CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

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SECTION A. General description of project activity

A.1. Title of the project activity:

Aliağa Wind Power Plant
Version 2.2.
21 March 2011

A.2. Description of the project activity:

The project involves installation of **36 wind turbines**, each having a capacity of **2.5 MW** in Aliağa Borough of İzmir, Turkey. The project is being developed by Bergama RES Enerji Üretim A.Ş.

The purpose of the project activity is to export the generated electricity to the regional grid thereby contributing towards country's electricity demand as well as Turkish economy. The total installed capacity of the project is **90.0 MW** and the expected annual electricity generation is **294,900 MWh**. The project activity displaces electricity generation from grid connected fossil fuel based power plants and contributes to clean energy generation. The project is estimated to reduce approximately **175,123 tonnes of CO_2e per annum** which would otherwise have been released from the generation of equivalent amount of fossil fuel based electricity generation by National Grid of Turkey.

The project wind turbines (3-blade) will be located on the top of Danişment Hill, Dutluyayla Hill, Halayık Hill ve Sıyırdım Hill and will cover an area of 145 hectares. The site selection is based on detailed wind measurements, smoothness of the surface, availability of the topographical conditions for access and construction, the available area size and the distance to the national grid connection point. For more details please refer section A.4.3

In absence of the project activity (same as pre project scenario) equivalent amount of electricity would have been generated in the regional grid which is electricity deficient. The 9th Official Development Plan published by the State Planning Organization, Turkey states that the electricity demand is expected to increase by 8.1 % each year over the period from 2007-13. This is primarily due to the expected developments in the industry, production and service sectors[1]. The Global Wind Energy Council has also stated, "Turkey's economy, which is growing at around 8% per year, is hungry for energy. At the moment, with around 42 GW of total installed power generation capacity, the country gets one third of its electricity from hydroelectric generation, one third from natural gas and one quarter from coal. The rest is made up of liquefied petroleum gas, wind energy and other sources. Power demand has been growing by about 9% each year, and power shortages are already widespread.[2]" Considering that the majority of the installed capacity of electricity generation is in form of fossil fuel power plants in the country.

The project contributes to sustainable development by lowering energy costs and the dependency on imported resources like natural gas and oil. Turkey, being in a region where continuous and powerful wind resources exist, it has great potential to utilise renewable resources for electricity generation[3].

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[1] Paragraph 341 at the "9th Official Development Plan (2007 to 2013)" published by SPO

[2] http://www.gwec.net/index.php?id=133 (Last visited 23.06.2010)

[3] *http://www.yesilekonomi.com/yayinlar/yesilkose/yenilenebilir-enerji-kaynaklari.htm (Last visited on 28.10.2010)*
http://www.eie.gov.tr/duyurular/YEK/YEKrepa/REPA-duyuru_01.html
http://www.cumhuriyet.com.tr/?hn=149076
http://www.alternaturk.org/turkiyede-ruzgar-enerjisi.php
http://www.solar-santral.com/menu_detay.asp?id=326

One of the Millennium Development Goals of Turkey is defined as "Target.9. Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources". Air pollution is one of the concerns under the heading defined with three indicators:

- Energy use per $1 Gross Domestic Product: Energy production and consumption have not reached the desired levels and total energy supply per $1 GDP is below OECD average. Turkey's GDP decreased due to the unstable economic environment, however unit price of energy increased.
- Carbon dioxide emissions (per capita) and consumption of ozone depleting CFCs: CO_2 emissions are the highest among the other greenhouse gas (GHG) emissions. 10% increase in CO_2 emissions per capita has been observed between1995-2003.
- Proportion of the population using solid fuels.[4]

The project will contribute to these targets in Millennium Development Goals by:

- Utilising local renewable resources for electricity production and lowering the unit price of energy,
- Lowering CO_2 emissions by promoting clean energy production instead of fossil fuel fired power plants.

The project also stimulates the economic development as wind power, being an infinite and natural resource, is more ecologically and financially sustainable than other choices.

From a local perspective, the project will provide job opportunities for local people and create household income for them. Associated works such as wiring will be done by local companies and this will increase their technological capacity in renewable energy projects and will stimulate the local economy as well.

The significant dates in the development of the project's history are summarized below in Table1:**Project schedule**	**Date**
Investment decision Date	02/06/08
Licence Date:	17/07/08
Signing of ERPA	08/10/08
LSC Meeting	07/11/08
Last Modification to licence	07/04/09
Turbine Supply and Installation Agreement	08/05/09
DOE Agreement	20/05/09
Construction/ RecruitmentStartDate	17/07/09
DOE Site Visit	25/08/09
LSC Report Uploaded to APX/GS Registry	03/09/09
LSC Feedback report uploaded	15/10/09
Partial Comissioning Date	09/04/10
Full Comissioning Date	16/06/10

Table 1: Significant Dates fot The Aliağa Wind Power Plant Project's Development

A.3. Project participants:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)

[4] Millennium Development Goals Report, Turkey 2005

Turkey (host)	Bergama RES Enerji Üretim A.Ş.[5]	No
USA and United Kingdom	JPMorgan Ventures Energy Corporation[6]	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

The project will be in Aliağa, İzmir, Turkey

A.4.1.1. Host Party(ies):

Republic of Turkey

A.4.1.2. Region/State/Province etc.:

Aegean region, Province of İzmir (Figure.1)

Figure 1. Aliağa Borough, İzmir, Turkey (Google Map)

A.4.1.3. City/Town/Community etc.:

Aliağa Borough (Figure.2)

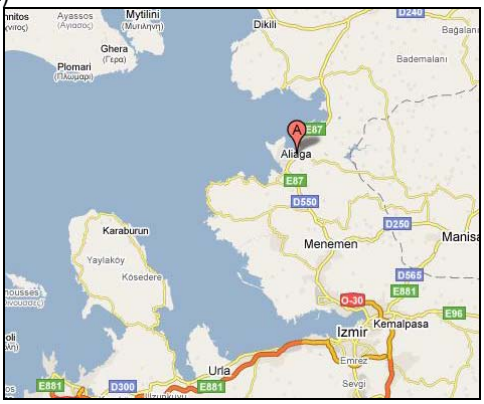

Figure 2: Aliağa Borough (Google Map)

[5] Private Entity
[6] Private Entity

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The turbines will be located on top of the four hills namely Danişment, Dutluyayla, Halayık and Sıyırdım. The residential areas nearby are İsmailli, Yüksekköy and Atçılar . İsmailli Village is 500 m away from Turbine1.; Atçılar Village is 500m away from Turbine19 and Turbine28 and Yüksekköy is 2,500m from Turbine10 (Table2 & Figure.3)

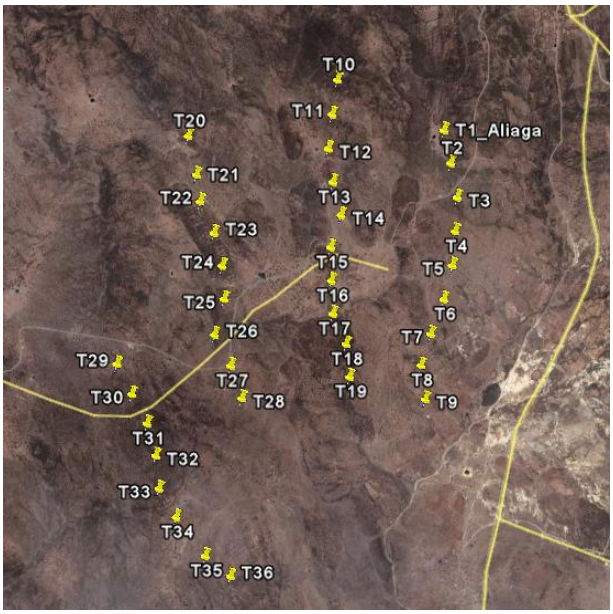

Figure 3: Location of the turbines (Google Earth)

Table 2: Coordinates of the turbines

Turbine No	Latitude N			Longitude E		
1	38^0	55’	7.3838”	27^0	12’	20.03116”
2	38^0	54’	58.3602”	27^0	12’	25.43237”
3	38^0	54’	49.1128”	27^0	12’	30.78585”
4	38^0	54’	39.5428”	27^0	12’	33.05612”
5	38^0	54’	29.7919”	27^0	12’	35.15977”
6	38^0	54’	19.6102”	27^0	12’	35.07789”
7	38^0	54’	8.8708”	27^0	12’	33.37567”
8	38^0	53’	59.0679”	27^0	12’	32.59729”
9	38^0	53’	49.5377”	27^0	12’	37.34157”
10	38^0	55’	13.7393”	27^0	11’	36.72474”
11	38^0	55’	3.7754”	27^0	11’	37.77742”
12	38^0	54’	54.0488”	27^0	11’	39.18343”
13	38^0	54’	44.9633”	27^0	11’	43.86103”
14	38^0	54’	36.2990”	27^0	11’	49.686”
15	38^0	54’	26.5547”	27^0	11’	48.58283”

16	38^0	54'	17.0909''	27^0	11'	51.67789''
17	38^0	54'	7.7013''	27^0	11'	55.25706''
18	38^0	53'	59.8989''	27^0	12'	2.754782''
19	38^0	53'	50.6969''	27^0	12'	7.014204''
20	38^0	54'	48.1231''	27^0	10'	46.47183''
21	38^0	54'	37.5314''	27^0	10'	53.07111''
22	38^0	54'	30.3223''	27^0	10'	56.77304''
23	38^0	54'	22.2483''	27^0	11'	4.671697''
24	38^0	54'	13.4900''	27^0	11'	10.5533''
25	38^0	54'	4.2087''	27^0	11'	14.18554''
26	38^0	53'	53.3885''	27^0	11'	13.8483''
27	38^0	53'	45.6545''	27^0	11'	22.39688''
28	38^0	53'	37.1520''	27^0	11'	29.27615''
29	38^0	53'	38.2058''	27^0	10'	40.28094''
30	38^0	53'	30.5914''	27^0	10'	48.18636''
31	38^0	53'	23.1916''	27^0	10'	56.30139''
32	38^0	53'	14.2829''	27^0	11'	1.906591''
33	38^0	53'	4.9605''	27^0	11'	5.964212''
34	38^0	52'	57.8071''	27^0	11'	14.86509''
35	38^0	52'	48.5874''	27^0	11'	29.19314''
36	38^0	52'	44.3829''	27^0	11'	40.37758''

A.4.2. Category(ies) of project activity:

The project category is Sectoral Scope 1: Energy industries (renewable /non-renewable sources).

A.4.3. Technology to be employed by the project activity:

The project aims to generate electricity by utilising wind power to supply the increasing national electricity demand in a more cleaner and sustainable manner. It will reduce the air pollution caused by the grid connected power plants which are mostly fossil fuel fired. The following Figure (Figure 4) exhibits the schematic representation of the project and its boundaries.

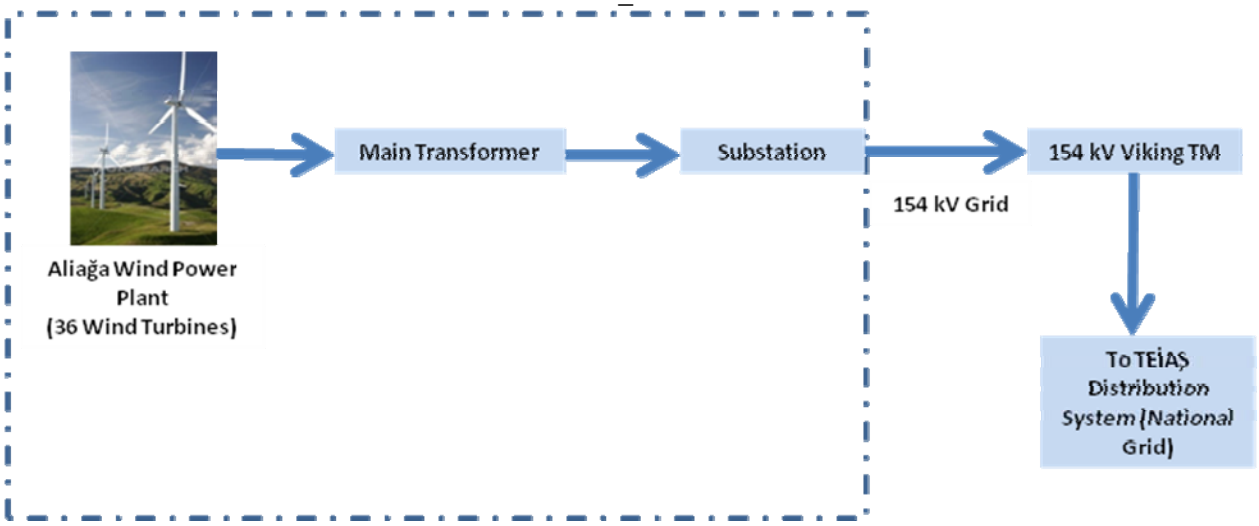

Figure 4: The Schematic representation of the Project.

The project comprises **36** wind turbines, each having **2.5MW** capacity, which will be located in Aliağa, İzmir, Turkey. The total installed capacity is **90.0 MW** and the annual electricity generation will be **294,900 MWh.** The project is a green field project and in the absence of the project activity an equivalent amount of electricity would have been generated in the fossil fuel based regional grid.

High speed, 3 blade wind turbines will be used for the project. Such high speed turbines are lighter and cheaper than low speed turbines, operating with a low torque and a low rate of rotation. The turbine blades have the ability to change angles according to wind direction. The towers will be 80 m high and 3m in diameter. The diameter of the blades is 90m. The electricity generated by the wind turbines will be transferred to switchgear through underground wiring and then will be passed to the interconnection with the national grid via 60 utility poles, each having 35m height, placed on the ground along 18 kms. The connection point will be Viking TM, 154 KV bus tie[7].

Based on the micrositing studies each turbine location is placed to achieve maximum yield from the wind blow. As indicated in their catalogue[8], the Nordex N90 2.5 MW turbines provide energy at even lower wind speeds (Figure.6). However the overall efficiency of the wind turbine is dependent on the placement of each turbine based on the research conducted prior to project implementation. According to the micrositing report by DEWI GMbH the overall efficiency of the wind farm is estimated to be 37.4% with 75% probability.

Figure 5: N90/2500 LS Power curve indicates that the turbines will be providing high yield at even lower wind speeds (Figure taken from the catalogue of N90 Nordex Turbines)

The following table (Table 3) is a list of the equipment that will be installed to the Aliağa Wind Power Plant:

Table 3: List of Equipments that will be installed to the Aliağa Wind Power Plant.

[8] N90 N**ordex N90/2500** New dimensions in the 3rd generation.(Manufacturer's product brochure,01,2009 available at http://www.nordex-online.com/fileadmin/MEDIA/Produktinfos/EN/N90_2500_Broschuere_GB_web.pdf)

Name of Part	Unit
Anchor Parts	36
Tower Section 1	36
Tower Section 2	36
Tower Section 3	36
Tower Section 4	36
Tower Equipment	36
Tower Bolts	36
Blade 1	36
Blade 2	36
Blade 3	36
Nacelle incl. Accessories	36
Drive Train	36
Cooling Hood	36
Hub	36
Converter Cabinet	36
Accessory and Consumable Container	36
Scada Equipment	1
Electricity Meters[9]	2

The project provides sustainable means of electricity generation compared to the fossil fuel fired thermal power plants. The majority of the electricity generated in the grid is from natural gas fired power plants and there are no incentives or future targets defined for wind energy by the government. The know-how and technology will be imported from European countries in the context of the project which will stimulate the development of wind energy sector in the country. Thus, the project uses an environmentally safe and sound technology in the project activity.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

The annual electricity generation is estimated to be **294,900 MWh** and approximately **175,123 tCO_2** emissions per year will be saved by the project. The amount of emission reduction totals **1,225,861 tCO_2** over the crediting period of **7 years** (Table 4).

Table 4- Expected emission reduction by the project activity

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2010 (1 April to 31 December 2010)	131,342
2011	175,123
2012	175,123
2013	175,123
2014	175,123

[9] The electricity meters belong to TEİAŞ, and will be sealed and locked as they will be installed in the main control room.

2015	175,123
2016	175,123
2017	43,781
Total emission reductions (tonnes of CO2e)	**1, 225,861**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions	**175,123**

A.4.5. Public funding of the project activity:

No public funding from an Annex 1 party is involved in the project activity

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

(a) Version 12 of ACM0002 "Consolidated baseline methodology for grid connected electricity generation from renewable sources "

The above methodology is hereafter referred to as the "Baseline Methodology". The Baseline Methodology will be used in conjunction with the approved monitoring methodology Version 12 of ACM0002 ("Monitoring Methodology").

(b) Version 5.2 of "Tool for the demonstration and assessment of additionality"
(c) Version 2 of "Tool to calculate emission factor of electricity system"

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

ACM0002 methodology defines the baseline scenario for the proposed project as:

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the Tool to calculate the emission factor for an electricity system.

The choice of methodology ACM0002, Version 12, is justified as the project activity meets its applicability criteria:

- The Aliağa Wind Power Plant Project is a grid-connected renewable power generation project that generates electricity from wind power.
- The project does not involve switching from fossil fuels to renewable energy at the site of the project activity, neither is it a biomass fired power plant nor a hydro power plant that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m^2.
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

B.3. Description of the sources and gases included in the project boundary:

Table 5 shows the main gases included in the project boundary. In accordance with ACM0002 ver. 12, the project activity does not result in project emissions

-Table 5: Main gases included in the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation in baseline (Turkey Grid)	CO_2	Yes	Main Emission Source
		CH_4	No	Excluded for simplification
		N_2O	No	Excluded for simplification
Project Activity	Not applicable to wind power projects as per ACM0002 version 12			

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The Proposed project is the installation of a new grid-connected renewable power plant and the baseline scenario is the following as per ACM0002 (Version 12.0.0):

> *"Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the .Tool to calculate the emission factor for an electricity system."*

The proposed project is connected to the Turkish National Grid. Therefore the baseline scenario of the proposed project is the provision of the equivalent amount of annual power output by the Turkish Grid which is the continued operation of existing power plants and the addition of new sources to meet electricity demand.

According to ACM002, baseline emissions are equal to power generated by the project that is delivered the Turkish Grid, multiplied by the baseline emissions factor. This baseline emissions factor (EFy) is calculated as the Combined Margin (CM). The analysis and description in B.5. and B.6. supports the baseline scenario selected above.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

The project activity reduces GHG emissions by substituting fossil fuel based electricity generation by renewable resources (wind) based electricity generation.

This section refers to the Tool to for the Demonstration and Assessment of Additionality Version 5.2 and the numbering in this section reflect the Tool's Guidelines provided at EB 39.

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

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

Project activities that apply the tool in context of approved consolidated methodology ACM0002 only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity. The following two alternatives to the Project activity are considered here in detail:

Scenario (a): The proposed Project activity undertaken without being registered as a GS VER project activity, i.e. the construction of a new wind electricity generation plant with an installed capacity of 90 MW, connected to the local grid, and implemented without considering VER revenues.

Scenario (b): Continuation of the current situation, i.e. electricity will continue to be generated by the existing generation mix operating in the Turkey regional grid.

Outcome of Step 1a: The only realistic and credible alternative scenario to the project activity is Scenario (b) Supply of equal amount of electricity by the existing grid.

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

The alternative Scenario (b) is in compliance with all mandatory applicable and legal and regulatory requirements. New power generation capacity is regulated by Electricity Market Regulation Authority (EMRA) who issues the licenses for electricity generation and is responsible for ensuring that new capacity applies with its rules and regulations.

Outcome of Step 1b: The alternative scenario to the project activity is the supply of electricity by the existing grid with additional capacity is in compliance with mandatory legislation and regulations.

Step 2 - Investment analysis
The "the proposed project activity is not the most economically and financially attractive" is demonstrated below:

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
-

Simple Cost Analysis is not applicable because project generates economical benefits from sale of electricity to grid. Investment Comparison Analysis is also eliminated since the baseline for the project is generation of electricity by the grid and no similar investment alternatives exist.. Therefore, Benchmark Analysis is the most appropriate approach for the evaluation of the project investment.

Sub-step 2b - Option III-Apply benchmark analysis
IRR is the most appropriate financial indicator for analysing the project.

The Tool for the Demonstration and Assessment of Additionality Version 5.2 and its Guidelines issued at EB 39 state that "Discount rates and benchmarks shall be derived from a) Government bond rates, increased by a suitable risk premium to reflect private investment and/or project type . . . or documented by official publicly available financial data".

Eurobond Rates
In this analysis, we use the return on Turkish government issued Eurobonds at the time the investment decision for the project was made, increased by a suitable risk premium that reflects an equity investment in a wind energy project. The premium is determined using the Capital Asset Pricing model and the Weighted Average Cost of Capital Model.

In line with the Tool for the Demonstration and Assessment of Additionality Version 5.2, the Eurobond rate from Government issued bonds is taken to be the benchmark or most basic and low risk return available to Turkish

Investors. Investment in the Project is made primarily in Euros (not Turkish Lira), therefore, the investment analysis is done by comparing the return on the Project to returns relatively risk free government Eurobonds.
On the investment decision date, June 2nd, 2008, Turkish Government issued Euro denominated Eurobonds maturing in 2019 were yielding 7.15%[10]

Capital Asset pricing Model
The Capital Asset Pricing Model (CAPM)[11] provides the asset-appropriate required return rate and can be utilised as a bench mark to compare the IRR value of the project since the model provides us with the rate at which future cash flows produced by the asset should be discounted given that asset's relative risks. The model is expressed by the following formula:

$$\frac{E\ (R_i) - R_f}{\beta_i} = E(R_m) - E(R_f)$$

Where, $E(R_i)$ strands for the expected return on the capital asset
R_f stands for the risk-free rate of interest such as interest arising from government bonds
$E(R_m)$ stands for the expected return of the market
$E(R_m)$-$E(R_f)$ is also sometimes known as the *market premium* or *risk premium* (the difference between the expected market rate of return and the risk-free rate of return).
And,
Bi stands for the sensitivity of the expected excess asset returns to the expected excess market returns, formulated as :

$$\beta_{i=}\frac{Cov\ (R_i,R_m)}{Var\ (R_m)}$$

Since beta reflects asset-specific sensitivity to non-diversifiable, i.e. market risk, the market as a whole, by definition, has a beta of "one". In our case as it is not possible to derive a Beta value specific to renewable energy investments with Turkey, it is reasonable to assume Beta as one and expect that this investment will behave parallel to the entire risk behaviour of the Turkish market.

Turkish Equity Risk Prem. = U.S. ERP (5.0%) x Istanbul Stock Exchange Volatility[12] (37%) / Volatility of S&P500 22%[13]
= 8.41%

And where Cost of Equity = EuroBond (7.15) + Beta (1) x Equity Risk Premium (8.41%)
= 15.56%

Weighted Average Cost of Capital

The Weighted Average Cost of Capital is a measure of the returns required from a project that is funded by both debt and equity. It may be formulated as:

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[10] See web page http://www.ziraat.com.tr/tr/bankamiz/faiz-ve-ucretler/aspx/eurobond.aspx and enter 2nd June 2008 in the drop down boxes.

[11] Black, Fischer., Michael C. Jensen, and Myron Scholes (1972). *The Capital Asset Pricing Model: Some Empirical Tests*, pp. 79-121 in M. Jensen ed., Studies in the Theory of Capital Markets. New York: Praeger Publishers.

[12] From Bloomberg for the investment decision date

13 http://www.tcmb.gov.tr/kurlar/200806/02062008.html

$WACC=(W_d.C_d) +(W_e.C_e)$

Where:

W_d = % of debt (84.69%)
C_d = Cost of Debt (8.34%)
W_e = % of Equity (15.31%)
C_e = Cost of Equity (15.56%)

Solving using the figures above:

WACC = (15.31 * 15.56) + (84.69 * 8.34)

WACC = 9.45%

Based on these external factors, the project requires an Internal Rate of Return of 9.45% to exceed the benchmark.

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

(7) The main parameters used for evaluation of the investment are given in Table 7 and further parameters are given in the Investment Analysis workbook provided to the DOE.

Table 6: Financial parameters used in investment analysis

Installed Capacity	*90 MW*
Expected Electricity Generation	*294,900 MWh per annum*
Emission Reduction(ER)	*175,123 tCO_2e per annum.*
ER sales price	*8.25 Euro/t CO_2e*
Total Investment	*109,821,701 Euro*
Loan	*93,010,272 Euro*
Loan Period	*12 years*
Electricity Sales Price	*0.055 Euro*
VAT	*18%*
Income Tax	*20%*

The value of the investment has been depreciated on a reducing balance basis over 20 years.
The turbines have a life of 20 years. The value applied at the end of the 20 year period (as required by the Guidelines) is an estimate of the scrap value of the metals included and is taken as EUR 864,000 (EUR 24,000 per turbine pylon[14]). This is a nominal value, as it is difficult to predict with any degree of certainty what the actual value will be.

[14] At the time of PDD drafting the value of one ton of scrap is obtained as 300€/t, and a turbine is estimated to leave behind a scrap amount of roughly 80 tons.

Wind power investments are highly capital intensive projects. The initial investment (costs for the WT itself, foundations, electrical equipment and grid-connection) constitutes approximately 75% of the electricity production cost. Therefore, the major factor for determining the return of investment in wind power projects is the cost of capital[15].

For the Aliağa Wind Power Plant project, the Internal Rate of Return (IRR) on Capital without the carbon credit income is calculated as .6.34%. This is below the benchmark of 9.45 discussed above.

Sub-step 2d - Sensitivity Analysis
(11) In order to determine whether the investment decision is the most attractive alternative financially, a sensitivity analysis has been done. Four parameters used for analysis:

- Operating Cost
- Electricity Price
- Electricity Generation Amount
- Construction Cost

For a range of ±10% fluctuations in parameters above, the figures in Table 8 have been obtained. Following the guidelines of EB 51 Annex 58 when any of the key variables are increased or decreased by 10%, the benchmark is not exceeded.

Table 7: Sensitivity analysis for the IRR on Capital without carbon revenue for the project

Parameters	**-10%**	**-5%**	**5%**	**10%**	**Exceed Benchmark?**
Operating Cost	**6.53%**	**6.43%**	**6.24%**	**6.14%**	**No**
Electricity Price	**4.75%**	**5.55%**	**7.10%**	**7.85%**	**No**
Generation	**4.75%**	**5.55%**	**7.10%**	**7.85%**	**No**
Construction Cost	**7.62%**	**6.95%**	**5.76%**	**5.23%**	**No**

[15] Wind Energy-The Facts, Volume 2-Costs&Prices p. 103, (http://www.ewea.org/index.php?id=33)

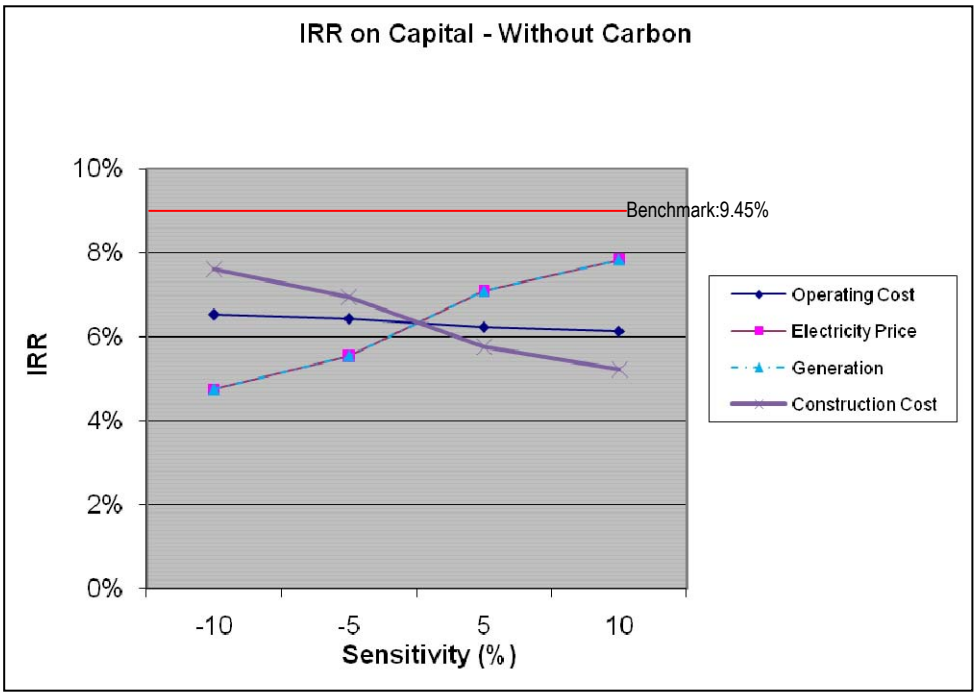

Figure 6: Sensitivity analysis of Capital IRR without the carbon revenue

To exceed the benchmark, the generation or electricity price must increase by about 21.00% over the life of the project, or the investment cost must be reduced by about 21.73%. As the Renewable energy law only guaranties a minimum price of EUR0.055 per kWh, the former is unlikely. As wind farms typically *underperform* compared to design, an increased generation of 21.00% is also unlikely

Adding in carbon revenues to the project increases the IRR to 9.02%. While this is lower than the benchmark, it is significantly closer to it than when carbon is not considered. It is also high enough to pay the cost of debt, although giving a slightly lower return on capital than expected. The carbon finance is therefore required in order to make a positive investment decision.

Outcome of Step 2:
Without carbon revenue the return on capital falls below the benchmark giving a return of 6. 34%. A variation in the key parameters of + / - 10% does not make the project exceed the benchmark. However, once the income from carbon credits is included, the returns increase from 6.34% to 7.69% which makes the investment decision possible and the project additional.

Step 3 - Barrier Analysis

The "Tool for the demonstration and assessment of additionality" states that project participants may choose to apply Step 2 (Investment Analysis), OR Step 3 (Barrier Analysis) to demonstrate Project additionality. Given the low IRR of the Project, Step 3 is not used to demonstrate additionality of the proposed Project.

Step.4. Common practice analysis

Sub-step 4a: Analyse other activities similar to the proposed project activity:

According to the Tool for the demonstration and assessment of additionality, projects are taken to be similar if they are,

> "in the same country . . . are of a broadly similar technology, are of a similar scale . . . and a comparable investment climate. . . other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis."

Wind power plant projects in Turkey under operation, are listed in Table.8.Investments in wind power have increased from 2006 to 2008 as it can be seen from the table. The capacities of the plants which became operational in 2006 are much higher than the plants previously commissioned in 1998 and 2000.

In the past, the very few wind farms that were built in Turkey were developed as Build and Operate (BO) or Build Operate and Transfer (BOT) protocols with the government in accordance with Energy Market Law. This model is no longer available and the reduced risk that the government-backed contracts provided is no longer available. Therefore, these early projects are not seen as being under the same investment climate and should not be used for comparison.

Most of the projects constructed in 2006 and thereafter have been registered as either Gold Standard (GS) or Verified Emission Reduction (VER) projects and are benefiting from carbon finance to make them financially attractive and overcome the other barriers they face. They are developed by the private sector without any guarantee of transfer to the government and so are considered "similar".

Table 8: Wind Projects in Turkey[16]

NO	*Location*	*Company*	*Comm. Date*	*Installed capacity (MW)*	*Developed as*	*Turbine capacity*
CAPACITY UNDER OPERATION				*146.25*		
1	*İzmir-Çeşme*	*Alize A.Ş.*	*1998*	*1.5*	*BOT*	*3 turbines, 500 kW*
2	*İzmir- Çeşme*	*Güçbirliği A.Ş.*	*1998*	*7.2*	*BOT*	*12 turbines, 600kW*
3	*Çanakkale-Bozcaada*	*Bores A.Ş.*	*2000*	*10.2*	*BOT*	*17 turbines, 600kW*
4	*İstanbul- Hadımköy*	*Sunjüt A.Ş.*	*2003*	*1.2*	*BOT*	*2 turbines, 600kW*
5	Balıkesir-Bandırma	Bares A.Ş.	I/2006	30	VER+	20 turbines, 1500 kW
6	*İstanbul-Silivri*	*Ertürk A.Ş.*	*II/2006*	*0.85*	*BO*	*1 turbine, 850 kW*
7	İzmir-Çeşme	Mare A.Ş.	I/2007	39.2	GS638	49 turbines, 800 kW
8	Manisa-Akhisar	Deniz A.Ş.	I/2007	10.8	VCS66	6 turbines, 1800 kW
9	Çanakkale-İntepe	Anemon A.Ş.	I/2007	30.4	GS347	38 turbines, 800 kW
10	Çanakkale-Gelibolu	Doğal A.Ş.	II/2007	14.9	GS439	13 turbines, 800 kW+ 5 turbines 900 kW

Sub-step 4b: Discuss any similar Options that are occurring:

Following the guidelines in "*The tool for the demonstration and assessment of additionality",* there are no similar activities that are occurring as all projects are not comparable to the project activity in terms of scale. Further, the

[16] "Türkiyedeki Rüzgar Santralleri, EPDK: (http://www.epdk.org.tr/lisans/elektrik/yek/ruzgarprojeleriningelisimi.doc)

project under operation being closest the project capacity amongst those listed are 7, 9 and 10 have all been implemented after taking CDM into consideration. Thus the project activity is not a common practice in the region._

_B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the latest version (version 12) of ACM0002 and the tool to calculate the emission factor for electricity system, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The Project therefore applies the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" ver 02 (EB50) as follows:

Step 1 -*Identify the relevant electric power system*

As the host country is not participating in the compliance markets hence does not have a DNA, a delineation of the project electricity system and connected electricity systems has not been published yet. For such cases, the tool suggests using the following criteria to determine the existence of significant transmission constraints:

1. *"In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 percent between the systems during 60 percent or more of the hours of the year."* This criteria is not applicable as there is no spot electricity market in the host country.
2. *"The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year"*: The transmission line operator (TEIAS) or any other offical source has not published the capacity usage figures for the Turkish grid, hence this criterion can not be proved.

According to the tool, where the application of these criteria does not result in a clear grid boundary, a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional / national) shall be used. A provincial grid definition may indeed in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity. In other countries, the national (or other largest) grid definition should be used by default.

Therefore, for the case of the subject project activity "the project electricity system" and "the connected system" are same, and the Turkish National Grid is used as the "project electricity system". It is also confirmed by TEIAS that the Turkish grid is interconnected. There isn't any independent or regional grid system in any region of Turkey. The map of the Turkish Electricity Grid is given in the below figure (Figure 14):

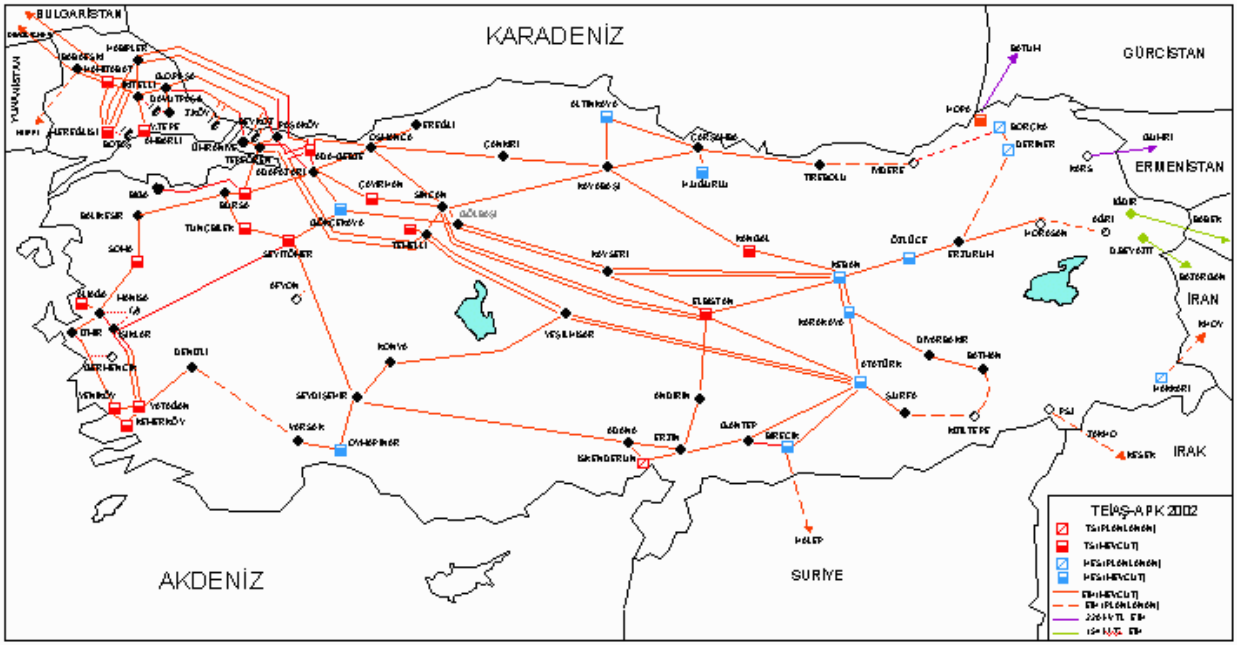

Figure 7: **The Map showing the boundaries of Turkish Electricity Grid (http://geni.org/globalenergy/library/national_energy_grid/turkey/turkishnationalelectricitygrid.shtml)**

All the calculations details of which are given below are made for the entire Turkish Grid.

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

Option I has been selected for the calculation of grid emission factor

Step 3 – Select an operating margin (OM) method

As the share of "low cost/must run" resources are below 50% for the five most recent years (Table 10), therefore, in accordance with the Tool, (a) Simple OM method will be used in the calculations.

Table 9: **Share of primary sources in electricity generation, 2002 – 2007**[17]

	2004	2005	2006	2007	2008
Thermal	69.32	75.48	74.78	81.02	82.72
Hydro	30.58	24.43	25.10	18.72	16.77
Wind & Geothermal	0.10	0.09	0.12	0.26	0.51
Total	100.0	100.0	100.0	100.0	100.0

For the calculation of the Simple OM, the Ex-Ante option is selected, at the time of PDD submission to the DOE, the data vintages that were most recent at the start of valdiation, belongs to the years 2006, 2007 and 2008. All the data used in calculation of the Simple OM are taken from the TEIAS website, details of which are given below.

[17] Annual Development of Installed Capacity and Generation in Turkey (1970-2008) (http://www.teias.gov.tr/istatistik2008/13.xls)

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

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

- **Annual fuel consumption by fuel type[18],**
- **Annual heating values for fuels consumed for electricity generation[19],**
- **Annual electricity generation by fuel type, import and export[20]**

Taking into consideration the available data Simple OM method Option B is the applicable method for the project activity. Option A requires data on net electricity generation of each power plant / unit and a CO2 emission factor of each power unit, both of which are not publicly available.

$EF_{grid,OMsimple,y}$, using option B 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:

_ (7)

Step 5 - Identify the cohort of power units to be included in the build margin

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

Among these two options, the sample group that comprises the larger annual generation is option (b), hence the set of capacity additions in the electricity system that comprise 20% of the system generation is used.

According to the tool in terms of vintage of data, project participants can choose either the ex-ante option or the ex-post option. Among these two options, Option 1 is selected. For the first crediting period, he build margin emission factor is calculated 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 will 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 will be used. This option does not require monitoring the emission factor during the crediting period.

Step 6 - Calculate the build margin emission factor

[18] Fuel Consumed in thermal P.P.in Turkey by the Electric Utilities (2006-2008) (http://www.teias.gov.tr/istatistik2008/44.xls)

[19] Heating Values Of Fuels Consumed In Thermal P.Ps In Turkey By The Electric Utilities (2006-2008), (http://www.teias.gov.tr/istatistik2008/46.xls).

[20] Turkey's Gross Electricity Generation by Primary Energy Resources and The Electric Utilities (2006-2008) / (http://www.teias.gov.tr/istatistik2008/37(06-08).xls)/ Annual Development of Electricity Generation-Consumption and Losses in Turkey (1984-2008), ((www.teias.gov.tr/istatistik2008/30(84-08).xls).

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

According to the tool, the CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin. Taking into consideration the available data on the capacity additions, the formula given under Option A2 of the Simple OM option A is used to calculate $EF_{EL,m,y}$. For this calculation the generation efficiencies are taken from Annex 1 of the Tool.

The CO2 emissions from the most recent capacity additions are calculated by multiplying the $EF_{EL,m,y}$ values calculated for each fuel source by the annual generation of that fuel source (Table 15). The emission factor has been taken as "zero" for the renewable and wastes and the generation efficiencies for the thermal power plants type of which are not known are taken as 60% which is generation efficiency for the combined cycle natural gas power plants. The Build Margin Emission Factor for each year is calculated by dividing the total CO_2 Emissions of the subject year by the total generation from the capacity additions of the same year.

The Build Margin Emission Factor of the grid is then calculated as a generation weighted average for the years 2004, 2005, 2006, 2007 and 2008.

Step 7 - Calculation of the combined margin emissions factor

Finally, the combined margin grid emission factor ($EF_{grid,CM,y}$) is expressed as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

Where:

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

Where weights w_{OM} and w_{BM} are by default 0.75 and 0.25 according to the selected methodology. And $\mathrm{EF}_{\mathrm{OM}}$ and $\mathrm{EF}_{\mathrm{BM}}$ are calculated as described in the previous steps.

Then baseline emissions (BE_y) are obtained as:

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ'y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emissions factor in year *y* (tCO_2/MWh)

And

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

The *ex-ante* emission reductions (ER_y) are calculated as follows:

Where:

ER_y = Emission reductions in year y (tCO_2)

BE_y = Baseline emissions in year y (tCO_2)

$PE_{,y}$ = Project Emissions in year y (tCO_2)

L_y = Leakage emissions in year y (tCO_2)

As methodology states the PEy and Ly in case of a wind power project to be zero hence ERy = BEy

B.6.2. Data and parameters that are available at validation:

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or Volume Unit (Tonnes or cubic meter)
Description:	Amount of fuel *i* consumed by relevant power plants in Turkey in years, 2006, 2007, 2008
Source of data used:	Turkish Electrical Distribution Company Web Site (http://www.teias.gov.tr/istatistik2008/44.xls)
Value applied:	Please see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used is taken from the TEIAS website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEIAS website is the most up-to date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$

Data / Parameter:	NCV
Data unit:	GJ/Mass or Volume Unit
Description:	Net Calorific Values for fossil fuels in years 2006, 2007 and 2008
Source of data used:	Turkish Electrical Distribution Company Web Site (http://www.teias.gov.tr/istatistik2008/46.xls http://www.teias.gov.tr/istatistik2008/44.xls)
Value applied:	Please see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used is taken from the TEIAS website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEIAS website is the most up-to date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$. As data on the NCV is not published directly on the TEIAS website, this data is calculated using the heating values of fuels and the volume or mass of fuels consumed for each year.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ

Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	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 applied:	Please see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the "Tool to calculate the emission factor for an electricity system" version 2, if values provided by the fuel supplier of the power plants in invoices or regional or national average defaults values are not available the IPCC default values at the lower limit of uncertainty must be used.
Any comment:	Data used both for the calculation of $EF_{grid,OM,Simple,y}$ and $EF_{EL,m,y}$

Data / Parameter:	EG_y
Data unit:	MWh
Description:	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
Source of data used:	Turkish Electrical Distribution Company Web Site http://www.teias.gov.tr/istatistik2008/37(06-08).xls www.teias.gov.tr/istatistik2008/30(84-08).xls
Value applied:	Please see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used is taken from the TEIAS website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEIAS website is the most up-to-date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,OM,Simple,y}$

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	*Net quantity of electricity generated and delivered to the grid by power unit m in year* y
Source of data used:	Turkish Electrical Distribution Company Web Site (www.teias.gov.tr). Statistical Reports are taken for the years 2004 and 2005 and capacity projection reports are used for the years 2006, 2007 and 2008.
Value applied:	Please see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used is taken from the TEIAS website, which is the website of the Turkish Electricity Distribution Company. The data published on the TEIAS website is the most up-to-date and reliable data available for the Turkish grid.
Any comment:	Data used for the calculation of $EF_{grid,BM,y}$

Data / Parameter:	$\eta_{m,y}$
Data unit:	-
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data used:	The default values provided at the annex 1 of the "Tool to calculate emission factor for an electricity sector version 2" are used

Value applied:	Please see Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the "tool to calculate emission factor for an electricity system if documented manufacturer's specifications or data from the utility, the dispatch center or official records are not available then the default values given in annex 1 of the tool shall be used. The first two options are not available for the power plants supplying the Turkish grid, therefore the default values are used.
Any comment:	Data used for the calculation of $EF_{grid,BM,y}$

B.6.3. Ex-ante calculation of emission reductions:

Simple Operating margin (OM)

For the calculation of the Simple OM, the Ex-Ante option is selected, at the time of PDD submission to the DOE, the data vintages that were most recent, belongs to the years 2006, 2007 and 2008. All the data used in calculation of the Simple OM are taken from the TEIAS website, details of which are given below. Taking into consideration the available data Simple OM method Option B is the applicable method for the project activity. TEIAS publishes the annual heating values**Error! Bookmark not defined.** of the fuels consumed in the power plants, the heating values are directly related to fuel consumption and are used to calculate average Net Calorific Values (TJ/kt) (Table.10).
The heating values of fuels consumed in thermal power plants are announced by TEIAS, the unit of the heating values are Tcal. Tcal is converted to GJoule by using the conversion factor 1cal = 4.1868 Joule. Then the heating values in GJ are divided by Fuel Consumption ($FC_{i,y}$) to get the Net Calorific Values of the fuels consumed in TJ/kton as follows:

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

Fuel Type	NCV (TJ/kt)		
	2006	**2007**	**2008**
Hard Coal+ Imported Coal	21.99	22.30	22.24
Lignite	6.95	6.86	6.83
Fuel Oil	40.20	39.87	39.70
Diesel Oil	42.68	43.09	42.38
LPG	0.00	0.00	0.00
Naphtha	43.88	43.18	44.61
Natural Gas	37.01	36.76	36.63

The emission factors of fuels required are taken from IPCC 2006 guidelines for GHG inventories[21]. All data used for the calculations can be found in Annex 3. Table 11 shows total CO_2 emission by fuel types calculated using lower IPCC emission factors and available data from the TEIAS website.

Table 11: **Calculation of emission by electricity generation (2006-2008)**

	Default CO_2 Emissions (tCO_2)

[21] 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)

	2006	2007	2008
Hard Coal+Imported Coal	11,463,337.82	12,477,802.81	12,942,102.18
Lignite	31,942,850.63	38,179,797.64	41,189,044.65
Fuel Oil	5,300,737.91	6,775,360.28	6,513,942.76
Diesel Oil	190,583.97	157,148.19	403,661.11
Lpg	0.00	0.00	0.00
Naphta	40,910.48	34,237.14	32,786.41
Natural Gas	34,235,163.83	40,838,575.57	42,980,830.92
TOTAL	**83,173,584.64**	**98,462,921.62**	**104,062,368.04**

Net electricity generated and supplied to the grid by thermal power plants has been calculated using data obtained from TEİAŞ web page[31]. The ratio between total gross and total net generation (including low-cost/must run plants) has been calculated for each year. The same ratio is assumed to be valid for all thermal plants and total net generation by the plants has been calculated accordingly. Summing up total net generation with the imported electricity, total supply excluding low cost / must run sources for each year is determined and given in Table 12.

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

Year	Gross generation	Net generation	Net/Gross	Gross Gen. Thermal	Net Gen Thermal	Import	Total Supply to the grid
2006	176,299.8	169,543.1	0.96167	131,835.1	126,782.51	573.20	127,355.716
2007	191.558.1	183,339.7	0.95709	155,196.2	148,537.80	864.30	149,402.10
2008	198,418.0	189,761.9	0.95637	164,139.3	156,978.63	789.40	157,768.03

The OM Emission Factor for the years 2006, 2007 and 2008 are calculated by dividing the total CO_2 emissions for those years (Table 11) to the Net Electricity Generation (Table 12) for the subject year. The annual OM emission factors are calculated as follows (Table 13):

Table 13: **Annual OM Emission Factors**

Year	*OM Emission Factor*
2006	0.65308
2007	0.65905
2008	0.65959

Finally, OM emission factor is calculated as a generation weighted average for the three most recent years. The resulting OM Emission Factor is;

$$\mathbf{EF_{grid,OMsimple} = 0.65750}$$

Build margin

The gross electricity generation in year 2008 is taken as reference for determination of plants that comprise 20% of the system generation. The gross generation was 198,418.0 GWh (Table 12) in 2008 and 20% of that amount is calculated as 39,683.60 GWh. Summing up all the plants build in 2008, 2007, and 2006, the total generation is

31,030.15. Therefore, the most recent power plants added in 2005 and 2004 are also included in the calculations, which rose the total generation up to 43,849.59 GWh. According to the tool "If 20% falls on part capacity of a unit, that unit is fully included in the calculation" hence for the year 2004, Ankara D.G (Baymina) Natural Gas Power Plant is fully included in the calculations.

The lists of most recent capacity additions to the grid by year and their average and firm generation capacities are available at the TEİAŞ web page for the years 2004[22] and 2005[23]. However, for the years 2008, 2007 and 2006, the annual generation capacity data for each plant is not available on the statistics page of TEIAS. The data for the years 2006[24], 2007[25] and 2008[26] are taken from the TEIAS Capacity Projection Reports which are also available in another section of the TEIAS website. For the capacity additions, the firm generation capacities of the power plants are used. The units that are taken out of the grid are not taken into consideration. All the data used for calculations could be found in Annex.3.

According to the tool in terms of vintage of data, project participants can choose either the ex-ante option or the ex-post option. Among these two options, Option 1 is selected. For the first crediting period, he build margin emission factor is calculated 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 will 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 will be used. This option does not require monitoring the emission factor during the crediting period.

The calculation of $EF_{EL,m,y}$ is shown in Table 14 below:

Table 14: **Calculation of EF_{EL} using default generation efficiencies**

	EF (tCO2/TJ)	(EF*3,6)	Generation Efficiency %	$EF_{EL,m,y}$ tCO2/MWh
Coal	92.80	334,080	39.0%	0.857
Lignite	90.90	327,240	39.0%	0.839
Fuel Oil	75.50	271,800	39.5%	0.688
Diesel	72.60	261,360	39.5%	0.662
LPG	61.60	221,760	60.0%	0.370
Naphta	69.30	249,480	60.0%	0.416
Natural Gas	54.30	195,480	60.0%	0.326

The CO2 emissions from the most recent capacity additions are calculated by multiplying the $EF_{EL,m,y}$ values calculated for each fuel source by the annual generation of that fuel source (Table 15). The emission factor has been taken as "zero" for the renewable and wastes and the generation efficiencies for the thermal power plants type of which are not known are taken as 60% which is generation efficiency for the combined cycle natural gas power

[22] Generation Units Put Into Operation and Out of Operation in 2006,(http://www.teias.gov.tr/istat2004/7.xls)

[23] Generation Units Put Into Operation and Out of Operation in 2005, (http://www.teias.gov.tr/istatistik2005/7.xls)

[24] TEIAS Capacity Projection Report 2007-2016 (http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202007.pdf)

[25] TEIAS Capacity Projection Report 2008-2017 (http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2008.pdf)

[26] TEIAS Capacity Projection Report 2009-2018 (http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSIYONU2009.pdf)

plants. The Build Margin Emission Factor for each year is calculated by dividing the total CO_2 Emissions of the subject year by the total generation from the capacity additions of the same year.

Table 15 Annual CO_2 Emissions for Capacity Additions and Annual BM Emission Factors

Capacity Additions in 2004 (GWh)		**CO_2 Emissions**	**$EF_{grid,BM,2004}$**
Natural Gas	8,810.42	2,870.43	
Naphta	322.94	134.28	
Coal	337.50	289.11	
Fuel Oil	466.23	320.81	
Renewables and wastes	46.00	0.00	
TOTAL 2004	**9,983.09**	**3,614.63**	**0.36208**
Capacity Additions in 2005 (GWh)		**CO_2 Emissions**	**$EF_{grid,BM,2005}$**
Coal	1,125.00	963.69	
Lignite	4,420.00	3,708.72	
Fuel Oil	99.09	68.18	
Natural Gas	7,117.67	2,318.94	
Renewables and wastes	871.00	0.00	
TOTAL 2005	**13,632.76**	**7,059.53**	**0.51784**
Capacity Additions in 2006 (GWh)		**CO_2 Emissions**	**$EF_{grid,BM,2006}$**
Lignite	6,597.75	5,536.02	
Natural Gas	3,300.62	1,075.34	
Renewables and wastes	537.13	0.00	
TOTAL 2006	**10,435.50**	**6,611.36**	**0.63355**
Capacity Additions in 2007 (GWh)		**CO_2 Emissions**	**$EF_{grid,BM,2007}$**
Lignite	4.77	4.00	
Naphta	6.90	2.87	
Fuel Oil	806.16	554.72	
Natural Gas	3,109.86	1,013.19	
Renewables and Wastes	988.57	0.00	
TOTAL 2007	**4,916.26**	**1,574.78**	**0.32032**
Capacity Additions in 2008 (GWh)		**CO_2 Emissions**	**$EF_{grid,BM,2008}$**
Fuel Oil	103.18	71.00	
Natural Gas	2,981.89	971.50	
Renewables and Wastes	1,796.91	0.00	
TOTAL 2008	**4,881.98**	**1,042.50**	**0.21354**

The Build Margin Emission Factor of the grid is then calculated as a generation weighted average for the years 2004, 2005, 2006, 2007 and 2008. The resulting BM Grid is:

$$EF_{grid,BM} = 0.40287$$

Where weights w_{OM} and w_{BM} are by default 0.75 and 0.25 according to the selected methodology. And EF_{OM} and EF_{BM} are calculated as described in the previous steps.

Based on the formula above, baseline emission factor is calculated as;

EF_y = 0.75 * 0.65750 + 0.25 * 0.40287 = 0.59384 tCO2/MWh

ERy = BEy = $EG_{facility,y}$ * EF_y

= 294, 900 * 0.59384 = 175,123

B.6.4 Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emission data (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2010 (01 April-31 Dec)	0	131,342	0	131,342
2011	0	175,123	0	175,123
2012	0	175,123	0	175,123
2013	0	175,1231	0	175,123
2014	0	175,123	0	175,123
2015	0	175,123	0	175,123
2016	0	175,1231	0	175,123
2017(01 Jan-30 April)	0	43,781	0	43,781
Total (tonnes of CO_2e)	**0**	**1,225,861**	**0**	**1,225,861**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG^{faciltiy}_{,y}$**
Data unit:	MWh
Description:	Net Electricity supplied to the Grid by the proposed project
Source of data to be used:	Plant records/logbooks
Value of data applied for the purpose of calculating expected emission reductions in section B.5	**294,900**
Description of	The electricity generated will be metered by TEİAŞ by two meters placed on the

measurement methods and procedures to be applied:	switchgear station where the plant is connected to national grid.
QA/QC procedures to be applied:	There will be two ammeters that will backup each other. Generated electricity will also be monitored by the operator using software for internal monitoring.
Any comment:	The collected data will be kept by Bergama RES Enerji Üretim A.Ş. During the crediting period and until two years after the last issuance of VERs for the Aliağa WPP project activity for that crediting period.

B.7.2. Description of the monitoring plan:

The Monitoring Plan for the project includes the net electricity generation by the project activity. The electricity generated will be metered by TEİAŞ by two meters placed on the switchgear station where the plant is connected to national grid. Those meters will provide official data which will be read and recorded monthly by TEİAŞ officers and will be co-signed into a protocol betweet the project owner and TEİAŞ.. The maintenance and calibration of the meters are also done by TEİAŞ; which ensures the accuracy and quality of the measurements.

The following shows the orgonization structure for the Aliağa Wind Power Plant Project (Figure 8)

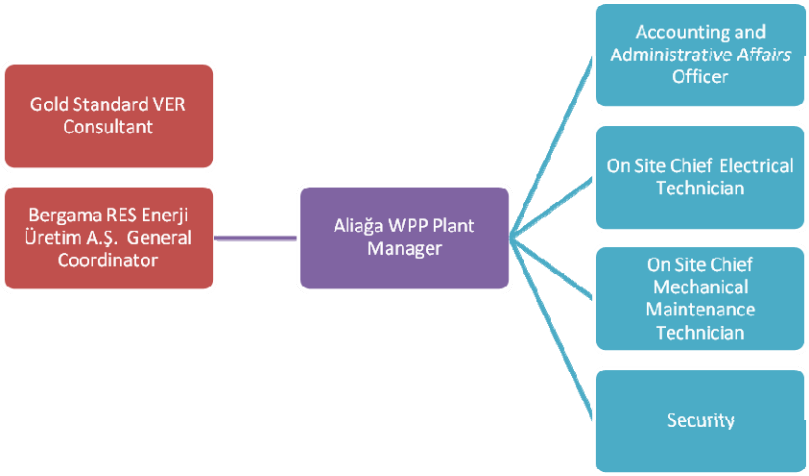

Figure 8: Organisational Structure for Aliağa WPP

The role of the staff that will be involved in the implementation of the monitoring plan is given in the following table (Table 16)

Table 16: Table indicating the role and responsabilities of the staff who will be involved in the implementation of the monitoring plan.

Who	Role
General Coordinator	Data entry in Excel workbook "BergamaRESWorkbook_2010.xls". Solve problems (see „Temporary electricity data collection procedure" [Section 7]). Responsible for QA/QC, including archiving. Requests calibration and maintenance certificates,
Plant Manager	Electricity meter(s) reading Attends monthly meter reading with TEIAS representative

GS VER Consultant	Prepares emission report and accompanies verification(s). Quality check of the monitoring data reported in the monitoring workbook
Grid operator	Maintenance and calibration of main and control meters. Electricity meter(s) reading.

The monitoring of the project will be conducted on an annual basis starting exactly one year after the commissioning of the project.

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):

16.01.2009
JPMorgan Ventures Energy Corporation, Project Participant, see Annex.1 for contact details.
Bergama RES Enerji Üretim A.Ş., see Annex.1 for contact details.

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

Estimated commissioning date is 09/04/2010[27].

C.1.2. Expected operational lifetime of the project activity:

20 years, and 0 months[28]

C.2. Choice of the crediting period and related information:

Renewable crediting period of 7 years renewable twice.

C.2.1. Renewable crediting period:

7 years

C.2.1.1. Starting date of the first crediting period:

01/04/2010

C.2.1.2. Length of the first crediting period:

7 years, 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

[27] The Gold Standard tool kit version 2.1 defines the project start date as follows: "*Start of the Gold Standard Crediting Period.: V.A.2.1.For VER project activities proceeding under the regular project cycle, the start date of the Gold Standard Crediting Period shall be the date of start of operation or a maximum of two years prior to Gold Standard registration, whichever occurs later.*"

[28] The servicelife of each turbine is 20 years. To be conservative we have considered the lifetime of the project to be equal to the service life of the project.

SECTION D. Environmental impacts

Environmental Impact Assessment (EIA) is not mandatory for wind power plants according to the national legislations. Ministry of Environment and Forestry (MoEF) has evaluated the project to have no significant environmental impacts and approved that EIA is not required for the project activity after reviewing the project documents for the Aliağa Wind Power project)

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

In the context of Environmental Plan submitted within the project documents to Ministry of Environment and Forestry, the following measures will be adopted in order to minimise the impacts during construction and operational periods:

Air Quality: Necessary precautions, such as watering roads, careful loading and unloading and covering the top of loaded trucks by tarpaulin; will be taken in order to minimize the dust formed during excavation.

Water & Wastewater Management: Water for domestic use will be supplied by tankers to the site and wastewater will be collected in septic tanks which will be emptied regularly. The wastewater will be discharged in accordance with Water Pollution Control regulations.

The waste oil will be collected in impermeable containers and transferred to recycling centres in accordance with Hazardous Waste Control Regulations and Waste Oil Control Regulations.

Solid Waste: Solid waste will be collected and recyclables will be separated to be sent to recycling centres. The rest will be disposed to the nearest landfill site in coordination with Aliağa Municipality.

Biodiversity: Necessary precautions will be taken for the species under conservation by international conventions, if any found on the site. Also, the security patrol of the wind farm, will look for any dead bird and bat body, any incident will be recorded

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

No significant environmental impact is determined.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

The Stakeholder Consultation Meeting for Aliağa Wind Power Plant was held on 07 November 2008 at 14:30 in İsmailli Village. All the stakeholders including central and local governmental agencies, local NGOs and GS endorsed NGOs were invited by faxes and emails. The mukhtars of the villages (İsmailli, Atçılar and Yüksekköy) close to the Project site were visited and invited to the meeting. The meeting date and place was announced in a local (in the 43rd issue of Bakırçay Local Newspaper, published on 29/10/2008) and a nationwide newspaper (Posta, published on 5th of November all over Turkey).

The meeting opened with the introduction of the project partners. The impacts of climate change were described briefly and the emission reduction concept was clarified. Gold Standard procedures were also explained to the participants in order to explain the aim of the meeting (Figure.12)

Afterwards, the project was described in brief while the non-technical summaries were being distributed to the attendees. Foreseen environmental impacts which are noise pollution and particulate matter emission during construction and noise pollution during operation were mentioned. It was stated that necessary precautions, such as watering the roads, careful loading and unloading the trucks and covering the top of loaded trucks with tarpaulins hammock; will be taken to avoid dust during construction. It was also explained that the noise of heavy machinery was likely to be negligible during construction, as well as the noise of turbines during operation. Afterwards, comments and questions are requested.

Figure 9 Stakeholder Consultation Meeting

The Sustainable Development Matrixes and the questionnaires about the meeting were distributed afterwards. The parameters of the matrix were explained and the attendees were asked to fill in the form with their views.

The project was generally perceived positively, particularly in terms of air pollution, clean energy services and income generation. The villagers also added that they could work in the construction of the project and would be happy if the workers are hired from the residents of nearby villages to the project site. The project owner replied positively to that request.

The meeting was closed by giving information on how the feedback will be given. The villagers were requested to follow up the feedback when the minutes of meeting are sent to the mukhtar. It is also indicated that the minutes will be faxed to the governmental agencies and NGOs as well.

The team also visited Atçılar Villagers who were invited to the meeting but did not attend. The mukhtar of the village was informed about the project and asked for his comments. He filled out the sustainability matrix and said Atçılar village would also benefit from the improvement of water supply system. He also said that the project would be good as new job opportunities will be available for the villagers.

E.2. Summary of the comments received:

The questions asked by the participants and answers are as follows:

Q1: Is there any radiation caused by the project, such as base stations erected for wireless communication?

No, the project does not cause any electromagnetic radiation like a base station erected for wireless communication.

Q2: Our water supply is provided by two water pump and the electricity bills are high for us to pay. The water line feeds 5 neighbouring villages as well. Is there any possibility that the wind turbines could feed that water pump? (The monthly electricity consumption for the pumps are around 5220 kWh and 4850 kWh)

According to the present laws and regulations, generated electricity should be connected to the national grid and distributed through that grid. The possibility of electricity supply for the pumps will be evaluated by the project owner and other available alternatives to the water supply problem of villages will be investigated.

Q3: What is the vegetation cover in the area?

The project area is covered by maquis[29] , a short local tree found abundantly in the area. A number of trees will be cut for the clearance of the site but will be remedied in coordination with local Forestry Management.

The Sustainable Development Matrixes and the questionnaires about the meeting were distributed afterwards. The parameters of the matrix were explained and the attendees are requested to fill down the form. The project is generally perceived positively particularly in terms of air pollution, clean energy services and income generation. The villagers also added that they could work in the construction of the project and would be happy if the workers are hired from the residents of nearby villages within the project site. The project owner replied positively to that request.

[29] Bushy vegetation made up of short trees and shrubs such as thorn, thicket etc.

E.3. Report on how due account was taken of any comments received:

Comments by the participants were noted during meeting and Sustainable Development Matrixes are evaluated. No significant effects which would require a revision in the project has been determined. Requests of local people about employment have been positively responded by the construction firm, Bergama RES Enerji Üretim A.Ş.

The villagers also commented that the water pumps might be fed by the electricity generated by the project. However, the electricity generated by the project will be fed to the national grid in accordance with the terms of licence.

Electricity is fed into the grid at 154,000 volts but a water pump will run at 240 volts. It is no possible to step the current down to this level locally.

An improvement of the water supply system would certainly contribute to the overall wellbeing of the community around the Project on grounds of health and economic development. However, such services are normally the duty of local government agencies.

Therefore alternative ways to support water supply system will be investigated during project realisation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding will be used in this Project

ANNEX 3

BASELINE INFORMATION

TÜRKİYE TERMİK SANTRALLARINDA KULLANILAN YAKIT MİKTARLARININ ÜRETİCİ KURULUŞLARA DAĞILIMI
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)

Birim(Unit):Ton/Gaz(gas) 10^3 m^3

			2006	2007	2008
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	1.567.333	1.707.037	1.636.566
	Linyit	*Lignite*	45.130.071	55.232.102	60.284.929
	TOPLAM	*TOTAL*	**46.697.404**	**56.939.139**	**61.921.495**
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	258.313	551.217	832.635
		Yrd. Yakıt *Auxiliary Fuel*	156.814	166.815	154.307
		TOPLAM *TOTAL*	**415.127**	**718.032**	**986.942**
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	7.792	3.617	0
		Yrd. Yakıt *Auxiliary Fuel*	45.483	46.354	83.041
		TOPLAM *TOTAL*	**53.275**	**49.971**	**83.041**
	TOPLAM	*TOTAL*	**468.402**	**768.003**	**1.069.983**
	Doğal Gaz	*Natural Gas*	3.185.327	4.932.282	5.789.269
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	Fuel-Oil	*Fuel Oil*	91.384	170.285	67.762
	Motorin	*Diesel Oil*	0	0	0
	TOPLAM	*TOTAL*	**91.384**	**170.285**	**67.762**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	4.050.530	4.322.106	4.633.442
	Linyit	*Lignite*	5.453.739	5.991.719	6.089.191
	TOPLAM	*TOTAL*	**9.504.269**	**10.313.825**	**10.722.633**
	Fuel-Oil	*Fuel Oil*	1.239.859	1.362.369	1.118.667
	Motorin	*Diesel Oil*	8.226	262	48.165
	LPG	*LPG*	33	0	0
	Nafta	*Naphta*	13.453	11.441	10.606
	TOPLAM	*TOTAL*	**1.261.571**	**1.374.072**	**1.177.438**
	Doğal Gaz	*Natural Gas*	13.849.221	15.525.511	15.818.366
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	5.617.863	6.029.143	6.270.008
	Linyit	*Lignite*	50.583.810	61.223.821	66.374.120
	TOPLAM	*TOTAL*	**56.201.673**	**67.252.964**	**72.644.128**
	Fuel-Oil	*Fuel Oil*	1.746.370	2.250.686	2.173.371
	Motorin	*Diesel Oil*	61.501	50.233	131.206
	LPG	*LPG*	33	0	0
	Nafta	*Naphta*	13.453	11.441	10.606
	TOPLAM	*TOTAL*	**1.821.357**	**2.312.360**	**2.315.183**
	Doğal Gaz	*Natural Gas*	**17.034.548**	**20.457.793**	**21.607.635**

CO2 emission factor (tCO2/TJ)	
Hard Coal+Imported coal	92,80
Lignite	90,90
Fuel Oil	75,50
Diesel Oil	72,60
Lpg	61,60
Naphta	69,30
Natural Gas	54,30

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)

Birim(Unit): Tcal

			2006	2007	2008
EÜAŞ	**Taşkömürü**	*Hard Coal*	5.569	6.065	5.514
VE	**Linyit**	*Lignite*	70.067	85.681	94.045
BAĞLI	**TOPLAM**	*Total*	**75.636**	**91.746**	**99.559**
ORTAKLIKLARI		**Asıl Yakıt** *Main Fuel*	2.480	5.292	7.993
	Fuel-Oil *Fuel Oil*	**Yrd. Yakıt** *Auxiliary Fuel*	1.505	1.601	1.481
		TOPLAM *TOTAL*	**3.985**	**6.893**	**9.474**
EÜAŞ	**Motorin** *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	80	37	0
AND		**Yrd. Yakıt** *Auxiliary Fuel*	468	477	855
AFFILIATED		**TOPLAM** *TOTAL*	**548**	**514**	**855**
PARTNERSHIPS OF EÜAŞ	**TOPLAM**	*TOTAL*	**4.533**	**7.407**	**10.329**
	Doğal Gaz	*Natural Gas*	**26.349**	**40.649**	**47.744**
	TOPLAM	*TOTAL*	**106.518**	**139.802**	**157.632**
MOBİL SANTRALLAR	**Fuel-Oil**	***Fuel Oil***	876	1.631	649
MOBIL POWER	**Motorin**	***Diesel Oil***			
PLANTS	**TOPLAM**	***TOTAL***	**876**	**1.631**	**649**
	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	23.935	26.050	27.796
OTOPRODÜKTÖRLER	**Linyit**	*Lignite*	13.865	14.639	14.182
ÜRETİM ŞİRKETLERİ	**TOPLAM**	*Total*	**37.800**	**40.689**	**41.978**
İŞLETME HAKKI DEVİR	**Fuel-Oil**	*Fuel Oil*	11.908	12.910	10.484
ADÜAŞ	**Motorin**	*Diesel Oil*	79	3	473
AUTOPRODUCERS	**Lpg**	*Lpg*	0	0	0
PRODUCTION COMP.	**Nafta**	*Naphta*	141	118	113
TOOR	**TOPLAM**	*TOTAL*	**12.128**	**13.031**	**11.070**
ADÜAŞ	**Doğal Gaz**	*Natural Gas*	**124.239**	**138.985**	**141.313**
	TOPLAM	*TOTAL*	**162.039**	**179.674**	**183.291**
	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	29.504	32.115	33.310
	Linyit	*Lignite*	83.932	100.320	108.227
	TOPLAM	*Total*	**113.436**	**132.435**	**141.537**
TÜRKİYE	**Fuel-Oil**	*Fuel Oil*	16.769	21.434	20.607
TURKEY	**Motorin**	*Diesel Oil*	627	517	1.328
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	141	118	113
	TOPLAM	*TOTAL*	**17.537**	**22.069**	**22.048**
	Doğal Gaz	*Natural Gas*	**150.588**	**179.634**	**189.057**
	TOPLAM	*TOTAL*	**281.561**	**334.138**	**352.642**

TÜRKİYE TERMİK SANTRALLARINDA TÜKETİLEN YAKITLARIN KURULUŞLARA GÖRE ISI DEĞERLERİ
(BİRLEŞİK ISI-ELEKTRİK SANTRALLARINDA ISI ÜRETİMİ İÇİN KULLANILAN YAKITLAR DAHİL)
HEATING VALUES OF FUELS CONSUMED IN THERMAL POWER PLANTS IN TURKEY BY THE ELECTRIC UTILITIES
(FUELS USED FOR HEAT PRODUCTION IN CHP PLANTS INCLUDED)
1cal = 4,1868 Joule

Birim(Unit): Gjoule

			2006	2007	2008
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	**Taşkömürü**	*Hard Coal*	23.316.289	25.392.942	23.086.015
	Linyit	*Lignite*	293.356.516	358.729.211	393.747.606
	TOPLAM	*Total*	**316.672.805**	**384.122.153**	**416.833.621**
	Fuel-Oil *Fuel Oil*	**Asıl Yakıt** *Main Fuel*	10.383.264	22.156.546	33.465.092
		Yrd. Yakıt *Auxiliary Fuel*	6.301.134	6.703.067	6.200.651
		TOPLAM *TOTAL*	**16.684.398**	**28.859.612**	**39.665.743**
	Motorin *Diesel Oil*	**Asıl Yakıt** *Main Fuel*	334.944	154.912	0
		Yrd. Yakıt *Auxiliary Fuel*	1.959.422	1.997.104	3.579.714
		TOPLAM *TOTAL*	**2.294.366**	**2.152.015**	**3.579.714**
	TOPLAM	*TOTAL*	**18.978.764**	**31.011.628**	**43.245.457**
	Doğal Gaz	*Natural Gas*	**110.317.993**	**170.189.233**	**199.894.579**
	TOPLAM	*TOTAL*	**445.969.562**	**585.323.014**	**659.973.658**
MOBİL SANTRALLAR *MOBIL POWER PLANTS*	**Fuel-Oil**	***Fuel Oil***	3.667.637	6.828.671	2.717.233
	Motorin	***Diesel Oil***	0	0	0
	TOPLAM	***TOTAL***	**3.667.637**	**6.828.671**	**2.717.233**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	100.211.058	109.066.140	116.376.293
	Linyit	*Lignite*	58.049.982	61.290.565	59.377.198
	TOPLAM	*Total*	**158.261.040**	**170.356.705**	**175.753.490**
	Fuel-Oil	*Fuel Oil*	49.856.414	54.051.588	43.894.411
	Motorin	*Diesel Oil*	330.757	12.560	1.980.356
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	590.339	494.042	473.108
	TOPLAM	*TOTAL*	**50.777.510**	**54.558.191**	**46.347.876**
	Doğal Gaz	*Natural Gas*	**520.163.845**	**581.902.398**	**591.649.268**
	TOPLAM	*TOTAL*	**678.424.885**	**752.259.103**	**767.402.759**
TÜRKİYE *TURKEY*	**Taşkömür+İthal kömür**	*Hard Coal+Imported Coal*	123.527.347	134.459.082	139.462.308
	Linyit	*Lignite*	351.406.498	420.019.776	453.124.804
	TOPLAM	*Total*	**474.933.845**	**554.478.858**	**592.587.112**
	Fuel-Oil	*Fuel Oil*	70.208.449	89.739.871	86.277.388
	Motorin	*Diesel Oil*	2.625.124	2.164.576	5.560.070
	Lpg	*Lpg*	0	0	0
	Nafta	*Naphta*	590.339	494.042	473.108
	TOPLAM	*TOTAL*	**73.423.912**	**92.398.489**	**92.310.566**
	Doğal Gaz	*Natural Gas*	**630.481.838**	**752.091.631**	**791.543.848**
	TOPLAM	*TOTAL*	**1.178.839.595**	**1.398.968.978**	**1.476.441.526**

NET CALORIFIC VALUES OF FUELS CONSUMED IN THE THERMAL POWER PLANTS

Unit: TJ/KT

			2006	2007	2008
EÜAŞ VE BAĞLI ORTAKLIKLARI *EÜAŞ AND AFFILIATED PARTNERSHIPS OF EÜAŞ*	Taşkömürü	*Hard Coal*	14,88	14,88	14,11
	Linyit	*Lignite*	6,50	6,49	6,53
	TOPLAM	*TOTAL*	**6,78**	**6,75**	**6,73**
	Fuel-Oil *Fuel Oil*	Asıl Yakıt *Main Fuel*	40,20	40,20	40,19
		Yrd. Yakıt *Auxiliary Fuel*	40,18	40,18	40,18
		TOPLAM *TOTAL*	**40,19**	**40,19**	**40,19**
	Motorin *Diesel Oil*	Asıl Yakıt *Main Fuel*	42,99	42,83	0,00
		Yrd. Yakıt *Auxiliary Fuel*	43,08	43,08	43,11
		TOPLAM *TOTAL*	**43,07**	**43,07**	**43,11**
	TOPLAM	*TOTAL*	**40,52**	**40,38**	**40,42**
	Doğal Gaz	*Natural Gas*	34,63	34,51	34,53
MOBİL SANTRALLAR *MOBILE POWER PLANTS*	Fuel-Oil	*Fuel Oil*	40,13	40,10	40,10
	Motorin	*Diesel Oil*			
	TOPLAM	*TOTAL*	**40,13**	**40,10**	**40,10**
OTOPRODÜKTÖRLER ÜRETİM ŞİRKETLERİ İŞLETME HAKKI DEVİR ADÜAŞ* *AUTOPRODUCERS PRODUCTION COMP. TOOR ADÜAŞ*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	24,74	25,23	25,12
	Linyit	*Lignite*	10,64	10,23	9,75
	TOPLAM	*TOTAL*	**16,65**	**16,52**	**16,39**
	Fuel-Oil	*Fuel Oil*	40,21	39,67	39,24
	Motorin	*Diesel Oil*	40,21	47,94	41,12
	LPG	*LPG*	0,00	0,00	0,00
	Nafta	*Naphta*	43,88	43,18	44,61
	TOPLAM	*TOTAL*	**40,25**	**39,71**	**39,36**
	Doğal Gaz	*Natural Gas*	37,56	37,48	37,40
TÜRKİYE *TURKEY*	Taşkömür+İthal kömür	*Hard Coal+Imported Coal*	21,99	22,30	22,24
	Linyit	*Lignite*	6,95	6,86	6,83
	TOPLAM	*TOTAL*	**8,45**	**8,24**	**8,16**
	Fuel-Oil	*Fuel Oil*	40,20	39,87	39,70
	Motorin	*Diesel Oil*	42,68	43,09	42,38
	LPG	*LPG*	0,00	0,00	0,00
	Nafta	*Naphta*	43,88	43,18	44,61
	TOPLAM	*TOTAL*	**40,31**	**39,96**	**39,87**
	Doğal Gaz	*Natural Gas*	37,01	36,76	36,63

Summary of NCV data:

Fuel Type	NCV (TJ/kt)		
	2006	2007	2008
Hard Coal+ Imported Coal	21.99	22.30	22.24
Lignite	6.95	6.86	6.83
Fuel Oil	40.20	39.87	39.70
Diesel Oil	42.68	43.09	42.38
LPG	0.00	0.00	0.00
Naphtha	43.88	43.18	44.61
Natural Gas	37.01	36.76	36.63

TÜRKİYE BRÜT ELEKTRİK ENERJİSİ ÜRETİMİNİN ÜRETİCİ KURULUŞLAR VE BİRİNCİL ENERJİ KAYNAKLARINA DAĞILIMI

TURKEY'S GROSS ELECTRICITY GENERATION BY PRIMARY ENERGY RESOURCES AND THE ELECTRIC UTILITIES

Birim(Unit) : GWh

ÜRETİM KARAKTERİSTİĞİ *Generation Characteristics*			2006	2007	2008
	TAŞKÖMÜRÜ	*Hard Coal*	1.909,4	2.072,5	1.882,4
E	LİNYİT	*Lignite*	16.664,3	20.862,1	22.433,3
	KÖMÜR TOPLAMI	*Coal Total*	**18.573,7**	**22.934,6**	**24.315,7**
Ü	FUEL-OİL	*Fuel Oil*	1.035,9	2.224,4	3.365,1
	MOTORİN	*Diesel oil*	21,7	12,2	0,4
A	SIVI TOPLAMI	*Liquid Total*	**1.057,6**	**2.236,6**	**3.365,5**
	DOĞAL GAZ	*Natural Gas*	**12.677,7**	**17.635,6**	**18.818,5**
Ş	TERMİK TOPLAM	*Thermal Total*	**32.309,0**	**42.806,8**	**46.499,7**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**38.773,4**	**31.032,4**	**28.419,4**
	TOPLAM	*Total*	**71.082,4**	**73.839,2**	**74.919,1**
BAĞLI ORTAKLIKLAR	LİNYİT	*Lignite*	11.365,2	12.875,9	14.802,7
Affiliated partnerships Of EÜAŞ	DOĞAL GAZ	*Natural Gas*	2.268,5	5.612,3	7.995,1
	TERMİK TOPLAM	*Thermal Total*	**13.633,7**	**18.488,2**	**22.797,8**
MOBİL SANTRALLAR	FUEL-OİL	*Fuel Oil*	**418,0**	**797,3**	**330,5**
MOBILE P.P.	MOTORİN	*Diesel oil*			
	TERMİK TOPLAM	*Thermal Total*	**418,0**	**797,3**	**330,5**
	TAŞKÖMÜRÜ+İTHAL KÖMÜR	*Hard Coal+Imported Coal*	12.307,2	13.063,7	13.975,1
	LİNYİT	*Lignite*	4.403,4	4.556,7	4.622,1
	KÖMÜR TOPLAMI	*Coal Total*	**16.710,6**	**17.620,4**	**18.597,2**
	FUEL-OİL	*Fuel Oil*	2.778,5	3.447,9	3.513,0
OTOPRODÜKTÖRLER	MOTORİN	*Diesel oil*	36,0	1,1	265,9
ÜRETİM ŞRK.	LPG	*LPG*	0,1	0,0	0,0
İŞLETME HAKKI DEV.	NAFTA	*Naphtha*	50,2	43,9	43,6
	SIVI TOPLAMI	*Liquid Total*	**2.864,8**	**3.492,9**	**3.822,5**
Autoproducers	DOĞAL GAZ	*Natural Gas*	**65.745,0**	**71.776,9**	**71.871,7**
Production Comp.	YENİLENEBİLİR+ATIK	*Renewables and wastes*	**154,0**	**213,7**	**219,9**
TOOR	TERMİK TOPLAM	*Thermal Total*	**85.474,4**	**93.103,9**	**94.511,3**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**5.691,3**	**5.329,5**	**5.859,3**
	TOPLAM	*Total*	**91.165,7**	**98.433,4**	**100.370,6**
	TAŞKÖMÜRÜ+İTHAL KÖMÜR	*Hard Coal+Imported Coal*	14.216,6	15.136,2	15.857,5
	LİNYİT	*Lignite*	32.432,9	38.294,7	41.858,1
	KÖMÜR TOPLAMI	*Coal Total*	**46.649,5**	**53.430,9**	**57.715,6**
	FUEL-OİL	*Fuel Oil*	4.232,4	6.469,6	7.208,6
	MOTORİN	*Diesel oil*	57,7	13,3	266,3
T Ü R K İ Y E	LPG	*LPG*	0,1	0,0	0,0
	NAFTA	*Naphtha*	50,2	43,9	43,6
TURKEY	SIVI TOPLAMI	*Liquid Total*	**4.340,4**	**6.526,8**	**7.518,5**
	DOĞAL GAZ	*Natural Gas*	**80.691,2**	**95.024,8**	**98.685,3**
	YENİLENEBİLİR+ATIK	*Renewables and wastes*	**154,0**	**213,7**	**219,9**
	TERMİK TOPLAM	*Thermal Total*	**131.835,1**	**155.196,2**	**164.139,3**
	HİDROLİK +JEOTERMAL+RÜZGAR TOPLAM	*Hydro+Jeothermal+Wind Total*	**44.464,7**	**36.361,9**	**34.278,7**
	TÜRKİYE TOPLAMI	*TURKEY'S TOTAL*	**176.299,8**	**191.558,1**	**198.418,0**

TÜRKİYE ELEKTRİK ENERJİSİ ÜRETİM - TÜKETİM VE KAYIPLARININ YILLAR İTİBARİYLE GELİŞİMİ
ANNUAL DEVELOPMENT OF ELECTRICITY GENERATION- CONSUMPTION AND LOSSES IN TURKEY
(1984-2008)

YILLAR *YEARS*	BRÜT ÜRETİM *GROSS GEN.*	ARTIŞ % *INCREASE*	İÇ İHTİYAÇ *INTERNAL CONSUMPTION*	%	NET ÜRETİM *NET GEN.*	İTHALAT *IMPORTS*	ŞEBEKEYE VERİLEN[1] *SUPPLIED TO THE NETWORK* [1]	İLETİM *TRANSMISSION*	%	DAĞITIM *DISTRIBUTION*	%	TOPLAM *TOTAL*	%	İHRACAT[2] *EXPORTS* [2]	NET TÜKETİM *NET CONS.*	ARTIŞ % *INCREASE*
								ŞEBEKE KAYBI		*NETWORK LOSSES*						
1984	30613,5	11,9	1890,7	6,2	28722,8	2653,0	31375,8	1577,4	5,0	2163,2	6,9	3740,6	11,9		27635,2	13,0
1985	34218,9	11,8	2306,8	6,7	31912,1	2142,4	34054,5	1611,4	4,7	2734,5	8,0	4345,9	12,8		29708,6	7,5
1986	39694,8	16,0	2815,0	7,1	36879,8	776,6	37656,4	1344,3	3,6	4102,4	10,9	5446,7	14,5		32209,7	8,4
1987	44352,9	11,7	2607,7	5,9	41745,2	572,1	42317,3	1627,4	3,8	3992,6	9,4	5620,0	13,3		36697,3	13,9
1988	48048,8	8,3	2400,0	5,0	45648,8	381,2	46030,0	2016,6	4,4	4291,9	9,3	6308,5	13,7		39721,5	8,2
1989	52043,2	8,3	3234,5	6,2	48808,7	558,5	49367,2	1544,0	3,1	4703,2	9,5	6247,2	12,7		43120,0	8,6
1990	57543,0	10,6	3311,4	5,8	54231,6	175,5	54407,1	1787,2	3,3	4893,1	9,0	6680,3	12,3	906,8	46820,0	8,6
1991	60246,3	4,7	3655,2	6,1	56591,1	759,4	57350,5	1437,8	2,5	6123,4	10,7	7561,2	13,2	506,4	49282,9	5,3
1992	67342,2	11,8	4237,3	6,3	63104,9	188,8	63293,7	1342,9	2,1	7651,9	12,1	8994,8	14,2	314,2	53984,7	9,5
1993	73807,5	9,6	3943,1	5,3	69864,4	212,9	70077,3	1634,9	2,3	8616,7	12,3	10251,6	14,6	588,7	59237,0	9,7
1994	78321,7	6,1	4539,1	5,8	73782,6	31,4	73814,0	1800,3	2,4	10042,7 *	13,6	11843,0	16,0	570,1	61400,9 *	3,7
1995	86247,4	10,1	4388,8	5,1	81858,6	0	81858,6	2034,9	2,5	11733,9 *	14,3	13768,8	16,8	695,9	67393,9 *	9,8
1996	94861,7	10,0	4777,3	5,0	90084,4	270,1	90354,5	2461,7	2,7	13393,1 *	14,8	15854,8	17,5	343,1	74156,6 *	10,0
1997	103295,8	8,9	5050,2	4,9	98245,6	2492,3	100737,9	2935,5	2,9	15646,4 *	15,5	18581,9	18,4	271,0	81885,0 *	10,4
1998	111022,4	7,5	5523,2	5,0	105499,2	3298,5	108797,7	3337,1	3,1	17457,8 *	16,0	20794,9	19,1	298,2	87704,6 *	7,1
1999	116439,9	4,9	5738,0	4,9	110701,9	2330,3	113032,2	2985,1	2,6	18559,9 *	16,4	21545,0	19,1	285,3	91201,9 *	4,0
2000	124921,6	7,3	6224,0	5,0	118697,6	3791,3	122488,9	3181,8	2,6	20574,1 *	16,8	23755,9	19,4	437,3	98295,7 *	7,8
2001	122724,7	-1,8	6472,6	5,3	116252,1	4579,4	120831,5	3374,4	2,8	19954,3 *	16,5	23328,7	19,3	432,8	97070,0 *	-1,2
2002	129399,5	5,4	5672,7	4,4	123726,8	3588,2	127315,0	3440,7	2,7	20491,2 *	16,1	23931,9	18,8	435,1	102948,0 *	6,1
2003	140580,5	8,6	5332,2	3,8	135248,3	1158,0	136406,3	3330,7	2,4	20722,0 *	15,2	24052,7	17,6	587,6	111766,0 *	8,6
2004	150698,3	7,2	5632,6	3,7	145065,7	463,5	145529,2	3422,8	2,4	19820,2 *	13,6	23243,0	16,0	1144,3	121141,9 *	8,4
2005	161956,2	7,5	6487,1	4,0	155469,1	635,9	156105,0	3695,3	2,4	20348,7 *	13,0	24044,0	15,4	1798,1	130262,9 *	7,5
2006	176299,8	8,9	6756,7	3,8	169543,1	573,2	170116,3	4543,8	2,7	19245,4 *	11,3	23789,2	14,0	2235,7	144091,4 *	10,6
2007	191558,1	8,7	8218,4	4,3	183339,7	864,3	184204,0	4523,0	2,5	22123,6 *	12,0	26646,6	14,5	2422,2	155135,2 *	7,7
2008	198418,0	3,6	8656,1	4,4	189761,9	789,4	190551,3	4388,4	2,3	23093,1 *	12,1	27481,5	14,4	1122,2	161947,6 *	4,4

PLANT NAME	ELECTRICITY UTILITIES	FUEL TYPE	INSTALLED CAPACITY (MW)	FIRM GENERATION CAPACITY (GWh)
				2004 CAPACITY ADDITIONS
ÇOLAKOĞLU(KAPASİTE ARTIRIMI)	Autoproducer	Coal	45,00	337,50
GÜL ENERJİ GR-II	Autoproducer	Fuel Oil	12,50	96,50
KARKEY-II 3+3 DGM	Prod. Comp.	Fuel Oil	54,30	369,73
BEREKET EN.(Feslek Hes) Gr-1-2	Autoproducer	HEPP	9,48	25,00
ELTA ELK(DODURGA) GR-I-II-III-IV	Autoproducer	HEPP	4,14	0,00
ERE(BİR KAPILI HES) GRUP-I	Prod. Comp.	HEPP	48,50	17,00
İSKUR TEKSTİL(SÜLEYMANLI) GR I-II	Autoproducer	HEPP	4,60	4,00
ENERJİ-SA ADANA 1 BT	Autoproducer	Naphta	49,77	322,94
ALTINMARKA GIDA GR I-II-III	Autoproducer	Natural Gas	3,60	28,77
ANKARA D.G.(BAYMİNA) GR-I-II-III	BOO	Natural Gas	798,00	6.500,00
ATATEKS 2 GM	Autoproducer	Natural Gas	5,63	45,04
AYEN OSTİM ENERJİ ÜRETİM	Prod. Comp.	Natural Gas	31,08	264,06
AYEN OSTİM ENERJİ ÜRETİM(BT)	Prod. Comp.	Natural Gas	9,89	84,04
BESLER GR-2, BT (5,2+7,5)	Autoproducer	Natural Gas	12,70	97,70
BİS ENERJİ 2 GT	Prod. Comp.	Natural Gas	73,04	602,65
ÇELİK ENERJİ ÜR.ŞTİ. 2 GM	Prod. Comp.	Natural Gas	2,42	18,64
ENTEK GR-IV	Prod. Comp.	Natural Gas	31,13	255,73
HABAŞ ALİAĞA GRUP I-II	Autoproducer	Natural Gas	89,23	713,86
KOMBASSAN KAĞ. MATBAA GIDA	Autoproducer	Natural Gas	5,50	35,71
KOMBASSAN KAĞIT GIDA VE TEKS	Autoproducer	Natural Gas	5,50	38,13
STANDART PROFİL 3 GM	Autoproducer	Natural Gas	6,74	49,23
ŞAHİNLER ENERJİ 1 GM	Autoproducer	Natural Gas	3,20	22,15
TANRIVERDİ 4 GM	Autoproducer	Natural Gas	4,66	38,67
TEKBOY TEKSTİL 1 GM	Autoproducer	Natural Gas	2,25	16,04
TOTAL 2004			**1.312,84**	**9.983,09**

				2005 CAPACITY ADDITIONS
İÇDAŞ ÇELİK GR-I	Autoproducer	Coal	135,00	1.080,00
KAHRAMANMARAŞ KAĞIT GR-I	Autoproducer	Coal	6,00	45,00
KARKEY(SİLOPİ-4) GR-IV	Prod. Comp.	Fuel Oil	6,15	47,24
KARKEY(SİLOPİ-4) GR-V	Autoproducer	Fuel Oil	6,75	51,85
İÇTAŞ ENERJİ(Yukarı Mercan) GR I-II	Prod. Comp.	HEPP	14,19	20,00
MURATLI GR I-II	EUAS	HEPP	115,00	400,00
TEKTUĞ(Kargılık) GR I-II	Prod. Comp.	HEPP	23,90	19,00
YAMULA GRUP I-II	BOT	HEPP	100,00	345,00
BEREKET EN.(DALAMAN) GR XIII-XIV-XV	Prod. Comp.		7,50	0,00
ÇAN GR I	EUAS	Lignite	160,00	1.040,00
ÇAN GR II	EUAS	Lignite	160,00	1.040,00
ELBİSTAN-B GR I	EUAS	Lignite	360,00	2.340,00
AK ENERJİ(K.paşa) GR- III	Prod. Comp.	Natural Gas	40,00	256,90
AK ENERJİ(K.paşa) GR I-II	Prod. Comp.	Natural Gas	87,20	560,10
AKBAŞLAR GR-II(İZOLE)	Autoproducer	Natural Gas	8,83	73,00
AKÇA ENERJİ GR-III	Autoproducer	Natural Gas	8,73	65,40
ALTEK ALARKO GR I-II	Prod. Comp.	Natural Gas	60,10	420,00
AYKA TEKSTİL GR-I	Autoproducer	Natural Gas	5,50	40,00
BAYDEMİRLER GR IV-V-VI	Autoproducer	Natural Gas	6,21	51,42
BİS ENERJİ GR VII	Prod. Comp.	Natural Gas	43,70	360,78
BOSEN GR-III	Autoproducer	Natural Gas	50,00	350,00
CAN ENERJİ GR-I	Prod. Comp.	Natural Gas	3,90	28,00
ÇEBİ ENERJİ BT	Prod. Comp.	Natural Gas	21,00	164,90
ÇEBİ ENERJİ GT	Prod. Comp.	Natural Gas	43,37	340,06
ÇUMRA ŞEKER	Autoproducer	Natural Gas	16,00	40,00
ENTEK ELK.A.Ş.KOÇ ÜNİ.GR I-II	Prod. Comp.	Natural Gas	2,33	19,00
EVYAP GR I-II	Autoproducer	Natural Gas	5,12	30,00
GRANİSER GRANİT GR-I	Autoproducer	Natural Gas	5,50	42,00
HABAŞ ALİAĞA (DÜZELTME)	Autoproducer	Natural Gas	6,16	49,26
HABAŞ ALİAĞA GR III	Autoproducer	Natural Gas	47,69	381,55
HABAŞ ALİAĞA GR IV	Autoproducer	Natural Gas	47,69	381,55
HABAŞ ALİAĞA GR-V	Autoproducer	Natural Gas	24,60	196,80
HAYAT KAĞIT GR-I	Autoproducer	Natural Gas	7,53	56,00
KAREGE GR IV-V	Prod. Comp.	Natural Gas	18,06	141,87
KORUMA KLOR GR I-II-III	Autoproducer	Natural Gas	9,60	77,00
KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	Autoproducer	Natural Gas	8,00	64,00
MERCEDES BENZ TURK GR I-II-III-IV	Autoproducer	Natural Gas	8,28	68,00
METEM ENERJİ(Hacışıramat) GR I-II	Prod. Comp.	Natural Gas	7,83	58,00
METEM ENERJİ(Peliklik) GR I-II-III	Prod. Comp.	Natural Gas	11,75	89,00
MODERN ENERJİ GR-II	Autoproducer	Natural Gas	6,72	50,40
MODERN ENERJİ GR-III	Autoproducer	Natural Gas	8,38	62,90
MOSB GR I-II-III-IV-V-VI-VII	Autoproducer	Natural Gas	84,83	434,00
NOREN ENERJİ GR-I	Prod. Comp.	Natural Gas	8,73	70,00
NUH ENERJİ-2 GR I	Prod. Comp.	Natural Gas	46,95	319,66
ORS RULMAN	Autoproducer	Natural Gas	12,42	99,40
PAK GIDA(Kemalpaşa) GR-I	Autoproducer	Natural Gas	5,67	45,00
TEZCAN GALVANİZ GR I-II	Autoproducer	Natural Gas	3,66	29,00
YONGAPAN(KAST.ENTG) GR-II	Autoproducer	Natural Gas	5,20	32,70
ZEYNEP GİYİM SAN. GR-I	Autoproducer	Natural Gas	1,17	9,00
ZORLU ENERJİ KAYSERİ GR-I-II-III	Prod. Comp.	Natural Gas	149,87	1.144,11
ZORLU ENERJİ KAYSERİ GR-IV	Prod. Comp.	Natural Gas	38,63	294,90
ZORLU ENERJİ YALOVA GR I-II	Prod. Comp.	Natural Gas	15,93	122,00
ETİ MAD.(BAN.ASİT)GR-I	Autoproducer	Waste	11,50	85,00
SUNJÜT(RES) GR I-II	Autoproducer	WPP	1,20	2,00
TOTAL 2005			**2.100,04**	**13.632,76**

				2006 CAPACITY ADDITIONS
ADANA ATIK SU ARITMA TESİSİ	Autoproducer	Waste	0,80	6,00
MENDERES ELEKTRİK GR I	Prod. Comp.	Geothermal	7,95	56,00
BEREKET EN.(Mentaş Reg) GR I - II	Prod. Comp.	HEPP	26,60	93,33
BEREKET EN.(Mentaş Reg) GR III	Prod. Comp.	HEPP	13,30	46,67
BEREKET ENERJİ GÖKYAR HES 3 Grup	Prod. Comp.	HEPP	11,62	23,00
EKİN (Başaran Hes) (Nazilli)	Prod. Comp.	HEPP	0,60	5,00
ERE(AKSU REG.ve ŞAHMALLAR HES) GR I-II	Prod. Comp.	HEPP	14,00	7,00
ERE(Sugözü rg. Kızıldüz hes) GR I - II	Prod. Comp.	HEPP	15,43	8,00
MOLU EN. Zamantı Bahçelik GR I - II	Prod. Comp.	HEPP	4,22	30,00
SEYHAN I-II	EUAS	HEPP	0,30	0,28
SU ENERJİ (Balıkesir) GR I - II	Prod. Comp.	HEPP	4,60	4,00
ŞANLIURFA GR I-II	EUAS	HEPP	51,80	85,00
TEKTUĞ(Kalealtı) GR I - II	Prod. Comp.	HEPP	15,00	11,00
ELBİSTAN B GR II	EUAS	Lignite	360,00	2.199,25
ELBİSTAN B GR III	EUAS	Lignite	360,00	2.199,25
ELBİSTAN B GR IV	EUAS	Lignite	360,00	2.199,25
AKMAYA (Lüleburgaz) GR I	Autoproducer	Natural Gas	6,91	48,00
AMYLUM NİŞASTA (ADANA)	Autoproducer	Natural Gas	14,25	80,00
ANTALYA ENERJİ GR I - II - III - IV	Prod. Comp.	Natural Gas	34,92	244,57
AYDIN ÖRME GR-I	Autoproducer	Natural Gas	7,52	60,00
BOZ ENERJİ GR I	Prod. Comp.	Natural Gas	8,73	60,00
BURGAZ (Lüleburgaz) GR I	Prod. Comp.	Natural Gas	6,91	55,00
CAM İŞ ELEKTRİK (Mersin) GR I	Prod. Comp.	Natural Gas	126,10	1.008,00
ÇERKEZKÖY ENERJİ GR I	Prod. Comp.	Natural Gas	49,16	327,00
ÇIRAĞAN SARAYI GR I	Autoproducer	Natural Gas	1,32	11,00
EKOTEN TEKSTİL GR-I	Prod. Comp.	Natural Gas	1,93	15,00
ELSE TEKSTİL (Çorlu) GR I - II	Autoproducer	Natural Gas	3,16	25,00
ENTEK (Köseköy) GR IV6	Prod. Comp.	Natural Gas	47,62	411,41
ENTEK (Köseköy) GR V	Prod. Comp.	Natural Gas	37,00	319,66
ERAK GİYİM GR-I	Autoproducer	Natural Gas	1,37	12,00
EROĞLU GİYİM (Çorlu) GR I	Autoproducer	Natural Gas	1,17	9,00
HAYAT TEM. VE SAĞLIK GR I - II	Autoproducer	Natural Gas	15,04	94,00
KASTAMONU ENTEGRE (Balıkesir) GR I	Autoproducer	Natural Gas	7,52	48,00
MARMARA ELEKTRİK (Çorlu) GR I	Prod. Comp.	Natural Gas	8,73	63,00
MARMARA PAMUK (Çorlu) GR I	Autoproducer	Natural Gas	8,73	71,00
SÖNMEZ ELEKTRİK (Çorlu) GR I - II	Prod. Comp.	Natural Gas	17,46	134,62
ŞIK MAKAS (Çorlu) GR I	Autoproducer	Natural Gas	1,58	13,00
YILDIZ ENT. AĞAÇ (Kocaeli) GR I	Autoproducer	Natural Gas	6,18	40,00
ALARKO ALTEK GR-III	Prod. Comp.	Thermal	21,89	151,36
EKOLOJİK EN. (Kemerburgaz) GR I	Prod. Comp.	Waste	0,98	8,00
ITC-KA EN. MAMAK TOP.M. GR I-II-III	Autoproducer	Waste	4,24	29,97
BARES IX GRUP	Prod. Comp.	WPP	13,50	42,75
BARES X. ve XX. GRUPLAR	Prod. Comp.	WPP	16,50	52,25
ERTÜRK ELEKTRİK Tepe RES GR I	Prod. Comp.	WPP	0,85	2,55
MARE MANASTIR RÜZGAR (X GRUP)	Prod. Comp.	WPP	8,00	26,33
TOTAL 2006			**1.725,50**	**10.435,50**

				2007 CAPACITY ADDITIONS
AKTEKS	Autoproducer	Fuel-Oil	0,80	5,35
İDİL 2 (PS3 A- 2)	Prod. Comp.	Fuel-Oil	24,40	180,00
KAREN	Prod. Comp.	Fuel-Oil	24,30	180,00
Mardin Kızıltepe	Prod. Comp.	Fuel-Oil	34,10	250,00
SİİRT	Prod. Comp.	Fuel-Oil	25,60	190,00
SÜPER FİLMCİLİK	Autoproducer	Fuel-Oil	0,10	0,80
BORÇKA HES	EUAS	HEPP	300,60	600,00
İSKUR TEKSTİL (SÜLEYMANLI HES)	Prod. Comp.	HEPP	4,60	4,00
KURTEKS Tekstil A.Ş./Kahramanmaraş(KARASU HES-Andırın)	Prod. Comp.	HEPP	2,40	19,00
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)	Prod. Comp.	HEPP	6,30	27,00
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)(İlave)	Prod. Comp.	HEPP	6,30	27,00
TEKTUĞ(Keban Deresi)	Prod. Comp.	HEPP	5,00	20,00
YPM Ener.Yat.AŞ.(Altıntepe Hidro.)(Sivas/Suşehir)	Prod. Comp.	HEPP	4,00	10,00
YPM Ener.Yat.AŞ.(Beypınar Hidro.)(Sivas/Suşehir)	Prod. Comp.	HEPP	3,60	9,00
YPM Ener.Yat.AŞ.(Konak Hidro.)(Sivas/Suşehir)	Prod. Comp.	HEPP	4,00	10,00
UŞAK ŞEKER (NURİ ŞEKER)	Autoproducer	Lignite	1,70	4,77
DENTAŞ	Autoproducer	Naphta	0,30	2,28
DESA	Autoproducer	Naphta	0,70	4,62
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kadıköy Hast.)	Autoproducer	Natural Gas	0,50	4,00
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kozyatağı Hast.)	Autoproducer	Natural Gas	0,60	5,00
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Nilüfer/BURSA)	Autoproducer	Natural Gas	1,30	11,00
AKATEKS Tekstil Sanayi ve Ticaret A.Ş.	Autoproducer	Natural Gas	1,80	14,00
Aliağa Çakmaktepe Enerji A.Ş.(Aliağa/İZMİR)	Prod. Comp.	Natural Gas	34,80	278,00
ALTINMARKA GIDA	Autoproducer	Natural Gas	0,10	0,81
ARENKO	Autoproducer	Natural Gas	0,70	5,57
ATAER ENERJİ	Autoproducer	Natural Gas	0,10	0,57
BİL ENERJİ	Autoproducer	Natural Gas	0,10	0,70
BİS Enerji Üretim AŞ.(Bursa)(İlave)	Prod. Comp.	Natural Gas	43,00	354,80
BİS Enerji Üretim AŞ.(Bursa)(İlave)	Prod. Comp.	Natural Gas	48,00	396,06
BOSEN ENERJİ ELEKTRİK AŞ.	Prod. Comp.	Natural Gas	142,80	1.071,00
ESKİŞEHİR END.ENERJİ	Autoproducer	Natural Gas	3,50	26,81
FLOKSER TEKSTİL SAN.AŞ.(Çatalça)(Poliser Tesisi)	Autoproducer	Natural Gas	2,10	17,00
FLOKSER TEKSTİL SAN.AŞ.(Çatalça)(Süetser Tesisi)	Autoproducer	Natural Gas	2,10	17,00
FRİTOLAY GIDA SAN.VE TİC. AŞ.	Autoproducer	Natural Gas	0,50	3,33
HABAŞ (Aliağa-ilave)	Autoproducer	Natural Gas	9,10	72,80
İGSAŞ	Autoproducer	Natural Gas	2,20	15,20
KARTONSAN	Autoproducer	Natural Gas	5,00	40,00
KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	Autoproducer	Natural Gas	3,90	33,00
KİL-SAN KİL SAN.VE TİC. A.Ş	Autoproducer	Natural Gas	3,20	25,00
MODERN ENERJİ	Autoproducer	Natural Gas	5,20	36,53
NUH ENERJİ-2(Nuh Çim.)	Autoproducer	Natural Gas	73,00	514,00
SAYENERJİ ELEKTRİK ÜRETİM AŞ. (Kayseri/OSB)	Prod. Comp.	Natural Gas	5,90	47,00
SÜPERBOY BOYA SAN.ve Tic.Ltd.Şti.(Büyükçekmece)	Autoproducer	Natural Gas	1,00	8,00
SWİSS OTEL(Anadolu Japan Turizm A.Ş (İstanbul)	Autoproducer	Natural Gas	1,60	11,00
T ENERJİ ÜRETİM AŞ.(İSTANBUL)	Prod. Comp.	Natural Gas	1,60	13,00
TAV Esenboğa Yatırım Yapım ve İşetme AŞ./ANKARA	Autoproducer	Natural Gas	3,90	33,00
TEKBOY ENERJİ	Autoproducer	Natural Gas	0,10	0,73
ZORLU EN.Kayseri (İlave 1 GT)	Prod. Comp.	Natural Gas	7,20	54,96
ITC-KA Enerji Üretim Aş.(Mamak)(İlave)	Prod. Comp.	Waste	1,40	9,90
ANEMON EN.ELEK.ÜRETİM.AŞ.	Prod. Comp.	WPP	8,00	21,84
ANEMON EN.ELEK.ÜRETİM.AŞ.(İlave)	Prod. Comp.	WPP	15,20	41,50
ANEMON EN.ELEK.ÜRETİM.AŞ.(İlave)	Prod. Comp.	WPP	7,20	19,66
BURGAZ RES (Doğal Enerji Üretim A.Ş.)	Prod. Comp.	WPP	4,00	11,54
BURGAZ RES (Doğal Enerji Üretim A.Ş.)	Prod. Comp.	WPP	10,90	31,46
DENİZ ELEK. ÜRETİM Ltd.Şti.(karakurt)	Prod. Comp.	WPP	10,80	24,00
MARE MANASTIR RÜZGAR ENERJİ(ilave)	Prod. Comp.	WPP	11,20	36,86
MARE MANASTIR RÜZGAR ENERJİ(ilave)	Prod. Comp.	WPP	20,00	65,82
TOTAL 2007			**942,40**	**4.916,26**

				2008 CAPACITY ADDITIONS
KARKEY(SILOPI-5) (154 kV) (Addition)	Prod. Comp.	Fuel Oil	14,78	103,18
SARAYKOY JEOTERMAL (Denizli)	Prod. Comp.	Geothermal	6,85	42,00
AKKOY ENERJI (AKKOY I HEPP)	Prod. Comp.	HEPP	101,94	263,00
ALP ELEKTRIK (TINAZTEPE) ANTALYA	Prod. Comp.	HEPP	7,69	17,00
CALDERE ELK.(CALDERE HEPP)Dalaman-MUGLA	Prod. Comp.	HEPP	8,74	25,00
CANSU ELEKTRIK (Murgul/ARTVIN)	Prod. Comp.	HEPP	9,18	31,00
DAREN HEPP ELKT. (SEYRANTEPE BARAJI VE HEPP)	Prod. Comp.	HEPP	49,70	161,00
DEGIRMENUSTU EN. (KAHRAMANMARAS)	Prod. Comp.	HEPP	25,70	40,00
H.G.M. ENERJI (KEKLICEK HEPP) (YeSIlyurt)	Prod. Comp.	HEPP	8,67	11,00
HAMZALI HEPP (TURKON MNG ELEKTRIK)	Prod. Comp.	HEPP	16,70	66,00
HIDRO KNT.(YUKARI MANAHOZ REG.VE HEPP)	Prod. Comp.	HEPP	22,40	45,00
IC-EN ELK.(CALKISLA REGULATORU VE HEPP)	Prod. Comp.	HEPP	7,66	11,00
KALEN ENERJI (KALEN II REGULAT. VE HEPP)	Prod. Comp.	HEPP	15,65	28,00
MARAS ENERJI (FIRNIS REGULATORU VE HEPP)	Prod. Comp.	HEPP	7,22	23,00
SARMASIK I HEPP (FETAS FETHIYE ENERJI)	Prod. Comp.	HEPP	21,04	54,00
SARMASIK II HEPP (FETAS FETHIYE ENERJI)	Prod. Comp.	HEPP	21,58	61,00
TORUL	EUAS	HEPP	105,60	130,00
YESIL ENERJI ELEKTRIK (TAYFUN HEPP)	Prod. Comp.	HEPP	0,82	4,00
AKSA ENERJI (Antalya)	Prod. Comp.	Natural Gas	183,80	1.290,00
AKSA ENERJI (Manisa)	Prod. Comp.	Natural Gas	52,38	370,00
ANTALYA ENERJI (Addition)	Prod. Comp.	Natural Gas	17,46	122,29
ATAC INSAAT SAN. A.S.B.(ANTALYA)	Autoproducer	Natural Gas	5,40	37,00
BAHCIVAN GIDA (LULEBURGAZ)	Autoproducer	Natural Gas	1,17	8,00
CAN ENERJI (Corlu-TEKIRDAG) (Addition)	Prod. Comp.	Natural Gas	52,38	304,23
FOUR SEASONS OTEL (ATIK PASHA TUR.A.S)	Autoproducer	Natural Gas	1,17	7,00
FRITOLAY GIDA SAN.VE TIC.AS.(Addition)	Autoproducer	Natural Gas	0,01	0,07
MB SEKER NISASTA SAN. A.S. (Sultanhani)	Autoproducer	Natural Gas	8,80	60,00
MELIKE TEKSTIL (GAZIANTEP)	Autoproducer	Natural Gas	1,58	11,00
MISIS APRE TEKSTIL BOYA EN. SAN.	Autoproducer	Natural Gas	2,00	14,00
MODERN ENERJI (LULEBURGAZ)	Autoproducer	Natural Gas	13,40	680,00
POLAT TURZ. (POLAT RENAISSANCE IST.OT.)	Autoproducer	Natural Gas	1,60	11,00
SONMEZ Elektrik (Addition)	Prod. Comp.	Natural Gas	8,73	67,31
ITC-KA Enerjl Uretlm A.S.(Mamak)(Addition)	Prod. Comp.	Waste	14,13	99,91
BAKI ELEKTRIK SAMLI RUZGAR	Prod. Comp.	WPP	21,00	92,00
DATCA RES (Datca)	Prod. Comp.	WPP	8,10	19,00
ERTURK ELEKTRIK Catalca RES	Prod. Comp.	WPP	60,00	180,00
GOZEDE HEPP (TEMSA ELEKTRIK) BURSA	Prod. Comp.	WPP	2,40	6,00
INNORES ELK YUNTDAG RUZG. (AliaGa)	Prod. Comp.	WPP	42,50	145,00
LODOS RES (Tasoluk)(G.O.P./ISTANBUL)	Prod. Comp.	WPP	24,00	69,00
SAYALAR RUZGAR (Dogal Enerji)	Prod. Comp.	WPP	30,60	88,00
SEBENOBA (DENIZ ELK.) (Samandag-HATAY)	Prod. Comp.	WPP	31,20	86,00
TOTAL 2008			**1.035,73**	**4.881,98**

Annex 4

MONITORING PLAN

THE MONITORING PLAN (MP) BUILDS ON THE BASELINE SCENARIO DESCRIBED IN PROJECT DESIGN DOCUMENT AND IS CONSISTENT WITH THE APPLIED METHODOLOGY ACM0002 "CONSOLIDATED BASELINE METHODOLOGY FOR GRID CONNECTED ELECTRICITY GENERATION FROM RENEWABLE SOURCES, V.12".

The MP will be implemented by Bergama RES Enerji Üretim A.Ş. who will also be responsible for operating the wind power plant. The monitoring plan will be implemented based on the detailed monitoring manual that is prepared and updated for the use of Bergama RES Enerji Üretim A.Ş.

The main parameter that will be monitored on site will be electricity generation. The electricity generated by each turbine is recorded by the help of SCADA system. The final output of the turbines are recorded by the main meters and the auxiliary meters that belongs to the distribution company,TEİAŞ. The electricity will be measured by those meters and stored in the system. These measurements will be compiled into monthly memoranda co-signed between the electricity distribution company and the Bergama RES Enerji Üretim A.Ş.

The official, data which will be obtained from the meters placed in the control room and read by TEİAŞ officers, will be crosschecked by the PMUM/MFRC[30] data, that can be accessed by a specific user ID and Password by the project owner. This data will be provided to the verifier in the form of screenshots for cross checking and comparison of the monthly electricity production indicated in the signed memoranda.

The following shows the orgonization structure for the Aliağa Wind Power Plant Project (Figure 10)

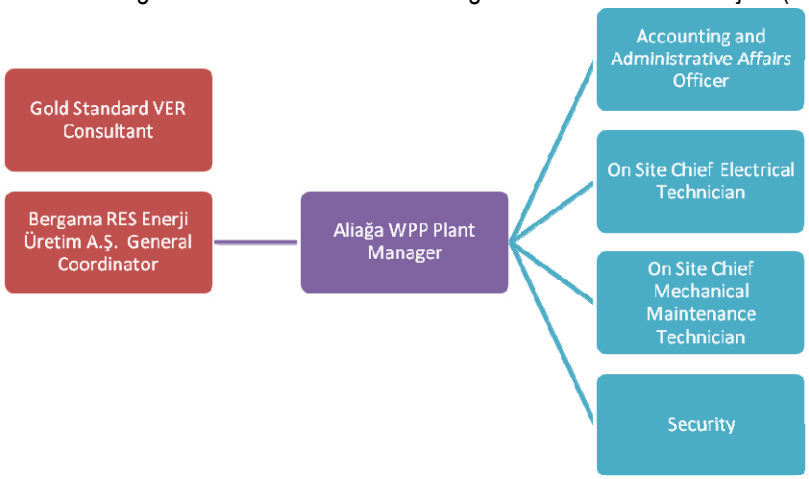

Figure 10 :Organisational Structure for Aliağa WPP

The role of the staff that will be involved in the implementation of the monitoring plan is given in the following table (Table 17)

Table 17 :Table indicating the role and responsabilities of the staff who will be involved in the implementation of the monitoring plan.

[30] PMUM-Piyasa Mali Uzlaştırma Merkezi/MFRC-Market Financial Reconciliation Center

Who	Role
General Coordinator	Data entry in Excel workbook "BergamaRESWorkbook_2010.xls". Solve problems (see „Temporary electricity data collection procedure" [Section 7]). Responsible for QA/QC, including archiving. Requests calibration and maintenance certificates,
Plant Manager	Electricity meter(s) reading Attends monthly meter reading with TEIAS representative
GS VER Consultant	Prepares emission report and accompanies verification(s). Quality check of the monitoring data reported in the monitoring workbook
Grid operator	Maintenance and calibration of main and control meters. Electricity meter(s) reading.

The monitoring of the project will be conducted on an annual basis starting exactly one year after the commissioning of the project.

Other parameters that will be monitored and reported in the monitoring report:

1. Air quality: The reduction of CO2 emissions is considered to be the positive contribution of the project to the Air quality, This parameter is going to be monitored based on the electricity produced, and calculated.

2. Quality of employment: This parameter is going to be ensured by providing a safe and clean working environment to the workers and will be shown by pictures, trainings provided to the employee and the Health and Safety rules applied in the facility.

3. Quantitative employment: Employee records gathered from the project owner including, gender, the city they inhabit and the position.

Biodiversity The project has EIA-exemption letter from Ministry of Environment and Forest. Necessary precautions will be taken for the species under conservation by international conventions. (If dead birds are observed they will be logged, kept and reported).

The parameters such as dust during construction, water quality and quantity, soil condition, other pollutants, biodiversity, public health and safety are considered as a mitigation action to be monitored only once in the initial verification or reported in case of an incident in the life time of the project.