and Turkish Electricity Distribution Company (TEDAS) which provides the infrastructure for the connection to the national grid. The metering system is defined in the agreement as two groups: main meter and back up meter. The design of the metering system is checked and approved by TEDAS before commissioning of the plant. The technical specifications of the power meters should be in line with Measure and Metering Devices Regulation[60] by Ministry of Industry and Trade. In addition, the Communiqué for Power Meters announced by Energy Market Regulations Authority (EMRA)[61] requires all meters to be in line with either Turkish Standards Institution[62] or International Electro-technical Commissions Standards. The meters are placed at the point the electricity is fed to the grid and sealed on behalf of the both parties. This prevents any intervention and assures the accuracy and quality of the measurements.

The main and spare meter readings are recorded monthly and cross-checked whether calibration is required. The capacity of the transmission line connected is 154 kVA, the accuracy class for power meters have been defined in the Communiqué for Power Meters[63] as 0.5S class. The calibration will be implemented in accordance with the related standard procedures (Please see the table below). The periodical maintenance is under the responsibility of TEDAS and has been fixed as once in 10 years in accordance with Article.9 of Measure and Metering Devices Regulation[64].

Standards for power meters

Capacity of the transmission line	Greater than 100 MVA	100 MVA -10 MVA	Lower than 10 MVA
Active power meters	IEC-EN 60687 0.2S class	IEC-EN 60687 0.5S class	IEC-EN 60687 0.5 class
Reactive power meters	IEC-EN 61268 2 class	IEC-EN 61268 2 class	IEC-EN 61268 2 class

Appendix 6: Summary of post registration changes

- - - - -

[59] http://www.tedas.gov.tr/7.Basvuru_Detay.html
[60] http://www.mevzuat.adalet.gov.tr/html/21179.html
[61] http://www2.epdk.gov.tr/mevzuat/teblig/elektrik/sayac/sayac.pdf
[62] http://global.tse.org.tr/
[63] http://www2.epdk.gov.tr/mevzuat/teblig/elektrik/sayac/sayac.pdf
[64] http://www.mevzuat.adalet.gov.tr/html/21179.html

History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Annex 34 15 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02	EB 20, Annex 14 08 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		