CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
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SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

Grid-connected electricity generation from renewable sources: Düzova 15 MW Wind Power Project, Turkey

Document Version: 01
Date of completion: 05 May 2009

A.2. Description of the small-scale project activity:

Ütopya Elektrik Üretim Sanayi ve Tic. Ltd. Şti. (Ütopya) plans to invest into a new wind power plant i.e. Düzova WEPP (Düzova) and granted production licence is granted by EMRA on May 2007[1]. The purpose of the project is to generate electricity and to feed it into the public grid. Düzova project shall be registered as a Voluntary Emission Reduction project in order to enable the project implementation by means of financial inflows coming from the credits sale. Because of its significant contribution to climate protection and to sustainable development in the region, this project is expected to fulfill the requirements of the Gold Standard.

Installed Capacity of Düzova WEPP is 15 MW with 6 turbines each having 2.5 MW capacity. Annual energy yield of the project activity is estimated to be 59,300 MWh. Proposed project activity will generate electricity using renewable wind energy and will transfer to the national electricity system (grid).

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

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

The emission reductions will be generated by substituting electricity produced from the conventional mix representing electricity generation for the Turkish grid, which to a relevant extent depends on fossil fuels. The emission reductions will be calculated based on the Combined Margin (CM) emission factor.

Other than the objective of climate change mitigation through significant reduction in greenhouse gas (GHG) emissions, the project has been carried out to provide social and economical contribution to the

[1] See Production Licence: http://www.epdk.org.tr/lisans/elektrik/yek/ozelhukum/utopyaDuzovaRES.pdf (page 1)

region in a sustainable way. The benefits that will be gained by the realization of the project compared to the business-as-usual scenario can be summarized under four main indicators:

Environmental
In the absence of the project activity, an equivalent amount of electricity would have to be generated from the power plants connected to the grid, majority of which are based on fossil fuels. Thus the project is replacing the anthropogenic emissions (CO_2, CH_4) and other pollutants (SO_X, NO_X, particulate matters) occurring from extraction, processing, transportation and burning of fossil fuels for power generation connected to the national grid. Also, by reduction in the consumption of these fuels, it contributes to conservation of water, soil, plant and animal ecosystems and transfers these natural resources and also the additional supply of these primary energy sources to the future generations.

Economical
The project will help to accelerate the growth of the wind power industry and stimulate the designation and production of renewable energy technologies in Turkey. Other entrepreneurs irrespective of sector will be encouraged to invest in wind power. It will assist to reduce Turkey's increasing energy deficit and diversify the electricity generation mix while reducing import dependency. Rural development will be maintained in the areas around the project site by providing infrastructural investments to these remote villages.

Social
The project will enhance local employment during the construction and the operation phase of the wind farm and result in alleviation of poverty and unemployment by increased job opportunities in a diversified range from engineers to simple workers in the vicinity of the project area. Construction materials for the foundations, cables and other auxiliary equipment will preferentially be sourced locally. Rural electrification will be more reliable, available and cost efficient thanks to the decreasing distances between the generation and consumption points.

Technological
Implementation of the proposed project will contribute to wider deployment of wind power technology on the local and national level. It will demonstrate the viability of larger grid connected wind farms, which will support improved energy security, alternative sustainable energy, and also renewable energy industry development.

The "do no harm assessment" table and "sustainable development" matrix in the Gold Standard Passport provide detail information about the project's contribution to sustainable development in the light of Local Stakeholder Consultation meeting results and Environmental Impact Assessment report. The results from the in-depth assessment of environmental and social impacts confirm the positive influence of the project on all the discussed domains.

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)
Turkey (host country)	Ütopya Elektrik Üretim Sanayi ve Tic. Ltd. Şti.	No

Ütopya Elektrik Üretim Sanayi ve Tic. Ltd. Şti. is project developer and owner of the project.

The Republic of Turkey is the host country. Turkey ratified the Kyoto Protocol (on 5th February of 2009) and put in effect on 13th May 2009[2]. Turkish National Focal Point to the UNFCCC is the Ministry of Environment and Forestry[3].

The Regional Environmental Center Country Office Turkey (REC Turkey) acts as the National Focal Point for UNFCCC Article 6 – Education, Training and Public Awareness.[4]

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

A.4.1.1. Host Party(ies):

The host country is Republic of Turkey.

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

The project will be in Aegean Region and province of Izmir in Turkey.

A.4.1.3. City/Town/Community etc:

The project will be situated in the district of Bergama and near Aşağıkırıklar village.

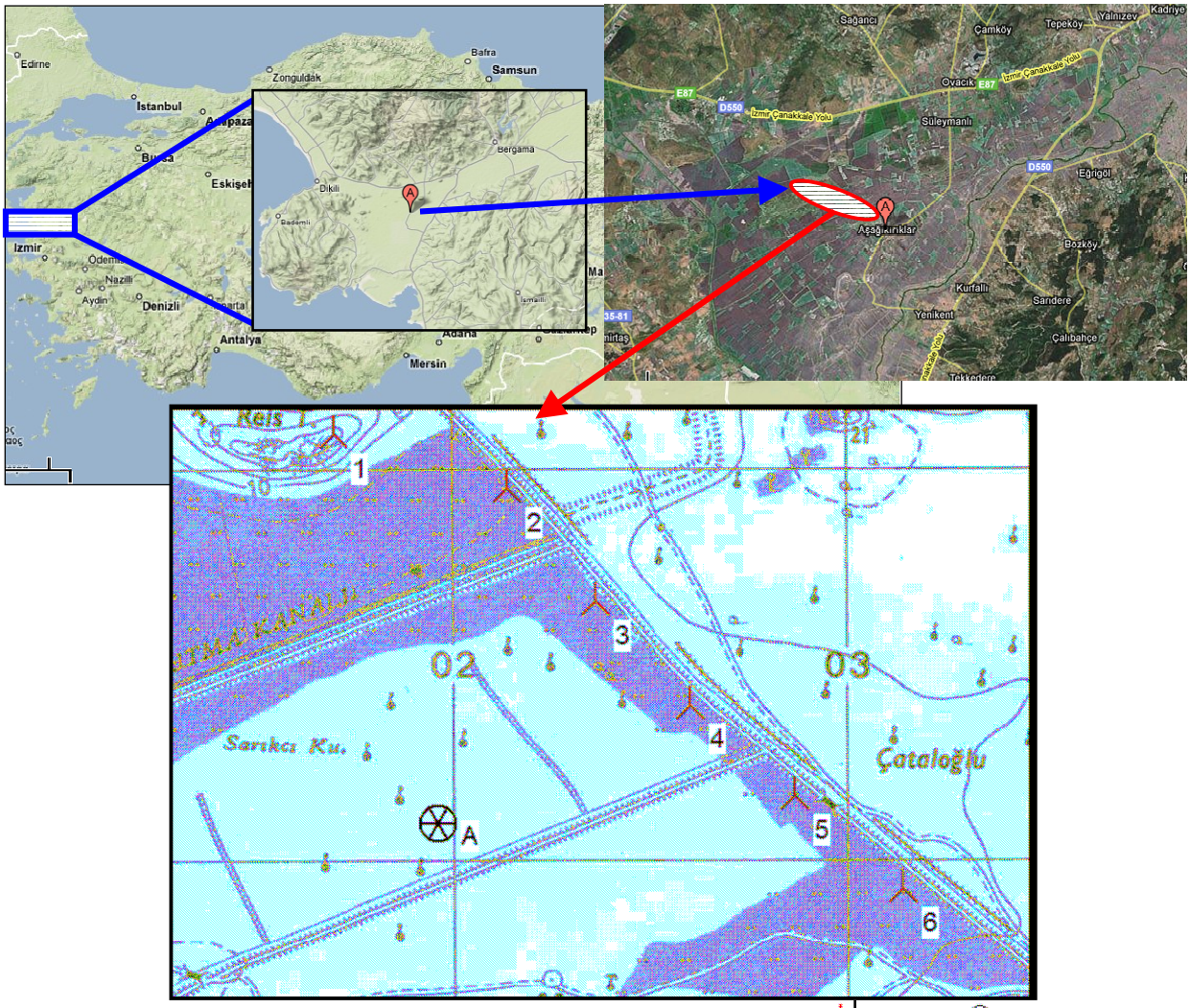
A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

The project site is located in the Aşağıkırıklar village, Bergama district, İzmir city, Turkey. The project area is completely plain area without any trees. There are not any agricultural activities on proposed project area. Location of the project and the specific positions of the 6 planned wind turbines are presented on the following map.

[2] See Official Gazette, http://rega.basbakanlik.gov.tr/main.aspx?home=http://rega.basbakanlik.gov.tr/eskiler/2009/05/20090513.htm&main=http://rega.basbakanlik.gov.tr/eskiler/2009/05/20090513.htm

[3] UNFCCC, list of the National Focal Points http://maindb.unfccc.int/public/nfp.pl?mode=wim (accessed in May 2009)

[4] See REC Turkey: http://www.rec.org.tr, (accessed in May 2009)



Map 1: Location of the project and the specific positions of the 6 planned wind turbines (New WTG, Measurement Mast)

The geographical coordinates (coordinate system ED50, Zone 35) of the turbines of the project activity are presented in the table below.

Table 1: Geographical coordinates of the wind turbines of the project activity

Wind Turbine	UTM ED 50/Zone 35	
	Easting (m)	Northing (m)
WTG 1	501 575	4 322 052
WTG 2	502 010	4 321 945
WTG 3	502 266	4 321 703
WTG 4	502 473	4 321 406
WTG 5	502 764	4 321 180
WTG 6	503 026	4 320 954

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

The project type is *'Type (I): Renewable energy projects*' and project cateorgy is '*D.Electricity generation for a system'*.

The Düzova project will consists of 6 wind turbines GE 2.5xl[5] model turbines with 2.5 MW output each having 100 m diameter, 7854 m^2 swept area and 85 m hub height. The wind turbines will be connected to the wind farm substation through 34.5 kV underground cables. The voltage is raised to 154 kV and is transferred to grid via a 3 km long transmission line which is connected to the bypassing Bergama-Ayvalik transmission line of TEIAS. The entire net electricity production is expected to be around 59,300 MWh per year.

Harnessing the wind energy to generate electricity by three blades turbines is reliable and proven technology which starts to be used widely since 1980s. There are enormous amount of wind turbines operating all over the world integrated with the environment. Also, according to manufacturer of the turbines (GE)[6] *'With technology centers of excellence in the United States, Europe, India and China, our teams of engineers and scientists use Six Sigma methodology, coupled with the latest computational modeling and power electronic analysis tools, to manufacture wind turbines with the reliability, efficiency and maintainability necessary to meet the challenges our customers face in today's energy environment.'* Therefore, environmentally safe and sound technology and know how is being applied by the project activity interalia technology transfer.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

Table 2: Estimated amount of emission reductions over the crediting period

Years	**Annual estimation of emission reductions [tCO_2 e]**
2009*	8,117
2010	38,960
2011	38,960
2012	38,960
2013	38,960
2014	38,960
2015	38,960
2016**	30,843
Total emission reductions (tonnes of CO_2 e)	**272,720**
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**38,960**

* 2,5 months operation for 2009
** 9,5 months operation for 2016

A.4.4. Public funding of the small-scale project activity:

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

[5] See http://www.gepower.com/prod_serv/products/wind_turbines/en/downloads/ge_25mw_brochure.pdf (page 3)

[6] See, http://www.gepower.com/prod_serv/products/wind_turbines/en/downloads/ge_25mw_brochure.pdf (page 4)

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

Following the '*Determining the Occurrence of Debundling*' decision tree in '*Compendium of guidance on the debundling for SSC project activities*'[7] (which is referred by Appendix C of the simplified modalities and procedures for the small-scale CDM project activities), since proposed project activity is the first emission reduction (VER) project of proposed project participant (Ütopya), there is not any registered Small Scale CDM (or VER) project activity of proposed project participant and therefore the proposed Small Scale project activity is not deemed to be a debundled component of a large 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 small-scale project activity:

Version 13 of 'AMS-I.D: Grid Connected Renewable Electricity Generation' is applied as baseline and monitoring methodology to the project activity.[8]

B.2 Justification of the choice of the project category:

The proposed project activity is grid connected wind power plant with 15 MW installed capacity as explained in A.2. Installed capacity is appropriate equivalent to limit for small scale project activity. Hence, proposed project activity falls in '*Type (I): renewable energy project activities with a maximum output capacity equivalent to up to 15 megawatts (or an appropriate equivalent)'* and category '*D: Electricity generation for a system'*. AMS-I.D is the approved methodology for application to the projects which falls in Type (I) and category (D).

B.3. Description of the project boundary:

According to methodology AMS-I.D version 13, the project boundary encompasses the physical, geographical site of the renewable generation source. The project boundary includes the Project site and all power plants connected physically to the grid because any power plant connected to the grid is affecting the electricity mixtures and characteristics of the system.

B.4. Description of baseline and its development:

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

Demand for electricity in Turkey is growing rapidly with average 6.11%[9] for previous ten years. TEİAŞ, who is responsible from the grid reliability has prepared an electricity demand projection for next ten years

[7] See, http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid17_v01.pdf (page 4)

[8] See, http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_PHPV5WESACMBTJ2YY54GAJYSIEI3HD

[9] For demand development see, TEİAŞ, http://www.TEİAŞ.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202008.pdf (page 4, Table 1)

period (2008-2017) for Turkey and announced on June 2008, given in Table 3, reflecting the continuation of current demand growth. [10]

Table 3 Low and Base Demand Scenarios for Ten Years Period (TWh)

Scenarios	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Low Scenario	204.0	217.0	230.7	246.2	262.7	280.3	299.1	319.2	340.4	363.0
Base Scenario	204.0	219.0	236.2	253.8	272.8	293.2	315.1	338.7	363.7	390.6

In this projection, electricity generation capacity additions are also forecasted taking into account all power plants which are operational, under construction and newly licensed. Generation capacity projection is given in Table 4:

Table 4 Projection of Total Generation Capacity by Fuel Types (TWh)

YEARS	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	SHARE IN 2017 (%)
LIGNITE	52.6	52.6	52.4	54.0	55.6	55.7	55.7	55.5	55.6	55.6	*18.1%*
HARDCOAL	3.0	4.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	*1.6%*
IMPORTED COAL	11.7	11.5	11.5	15.3	21.2	23.8	23.3	23.6	24.3	23.8	*7.8%*
NATURAL GAS	107.9	109.2	113.4	115.7	122.1	121.7	120.6	121.3	121.9	119.1	*38.8%*
GEOTHERMAL	0.3	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	*0.2%*
FUEL OIL	14.0	11.1	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	*3.4%*
DIESEL	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	*0.4%*
OTHER	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	*0.5%*
THERMAL TOTAL	*192.5*	*191.9*	*196.4*	*204.1*	*218.0*	*220.3*	*218.8*	*219.5*	*220.9*	*217.6*	*70.9%*
BIOGAS+WASTE	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	*0.1%*
HYDRO	47.2	50.8	59.3	68.6	75.6	80.3	85.9	87.5	86.7	85.5	*27.9%*
WIND	1.4	2.9	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	*1.2%*
TOTAL	**241.3**	**245.8**	**259.5**	**276.6**	**297.5**	**304.4**	**308.6**	**310.8**	**311.4**	**307.0**	***100.0%***

It is clear from above table that at least for 10 years fossil fuels will be the main resource for electricity generation with 70.9% share in 2017. Natural Gas will continue to hold the dominance and total imported fuel will still constitutes significant share with 50.9%. However, non-hydro renewables constitutes only 1.3%, hydro included is 29.2% of energy mix in 2017. This projection is consistent with continuing fossil fuel dependent characteristics of Turkish electricity sector, which is given in Figure 1. Fossil fuels are generally takes higher shares of Turkish electricity generation from 1970s and there is a clear increasing trend since the beginning of 1990s which comes to 80.9% as the year of 2007.

[10] See, TEİAŞ, (http://www.TEİAŞ.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202008.pdf page 50, Table 26)

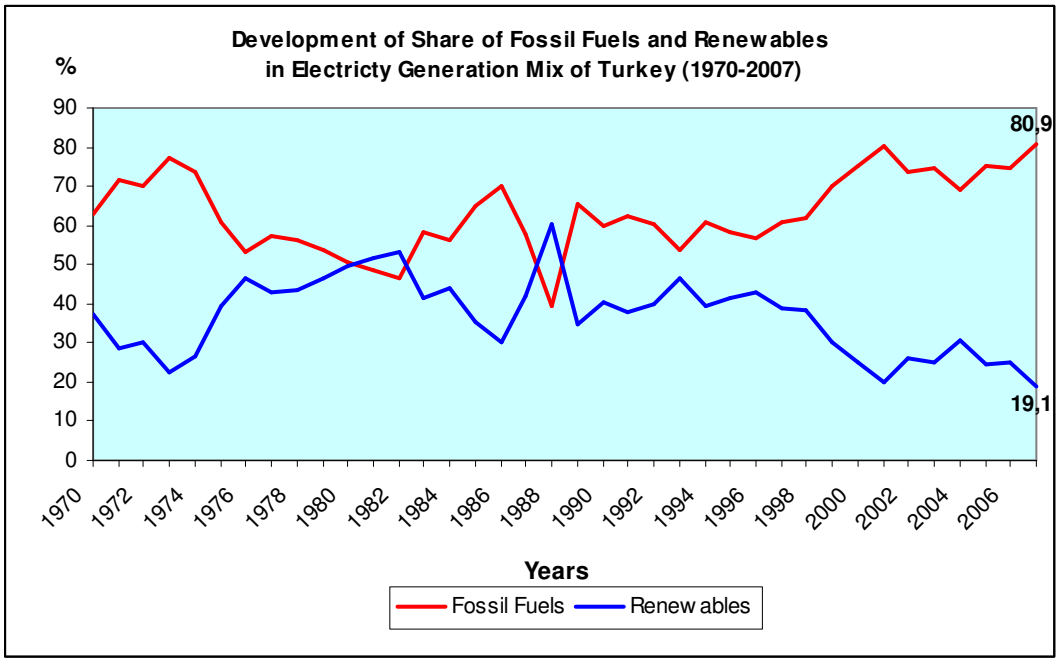


Figure 1 Development of Fossil Fuels and Renewables Shares in Turkey (1970-2007)[11]

In the shed of above analysis for the baseline scenario (continuation of current situation) we can conclude that:

a) Energy demand in Turkey has been increasing with significant rates since ten years, and it is expected to continue at least for ten years.

b) Even all operational plants, construction phase plants and licensed ones are taken into account lack of supply is projected after the year of 2014. Some other scenarios in the study of TEİAŞ, projects lack of supply starting with the year of 2009.[12]. So, there is significant need for electricity generation investments to satisfy demand.

c) Fossil fuels will hold the dominance in generation mix for at least midterm period with 70% share. Hydro included renewables will remain low with 29.2% share and wind energy contribution will stay negligible with only 1.2% of total share.

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 small-scale CDM project activity:

For the explanation of how and why the project activity leads to emission reductions that are additional to what would have occurred in the absence of the project activity, the Gold Standard Toolkit (page 34, Table 2.4) refers to the "Tool for the demonstration and assessment of additionality version 05.2 "[13] (Tool), which defines a step-wise approach to be applied to the proposed project.

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[11] TEİAŞ, http://www.TEİAŞ.gov.tr/ist2007/32.xls (Renewable generation is composing of 'renewable and waste', 'hydro' and 'geothermal and wind' data)

[12] See, Ten Years Projection for Electricity Generation Capacity (2008-2017), http://www.TEİAŞ.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202008.pdf page 104

[13] See,, http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf page 4

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

Sub-step 1a. Alternatives to the project activity

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

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

This alternative is realistic and credible as Ütopya may undertake project activity if he sees no risk for project and/or if the project turns out to be financially attractive without GS VER credit income. However, investments analyze shows that the project is not economically feasible without GS VER credit income. Detail information is given in Step-2c and 2d.

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

The project activity is the electricity power generation activity without any greenhouse gas emission harnessing the energy of the wind. There isn't any alternative investment scenario for Ütopya which produces same amount of energy from other kind of technology (such as Coal and Hydro) as Ütopya is an Independent Power Producer. So, this alternative is *not* realistic for project developer.

c) Continuation of the current situation, i.e. Düzova WEPP is not built

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

According to baseline scenario which is described in B.4, there is a need for energy investment to satisfy increasing demand and if the Düzova WEPP is not built, the same amount of energy will be supplied by other private investors to the grid. Forecasts shows that electricity supplied in the absence of Düzova WEPP will be mainly based on fossil fuels as the projections for the year of 2017 forecasts 70% share for fossil fuels in the energy mix.

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

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

b) Continuation of the current situation, i.e. Düzova WEPP is not built.

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

Both alternatives are in compliance with all mandatory applicable legal and regulatory requirements – not building a wind farm as well as building one.

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

Step 2. Investment analysis

Sub-step 2a: Appropriate analysis method

With the help of the investment analysis it shall be demonstrated that the proposed project activity is not economically or financially feasible without the revenue from the sale of VERs. Therefore, the benchmark analysis shall be applied, as there is no alternative project activity for a comparison of the attractiveness of an investment.

Sub-step 2b: Option III: Benchmark analysis

As a common means to evaluate the attractiveness of investment projects and compare them with possible alternatives, the IRR (Internal Rate of Return) shall be used.

The IRR shall be compared to the government bond rate, published by the under secretariat of Treasury of the Prime Ministry. One of press announcements from 2008 and 2009 show that the annual compound yield for auctions changes between 16,18 – 22,78 percent.[14]

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

The IRR is calculated on the basis of expected cash flows (investment, operating costs and revenues from electricity sale), as used in the financial analysis for the feasibility assessment of the project. The parameters and values used for the IRR calculation are available to DOE during validation. The resulting IRRs for 10 years and 20 years are stated in below table:

Table 5 IRR values for project activity

Period	IRR
10 years	0.0%
20 years	7.80%

Without adding any risk premium to the annual bond rates presented above, they do clearly exceed the resulting IRRs, thus rendering the project activity economically unattractive.

Sub-step 2d: Sensitivity analysis

While the main parameter determining the income of the project is the electricity sales price, a variation of the accordant value shall demonstrate the reliability of the IRR calculation. Electricity price (EP) is varied according to regulated prices (50 and 55 €/MWh) and an indicative spot price (60 €/MWh). In reality, spot price occurrences are not used in wind project economic analysis by financiers due to high volatility in this price. In addition to the TL based spot price volatility, Euro/TL exchange rate volatility adds more uncertainty to price evolution in spot market as financing of these projects will be Euro base (complete data

[14] a) For one of auction results in 2008 See, http://www.treasury.gov.tr/irj/go/km/docs/documents/Treasury%20Web/Announcements/Press%20Release/Public%20Finance/Auction%20Announcements/The%20Result%20of%20the%20Auction%20Conducted%20on%20February%2011th%2c%202008.doc (Interest Rate (%) – Ann. Com.)

b) For one of auction results in 2009 See, http://www.treasury.gov.tr/irj/go/km/docs/documents/Treasury%20Web/Announcements/Press%20Release/Public%20Finance/Auction%20Announcements/The%20Result%20of%20the%20Auction%20Conducted%20on%20January%2012th%2c%202009.doc (Interest Rate (%) – Ann. Com.)

and figures on spot market prices and exchange rates are available to DOE). Moreover, emerging market conditions (a new Balancing and Settlement Regulation[15] will come into force next year which changes price mechanism in spot market) adds further uncertainties to the prices in spot market in mid/long term period.

The investment, energy yield and operating cost parameters are varied with +/- 10%. The worst, base and best case results for each parameter variation is given below, in Table 6. The sensitivity analysis confirms that the proposed project activity is unlikely to be economically attractive without the revenues from VERs as even the maximum IRR result for the best case scenario (10.74%) is below the yield of bonds without considering any risk premium.

Table 6 IRR results according to different parameters (for other parameters 55 €/MWh EP is applied)

Paramter	**Electricity Price**			**Investment Cost**			**Energy Yield**			**Operating Cost**		
Variance	50	55	60	-10%	0	10%	-10%	0	10%	-10%	0	10%
IRR	5.06%	7.80%	10.54%	8.67%	7.80%	7.03%	4.83%	7.80%	*10.74%*	8.76%	7.80%	6.83%

Step 4: Common Practice Analysis

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

At the moment, 92 production licenses for wind power plants are issued by EPDK, the "Electricity Market Regulation Agency".[16] Work flow of the production projects are different in Turkey comparing with other countries. In many countries, the project developer should grant all other permits to be able to have a production licence. In Turkey, to be able to take some permits like construction and building permits and EIA Not Required certificate the project developer should have production licence. So, even 92 licenses have been issued by EPDK, this doesn't mean that all these companies have taken investment decision and all these projects will be implemented. It is assessed that, the main intention of license applicants-owners is getting the right of building wind farm on proposed area to have a valuable asset, than they wait for appropriate incentive for wind energy or look for VER credits to get necessary finance to implement these projects.

There are 18 wind projects in operation as May 2009. These projects are given in below table.

Table 7 The wind projects in operation as May 2009[17]

NO.	**Location**	**Company**	**Installed Cap. (MW)**	**Business Model of the Project**	**GS Project ID**
1	İzmir-Çeşme	Alize Enerji Elektrik Üretim A.Ş.	1.50	IPP	-
2	Çanakkale-İntepe	Anemon Enerji Elektrik Üretim A.Ş.	30.40	IPP-VER	GS347
3	Manisa-Akhisar	Deniz Elektrik Üretim Ltd. Şti.	10.80	IPP-VER	-
4	Çanakkale-Gelibolu	Doğal Enerji Elektrik Üretim A.Ş.	14.90	IPP-VER	GS439

[15] See, EPDK, http://www.epdk.org.tr/mevzuat/yonetmelik/elektrik/dengeleme/yeni/duyilk.doc (accessed in April 2009)

[16] See, EPDK, http://www.epdk.gov.tr/lisans/elektrik/yek/yeklisansgeneltablo.xls (accessed in April 2009)

[17] EPDK, http://www.epdk.org.tr/lisans/elektrik/yek/ruzgarprojeleriningelisimi.xls (accessed in May 2009)

5	Manisa-Sayalar	Doğal Enerji Elektrik Üretim A.Ş.	30.60	IPP-VER	GS369
6	İstanbul-Çatalca	Ertürk Elektrik Üretim A.Ş.	60.00	IPP-VER	GS367
7	İzmir-Aliağa	İnnores Elektrik Üretim A.Ş.	42.50	IPP-VER	GS352
8	İstanbul-Gaziosmanpaşa	Lodos Elektrik Üretim A.Ş.	24.00	IPP-VER	GS503
9	İzmir-Çeşme	Mare Manastır Rüzgar Enerjisi Santralı San. ve Tic. A.Ş.	39.20	IPP-VER	GS368
10	İstanbul-Hadımköy	Sunjüt Sun'i Jüt San. ve Tic. A.Ş	1.20	IPP	-
11	İstanbul-Silivri	Teperes Elektrik Üretim A.Ş.	0.85	IPP	-
12	Balıkesir-Bandırma	Yapısan Elektrik Üretim A.Ş.	30.00	IPP-VER	-
13	Balıkesir-Şamlı	Baki Elektrik Üretim Ltd. Şti.	57.00	IPP-VER	GS351
14	Muğla-Datça	Dares Datça Rüzgar Enerji Santralı Sanayi ve Ticaret A.Ş.	17.00	IPP-VER	GS438
15	Hatay-Samandağ	Deniz Elektrik Üretim Ltd. Şti.	20.00	IPP-VER	-
16	Aydın-Didim	Ayen Enerji A.Ş.	31.50	IPP-VER	GS436
17	İzmir-Çeşme	Ares Alaçatı Rüzgar Enerjisi Sant. San. ve Tic. A.Ş.	7.20	BOT	-
18	Çanakkale-Bozcaada	Bores Bozcaada Rüzgar Enj. Sant. San. ve Tic. A.Ş.	10.20	BOT	-

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

Two of the projects given in Table 7 (No. 17 and 18) are realised as BOT (Build Own Transfer) plants, that means stately owned and with guaranteed income which is different model with IPPs as project activity.

Three of the projects given in Table 7 (No. 1, 10 and 11) there are no further information on the circumstances for their implementation, however, due to small capacity; these projects could be considered as R&D investment of the companies and cannot be considered similar activity. Nevertheless, their size alone gives a reason for not including them into the common practice analysis, as the investment risks are far away from those for Söke-Çatalbük.

All other projects given in Table 7 are realised as VER projects. Karakurt[18], Bares[19] and Sebenoba[20] projects (No. 3, 12 and 15) are registered as VER+. All remaining 12 projects are developed as GS-VER projects[21].

[18] See, http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3784&Ebene1_ID=49&Ebene2_ID=1152&mode=4

[19] See, http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=6081&Ebene1_ID=49&Ebene2_ID=1943&mode=4

[20] See, http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3781&Ebene1_ID=49&Ebene2_ID=1116&mode=4

As shown above, the observed activities in the Turkish wind market can either not be considered similar, as they were realised under a different environment, or do not have to be included in this analysis since they are realised as VER or VER applicants. Thus, no similar options occur, showing that wind power is far from being common practice in Turkey.

Summarizing the explanations above one can state that the commercial risks are high for this project. Taking into consideration the significant technological and investment barriers and barriers due to prevailing practice in conjunction with renewable energies and specifically with wind energy in Turkey, investors are unlikely to invest into the project in the absence of carbon finance.

The emissions reductions from the proposed project are therefore additional to what would have occurred in the absence of the GS-VER project activity.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to applied methodology, AMS-I.D., the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner.

Stepwise approach of 'Tool to calculate the emission factor for an electricity system' version 01.1 is used to find this combined margin (emission coefficient) as described below:

Step 1. Identify the relevant electric power system

There are 21 regional distribution regions in Turkey but no regional transmission system is defined. In Article 20 of License Regulation it is stated that '*TEIAS shall be in charge of all transmission activities to be performed over the existing transmission facilities and those to be constructed as well as the activities pertaining to the operation of* ***national transmission system*** *via the National Load Dispatch Center and the regional load dispatch centers connected to this center and the operation of Market Financial Reconciliation Center*[22]'. As it can be understood from this phrase, only one transmission system which is national transmission system is defined and only TEİAŞ is in the charge of all transmission system related activities. Therefore, the national grid is used as electric power system for project activity. The national grid of Turkey is connected to the electricity systems of neighbouring countries. Complying with the rules of the tool, the emission factor for imports from neighbouring countries is considered 0 (zero) tCO_2/MWh for determining the OM.

There is no information about interconnected transmission capacity investments, as TEİAŞ, who operates the grid, also didn't take into account imports-exports for electricity capacity projections.[23] Because of that, for BM calculation transmission capacity is not considered.

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[21] See, https://gs1.apx.com/myModule/rpt/myrpt.asp?r=111

[22] See, http://www.epdk.org.tr/english/regulations/electric/license/licensing.doc (page 21)

[23] See, http://www.epdk.org.tr/yayin_rapor/elektrik/yayin/uretimKapasiteProjeksiyonu2008_2017.pdf (page 39)

Step 2. Select an operating margin (OM) method

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

Table 8: Share of Low Cost Resource (LCR) Production 2003-2007 (Production in GWh)

	2003	**2004**	**2005**	**2006**	**2007**
Gross production	140,580.5	150,698.3	161,956.2	176,299.8	191,558.1
TOTAL LCR Production	35,595.4	46,338.6	39,836.3	44,618.7	36,575.6
Hydro	35,329.5	46,083.7	39,560.5	44,244.2	35,850.8
Renewables and Waste	115.9	104.0	122.4	154.0	213.7
Geothermal and Wind	150.0	150.9	153.4	220.5	511.1
Share of LCRs	25.32%	30.75%	24.60%	25.31%	19.09%
Average of last five years	**25.01%**				

As average share of low cost resources for the last five years is far below 50% (25.01%), the simple OM method is applicable to calculate the operating margin emission factor ($EF_{grid,OM,y}$)

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

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

The ex ante option is selected for Simple OM method, with the most recent data for the baseline calculation stemming from the years 2005 to 2007.

Step 3. Calculate the operating margin emission factor according to the selected method

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

- data on fuel consumption and net electricity generation of each power plant (Option A),
- data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or
- data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C).

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

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

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

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	three most recent years for which data is available at the time of submission of the PDD to the DOE for validation

For the calculation of the OM, CO_2 emissions due to electricity production are taken from national statistics (TUIK)[24] for 2005, 2006 and 2007.

Table 9: CO_2 emissions from electricity production 2005-2007 ($ktCO_2$)

	2005	**2006**	**2007**
CO_2-Emmissions	83,680	85,312	100,662

Table 10 presents the gross electricity production data by all the relevant energy sources. Low-cost/must run resources like hydro, wind, geothermic and biomass do not emit fossil CO_2 and thus are not taken into account in calculations.

Table 10: Gross electricity production by fossil energy sources 2005-2007 (GWh)

Energy Source	**2005**	**2006**	**2007**
Natural Gas	73,444.9	80,691.2	95,024.8
Lignite	29,946.3	32,432.9	38,294.7
Coal	13,246.2	14,216.6	15,136.2
Fuel Oil	5,120.7	4,232.4	6,469.6
Motor Oil	2.5	57.7	13.3
Naphtha	326.5	50.2	0.0
LPG	33.7	0.1	43.9
Total fossil fuels	**122,120.8**	**131,681.1**	**154,982.5**

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

[24] See TUIK, http://www.tuik.gov.tr/PreHaberBultenleri.do?id=4078&tb_id=3 (cell Q7 for 2005, R7 for 2006 and S7 for 2007)

Table 11: Net/gross electricity production 2005-2007 (GWh)

	2005	2006	2007
Gross Production	161,956.20	176,299.80	191,558.13
Net Production	155,469.10	169,543.10	183,339.70
Relation	**95.99%**	**96.17%**	**95.71%**

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

Table 12 shows the resulting net data for fossil fuel generation and adds electricity imports.

Table 12: Electricity supplied to the grid, relevant for OM (MWh)

	2005	2006	2007
Net El. Prod. by fossil fuels	117,229.3	126,634.4	148,333.3
Electricity Import	635.9	573.2	864.3
Electricity supplied to grid by relevant sources	**117,865.2**	**127,207.6**	**149,197.6**

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

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

Table 13: Calculation of Weighted $EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)

	2005	2006	2007
CO_2-Emmissions ($ktCO_2$)	83,680	85,312	100,662
Net Electricity Supplied to Grid by relevant sources (GWh)	117,865.2	127,207.6	149,197.6
$EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)	0.7100	0.6706	0.6747
3-year Generation Weighted Average $EF_{grid,OMsimple,y}$ ($ktCO_2/GWh$)	**0.6839**		

Step 4. Identify the cohort of power units to be included in the build margin

Build Margin calculations are performed with the sample group of power units *m* consisting 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

Option (b) is used to identify the sample group, as this option comprises the larger annual generation in Turkey. In 2007, gross electricity generation amount is 191,558 GWh and 20% of this is 38,311.6 GWh.

The last plant of the sample group is built in 2004 and until the end of the 2007 there were five VER projects with total 125.3 MW capacities (Bares, Anemon, Mare, Burgaz, Deniz WEPPs). Because of the last

plant of the sample group was built 4 years ago (not more than 10 years ago), VER plants are excluded from sample group.

While identifying the sample group dismantled, revised, retrofits are not included. Only new capacity additions (power plants / units) are taken into account.
Sample group for BM emission factor is given below table. The derivation of the values presented in Table 14 is contained in a separate excel file which is available for validation.

Table 14: Sample group generation for BM emission factor calculation (GWh)

Energy Source	2004	2005	2006	2007	Total
Natural Gas	8,810.4	7,068.4	3,273.6	2,555.3	**21,707.7**
Lignite	0.0	4,420.0	7,020.0	0.0	**11,440.0**
Coal	337.5	1,125.0	0.0	0.0	**1,462.5**
Fuel Oil	789.2	99.1	0.0	800.0	**1,688.3**
Hydro	241.8	1,028.8	539.6	1,217.0	**3,027.2**
Renewables	0.0	87.4	436.5	11.0	**534.9**
TOTAL	**10,178.9**	**13,828.69**	**11,269.70**	**4,583.30**	**39,860.5**

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

Step 5. Calculate the build margin emission factor

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

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

Where:

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

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

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

Where:

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

There is no plant specific efficiency factor and CO_2 emission factor data in Turkey, however national statistics of TEIAS is used to calculate average efficiency of power plants for each fuel type. Calculation table of efficiencies is given in Annex-2 (Table 17). Here, Natural Gas and Coal efficiencies are turned to be in de range of default values given in Annex-1 of the Tool and deemed to be reliable. Lower efficiency of Lignite is due to low calorific values of lignite in Turkey (900-3000 kCal) and inefficiency in lignite power plants which are old. However, efficiency of oil plants (24.68%) is significantly lower than default values so also this efficiency data is reliable to use. It is assessed that, oil is generally used as auxiliary fuel in coal and lignite plants during start-up period and thermal efficiency of the plants in start-up is lower than normal operation. So for oil generation the default value from the Tool is used. Also, since there is no national data about emission factors of the plant, IPCC data used for $EFCO_{2,m,i,y}$. Consequently, the BM emission factor is calculated as given in following table:

Table 15: BM emission factor calculation using equation (2) and (3)

Energy Source	Sample Group Total Generation (GWh)	Effective CO_2 emission factor (tCO_2/TJ)	Average Efficiency ($\eta_{m,y}$)	CO2 Emission ($ktCO_2$)
Natural Gas	21,707.7	54.3	45.91%	9,243.4
Lignite	11,440.0	90.9	32.91%	11,375.5
Coal	1,462.5	92.8	40.94%	1,193.3
Fuel Oil	1,688.3	75.5	39.50%	1,161.7
Hydro	3,027.2	0.0	0.00%	0.0
Renewables	534.9	0.0	0.00%	0.0
Total	***39,860.5***			***22,973.8***
$EF_{grid,BM,y}$ (tCO_2/MWh)	**0.5764**			

Step 6. Calculate the combined margin emission factor

The combined margin emission factor is calculated as follows:

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

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = 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 (%)

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

$EF_{grid,CM,y}$ = 0,6839 tCO_2/MWh * 0,75 + 0,5764 tCO_2/MWh * 0,25 = 0,6570 tCO_2/MWh

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

Data / Parameter:	**Gross electricity generation**
Data unit:	**MWh**
Description:	Gross Electricity supplied to the grid by relevant sources (2005-2007)
Source of data used:	Turkish Electricity Transmission Company (TEIAS), Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (1940-2007) TEIAS, see: http://www.teias.gov.tr/ist2007/31(40-07).xls (accessed in May 2009)
Value applied:	See Table 10, Table 11, Table 17
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**Net electricity generation**
Data unit:	**MWh**
Description:	Net electricity fed into the grid. Used for the calculation of the net/gross relation (Including Import and Export figures)
Source of data used:	Turkish Electricity Transmission Company (TEIAS), Annual Development of Electricity Generation- Consumption and Losses in Turkey (1984-2007) TEIAS, see http://www.teias.gov.tr/ist2007/30(84-07).xls (accessed in May 2009)
Value applied:	See Table 11
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is used to find relation between the gross and net electricity delivered to the grid by fossil fuel fired power plants (Table 11). Import and Export data is used to find total net electricity fed into the grid in the years of 2005, 2006 and 2007 (Table 12). TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**CO_2 –Emissions**
Data unit:	kton
Description:	CO_2 Emission Amount due to Electricity Production from 2003 to 2007
Source of data used:	Turkish Statistical Institute, TUIK: http://www.tuik.gov.tr/PreHaberBultenleri.do?id=4078&tb_id=3 (row 7, accessed in June 2008)
Value applied:	See Table 9 and Table 13
Justification of the	

choice of data or description of measurement methods and procedures actually applied :	TUIK is the national statistical body, which makes available the official data for greenhouse gas inventory for each year.
Any comment:	

Data / Parameter:	**Sample Group for BM emission factor**
Data unit:	Name of the plants, MW capacities, fuel types, annual electricity generations and dates of commissioning.
Description:	Most recent power plants which compromise 20% of total generation
Source of data used:	Annual Development Of Fuels Consumed In Thermal Power Plants In Turkey By The Electric Utilities,TEIAS: http://www.teias.gov.tr/istat2004/7.xls (for 2004, accessed in May 2009) http://www.teias.gov.tr/istatistik2005/7.xls (for 2005, accessed in May 2009) http://www.epdk.org.tr/yayin_rapor/elektrik/yayin/uretimKapasiteProjeksiyonu.pdf (page 76 and 77, for 2006, accessed in May 2009) http://www.epdk.org.tr/yayin_rapor/elektrik/yayin/uretimKapasiteProjeksiyonu2008_2017.pdf (page 121 and 122, for 2007, accessed in May 2009)
Value applied:	See Table 16
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAS is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	$\mathbf{EF_i}$
Data unit:	tCO_2/GJ
Description:	Emission factor for fuel type i
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 IPCC Guidelines on National GHG Inventories. http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value applied:	See **Fehler! Verweisquelle konnte nicht gefunden werden.**
Justification of the choice of data or description of measurement methods and procedures actually applied :	No plant specific and national emission factor data is available in Turkey. So, IPCC default data is used.
Any comment:	

Data / Parameter:	$\eta_{i,y}$
Data unit:	-
Description:	Average energy conversion efficiency of power unit m in year y

Source of data used:	Annex I the "Tool to calculate the emission factor for an electricity system"
Value applied:	See Table 15, and Table 17
Justification of the choice of data or description of measurement methods and procedures actually applied :	For Natural Gas, Lignite and Coal power plants calculated national data is used. See Annex-2, Table 17. For oil plant efficiency, default value given in the tool is applied: http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Emission reductions are calculated as follows:

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

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

Project emissions

The proposed project activity involves the generation of electricity by development of a wind farm. The generation of electricity does not result in greenhouse gas emissions and therefore is taken as 0 tCO2/year.

Leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage does not has to be taken into account and is taken as 0 tCO2/year.

Then:

$$ER_y = BE_y$$

Baseline emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = (EG_y - EG_{baseline}) \times EF_{grid,CM,y} \qquad \textbf{(6)}$$

Where:
BE_y = Baseline emissions in year y (tCO_2/yr).

EG_y = Electricity supplied by the project activity to the grid (MWh).
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.
$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

The project activity is the installation of a new grid-connected renewable power plant so, $EG_{baseline} = 0$
Then:

$ER_y = BE_y = EG_y * EF_{grid,CM,}$ = 59,300 MWh/year * 0.6570 tCO_2/MWh = **38,960 tCO_2/year.**

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

Year	Estimated project emissions [tCO_2]	Estimated baseline emissions [tCO_2]	Estimated leakage [tCO_2]	Estimated emission reductions [tCO_2]
2009*	0	8,117	0	8,117
2010	0	38,960	0	38,960
2011	0	38,960	0	38,960
2012	0	38,960	0	38,960
2013	0	38,960	0	38,960
2014	0	38,960	0	38,960
2015	0	38,960	0	38,960
2016**	0	30,843	0	30,843
Total	**0**	**272,720**	**0**	**272,720**

* 2,5 months operation for 2009
** 9,5 months operation for 2016

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG
Data unit:	MWh
Description:	Net electricity delivered to the grid
Source of data to be used:	The data from the Electricity Meter are the basis for the monthly invoice. For monitoring, the monthly invoice – exactly the field where net electricity supplied to the grid is stated – shall be used as source of data.
Value of data	59,300 MWh/year
Description of measurement methods and procedures to be applied:	• Regarding the electricity meters: two meters will be placed (one main and one reserve). The fact that two meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyer. • Measured hourly and readings monthly: On every month's last day, the

	production index will be taken from the main as well as the reserve meter: *"The meters included in the metering system configuration of the settlement aggregation entities registered on the names of the market participants shall be read monthly, within the first 4 (four) days of the month, by TEIAS and/or distribution licensees with participation of the market participant's representative and the meter reading values shall be submitted to MFSC.* *The MFSC shall monthly update the list of meters that need to be read as part of the settlement process to reflect new registrants and updates in existing registrations, and send them to TEIAS and the distribution licensees.* *The (a) energy withdrawn from the system in kWh, and (b) active energy supplied to the system in kWh for each settlement period of the related invoicing period shall be read from the registered meters."* • A protocol, which shows the measured data (including electricity amount supplied by the plant and received from the grid) will be signed from the WEPP Manager and a responsible person from the State Authorities (TEİAŞ – Turkish Electricity Transmission Company) • This protocol will be send to Ankara to Market Financial Settlement Center (PMUM in Turkish-PMUM is a governmental organisation and is responsible for determining the spot electricity price) • PMUM checks the correctness of the protocol and prepares the invoice until 18th of the following month (PMUM invoices their services like electricity balancing and settlement operations) • In reference to the checked data from the protocol and the PMUM invoice, ÜTOPYA can prepare the invoice for the produced energy. • Since the meters are reading electricity supplied to the system and withdrawn from the system separately, the net electricity amount supplied to the grid will be calculated by electricity supplied minus electricity withdrawn. Thus with this procedure is monitored sufficient and no extra Monitoring has to be implemented. The above described measurement method follows Article 52 of the official regulation "Electricity Market Balancing And Settlement Regulation"[25]
QA/QC procedures to be applied:	As stated at the end of the first paragraph of A.2 part of this PDD (page 2), Düzova WEPP will be connected to the grid with 154 kV voltage level.

[25] See, http://www.epdk.org.tr/english/regulations/electric/balancing/balancing.doc page 50 (accessed in April 2009)

	According to the first paragraph of the sub clause b) of Provisional Article 4 of the 'Communiqué Regarding the Meters to be used in the Electricity Market '[26] (Communiqué): *'The measurement points of the generation facilities connected to the transmission system transformers over high voltage lines (66 kV, 154kV or 380kV) shall be at the* ***exit side of the group step up transformers of the generation facilities****.'* According to the 2. Article of the Communiqué : '*The meters to be used in the electricity market shall be compliant with the standards of Turkish Standards Institute or IEC and have obtained* ***"Type and System Approval" certificate from the Ministry of Trade and Industry.'*** Therefore, Ministry of Trade and Industry (Ministry) is responsible from control and calibration of the meters. b) paragraph of the 9th Article of the 'Regulation of Metering and Testing of Metering Systems'[27] (Regulation) of Ministry states that: ' *b) Periodic tests of meters of electricity, water, coal gas, natural gas and current and voltage transformers are done* ***every 10 years****.'* Therefore periodic calibration of the meters will be done every 10 years. Also according to 67th article (page 20) of this regulation, the calibration shall be done in calibration stations which have been tested and approved by Ministry of Trade and Industry. Article 10 d) of Communiqué requires the meters shall be three phase four wire and Article 64 of Regulation clearly states how calibration shall be performed for this kind of meters. According to 3. Article of System Usage Agreement[28] done by ÜTOPYA and TEIAS; other than periodic tests, if a party alleges the meters are not working appropriately tests of the meters will be done by presence of both parties. If, after controls, it is seen that the meter is not working appropriately, the measurements of reserve meters are taken into account beginning from date both meters are reading the same (page 3, 2-c) As above mentioned, the data acquisition and management and quality assurance procedures that are anyway in place, no additional procedures have to be established for the monitoring plan.
Any comment:	

B.7.2 Description of the monitoring plan:

[26] See, http://www.epdk.org.tr/english/regulations/electric/meters.doc, page 1

[27] See, http://www.sanayi.gov.tr/download/osgm/olcu_aletleri_muayene_yonetmelik.zip , page 2

[28] See, http://www.teias.gov.tr/sistemkullanim1.doc , page 3, 2-b)

Monitoring methodology and plan as per Paragraph 13 of "Type AMS I.D. Grid connected renewable electricity generation" (Version 13) of Appendix B of the Simplified M&P for Small-Scale CDM Project. Activities, states that:

- *"Monitoring shall consist of metering the electricity generated by the renewable technology."*

Furthermore, according to the general requirements stated in the Appendix B, "General Guidance to SSM CDM Methodologies"[29], Paragraph 12 the project participants shall:

- *"Electronically archive all data collected as part of monitoring for a period of 2 years from the end of the crediting period;*
- *Data variables that are most directly related to the emission reductions (e.g. quantity of the fuel inputs, the amount of heat or electricity produced, gas captured) should be measured continuously. Data elements that are generally constant and indirectly related to the emission reductions (e.g. Emission factors, Calorific Value, System Efficiencies) should be measured or calculated at least once in an year, unless detailed specifications are provided as part of the indicated methodology;*
- *Measuring equipment should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturer specifications, but at least once in 3 years;*
- *The measured data with high levels of uncertainty or without adequate calibration should be compared with location/national data and commercial data to ensure consistency;*
- *Wherever a statistical sample is proposed for monitoring, the sample should be representative of the population and should have a minimum level of confidence of one times the standard deviation (one sigma), unless detailed specifications are provided as part of the indicated methodology. "*

The actual emission reductions will be ex-post verified, based on the data collected during monitoring.

B.7.2.1. Monitoring of the emissions in the project scenario and the baseline scenario

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

The collected data will be kept by ÜTOPYA during the crediting period and until two years after the last issuance of VERs for the Düzova WEPP project activity for that crediting period.

Given a data vintage based on ex ante monitoring and selection of a renewable 7 year crediting period, the Combined Margin will be recalculated at any renewal of the crediting period using the valid baseline methodology.

As the proposed project activity does not lead to any project emissions, no data is monitored here.

[29] Annex 20, Revision to "general guidance to SSC methodologies " (version 12) from the 41st Executive Board Meeting Report, 30 July-02 August 2008, http://cdm.unfccc.int/EB/archives/meetings_08.html#041

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

Operational and Management Structure

As described above, the only relevant data that has to be monitored is the net electricity generation (GEN_y) per year. These data are subject to the accounting quality systems of both parties to the power purchase agreement, TEİAŞ and ÜTOPYA. The monthly meter reading documents are stored by ÜTOPYA and TEIAS. The settlement notification, which is issued by TEIAS and includes the meter reading data, is stored on a TEIAS file server and accessible for ÜTOPYA via a secured website (https://pmum.teias.gov.tr/UzlasmaWeb/). The meters themselves can always be read as plausibility check for verification. With this, no additional structures or processes have to be implemented to insure the availability and high quality of the necessary data for monitoring.

At the end of each monitoring period, which is planned to generally last one year, the data from the monthly meter reading records will be added up to the yearly net electricity generation and multiplied with the combined margin emission factor with the help of an excel spreadsheet that also contains the combined margin calculation. Thus, the complete baseline approach is always transparent and traceable. For the elaboration and quality assurance of the monitoring report, FutureCamp GmbH, an expert in the project mechanisms who already supported in the project design, is assigned.

ÜTOPYA will keep all the data needed for the calculation of emission reductions during the crediting period and until two years after the last issuance of GS VERs for Düzova WEPP.

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

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

Date of completion: 05 May 2009

Name of entity determining the baseline: FutureCamp GmbH, Germany (project consultant)
Tel: +49 89 45 22 67-0
Fax: +49 89 45 22 67-11
Email: climate@future-camp.de
Contributor: Ütopya Elektrik Üretim Sanayi ve Tic. Ltd. Şti.

FutureCamp is not a project participant.

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:

Starting date of the project is 15/03/2009 which is starting date of construction workings.

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

The expected lifetime of the Düzova Wind Power Plant project is 20 years.

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

C.2.1. Renewable crediting period

A renewable crediting period has been selected for the project.

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

The first crediting period starts with commissioning of the wind power plant expected to be in 15/10/2009.

C.2.1.2. Length of the first crediting period:

The length of the first crediting period is 7 years, 0 months.

C.2.2. Fixed crediting period:

Fixed crediting period is not applicable.

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

SECTION D. Environmental impacts

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The regional environmental authority confirmed with a certificate[30] that an official Environmental Impact Assessment (EIA) is not required for the proposed project. The need for an EIA is checked by the regional authority on a project specific base taking into account a project specific information file and considering local conditions.

All potential environmental issues were discussed in detail on the stakeholder consultation and no objections or critical opinions were received. The evaluation of social and environmental indicators regarding the project is based on the Sustainable Development Assessment Matrix provided in the Local Stakeholder Consultation Report as well as on common sense regarding the wind power plant technology. This analysis confirmed no EIA is necessary. No negative or critical indicators were identified. The total score of the Sustainable Development Assessment Matrix is +7.

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:

There have not been identified any significant environmental impacts of the project.

SECTION E. Stakeholders' comments

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

The stakeholders were actively invited to the stakeholder consultation meeting by:

- Invitation letter;
- Invitation in the local newspaper;
- Invitation in the national newspaper;
- Invitation on Aşağıkırıklar Village Coffehouse.

The stakeholder meeting was held on 13th of February at Wedding Hall of Aşağıkırıklar Village, Bergama / İzmir. At the meeting besides project developers, there were six local volunteers of TEMA Foundation one of them was local representative, one local representative of Greenpeace, three representative of Aliağa Organized Industrial Region Admistration (ALOSBİ), two representative of Bergama Trade Registry, and president of Turkish Woman Association, Bergama Branch. Mayor of Aşağıkırıklar Village and many participants from the village were there to participant to the meeting. The number of total participants was more than 200, however, 100 of them signed the participation list. Supporter of Gold Standard Organizations i.e. WWF, Greenpeace and REC Turkey has been informed about project.

The place of meeting was chosen to be the closest place to the project area and all local people are informed about meeting in advance by coffeehouse, municipality announcements and local newspaper

[30] Available to DOE during validation.

announcements. Additionally, one week before meeting village had been visited and announcement of upcoming meeting had been done. With an announcement in national newspaper there were two participants from Bergama Trade Registry and three participants from Aliağa Organized Industrial Region Administration who were interested in project.

Before presentation, agenda of the meeting and non-technical PDD was distributed to the participants for broader view. Project presentation and description was made including information about project developers, the technology and operation of the power plant, estimated emission reduction amount of the plant, the importance of revenue from emission reduction, information about Gold Standard and the project characteristics which makes this project different from other power plant projects in Turkey. Before passing to blind sustainable development exercise, question and comments were taken from participants about further clarification of project.

After clarification of the project with answering questions, he presented blind sustainable exercise to the participants and wanted them to comment on each indicator as positive, negative and neutral. After presentation some questions were raised by participants, which were answered by project coordinator Mr. Sancar Saraçoğlu and presenter. The questions and answers are given in '*ii.Assessment of comments'* section of LSC Report. All questions received and minutes of the meeting was taken under protocol signed by Major of Aşağıkırıklar Village Halil Erol and Project Coordinator Mr. Sancar Saraçoğlu. Questions and comments raised by participants were addressed in assessment of comments part.

The meeting was closed by a general support from participants and of project developer goodwill.

Detailed information regarding the stakeholder consultation and the stakeholders' comments is provided in the extra document Local Stakeholder Consultation (LSC) Report, which is also available to DOE.

E.2. Summary of the comments received:

17 original evaluation forms as well as translation version in English are attached in Annex 2 of the LSC Report.

The overall feedback to the organized consultation, and what follows to the project, has been very positive. The stakeholders consider the project environmental-friendly, which can provide clean energy, help the villages, and provide new employment possibilities in the region. Detail information regarding the stakeholders' feedback and comments is provided in the LSC Report.

The stakeholders didn't raise any concerns except some demands for local employment, and affects of project on crops. The concern of local employment was answered clearly by project coordinator as there will be priority to employ local people for project works. The request of villagers in written forms regarding loudspeaker system and graveyard hedge was read by presenter and accepted by project developer.

The comments and question regarding affect of project on crops raised in written forms and passed to us after meeting were explained during presentation as there will be no affect of project on crops. While project area is not an agricultural area, the affects of turbines which could be only in sense of shadowing, agricultural areas and crops which is located 100-200 meter away from project area would not be negatively affected.

All comments and questions from stakeholders were considered as serious and reasonable. An adequate answer has been provided. There have not been raised any critical comments nor objections for the project

implementation. Detailed table with all stakeholder comments and the responses is provided in the Section B.5 of Stakeholder Consultation Report.

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

The stakeholders have not raised any concerns, any important suggestions and negative opinion regarding the project, which may necessitate revisiting sustainability assessment. Concern of local employment and affects to the agricultural activities are evaluated and they are adequate answers have been provided. Since, the project area is plain without any agricultural activity there will be no negative effect. Also, project developer has stated his intention and sensitivity about local employment for this project. Therefore sustainable assessment is not going to be revisited as well as no alteration in project design will be done.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Ütopya Elektrik Üretim Sanayi ve Tic. Ltd. Şti.
Street/P.O.Box:	Hakkı Yeten Cad.
Building:	No: 10/C Kat: 6
City:	BEŞİKTAŞ-İSTANBUL
State/Region:	
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Telephone:	+90 212 2156060
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E-Mail:	onur.yazgan@finaenerji.com
URL:	http://www.finaenerji.com.tr
Represented by:	Onur Yazgan
Title:	Mr.
Salutation:	Project Manager
Last Name:	Yazgan
Middle Name:	
First Name:	Onur
Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

BASELINE INFORMATION

RECENT POWER PLANTS: CAPACITY AND FUEL TYPE

Table 16: Sample Group PPs for BM Emission Factor Calculation

Name of Power Plant	Capacity (MW)	Average Generation (GWh)	Fuel Type	Date of Operation
ANKARA D.G.(BAYMİNA) GR-I-II-III	798,0	6.500,0	N. Gas	08.01.2004
ENTEK GR-IV	31,1	255,7	N.GAS+NAPHTA	12.02.2004
ATATEKS 2 GM	5,6	45,0	N. Gas	20.02.2004
TANRIVERDİ 4 GM	4,7	38,7	N. Gas	24.03.2004
ÇOLAKOĞLUB(CAPACITY INCREMENT)	45,0	337,5	IMPORTED COAL	05.05.2004
TEKBOY TEKSTİL 1 GM	2,2	16,0	N. Gas	18.05.2004
GÜL ENERJİ GR-II	12,5	96,5	Fuel Oil	03.06.2004
KOMBASSAN KAĞIT GIDA VE TEKS	5,5	38,1	N. Gas	09.06.2004
AYEN OSTİM ENERJİ ÜRETİM	31,1	264,1	N. Gas	11.06.2004
BİS ENERJİ 2 GT	73,0	602,7	N. Gas	16.06.2004
ENERJİ-SA ADANA 1 BT	49,8	322,9	NAPHTA	23.06.2004
ŞAHİNLER ENERJİ 1 GM	3,2	22,2	N. Gas	29.06.2004
BESLER GR-2, BT (5,2+7,5)	12,7	97,7	N. Gas	07.07.2004
ÇELİK ENERJİ ÜR.ŞTİ. 2 GM	2,4	18,6	N. Gas	09.07.2004
KOMBASSAN KAĞ. MATBAA GIDA	5,5	35,7	N. Gas	24.09.2004
AYEN OSTİM ENERJİ ÜRETİM (BT)	9,9	84,0	N. Gas	01.10.2004
HABAŞ ALİAĞA GRUP I-II	89,2	713,9	N. Gas	08.10.2004
STANDART PROFİL 3 GM	6,7	49,2	N. Gas	22.10.2004
KARKEY-II 3+3 DGM	54,3	369,7	Fuel Oil	12.11.2004
ALTINMARKA GIDA GR I-II-III	3,6	28,8	N. Gas	17.12.2004
ERE (BİR KAPILI HES) GRUP-I	48,5	170,6	Hydro (Run of River)	11.03.2004
ELTA ELK (DODURGA) GR-I-II-III-IV	4,1	12,3	Hydro (Run of River)	26.04.2004
İSKUR TEKSTİL (SÜLEYMANLI) GR I-II	4,6	17,9	Hydro (Run of River)	28.04.2004
BEREKET EN. (Feslek Hes) Gr-1-2	9,5	41,0	Hydro (Run of River)	05.08.2004
ÇAN GR I	160,0	1.040,0	LIGNITE	15.02.2005
ÇAN GR II	160,0	1.040,0	LIGNITE	15.03.2005
ELBİSTAN-B GR I	360,0	2.340,0	LIGNITE	15.02.2005
AKBAŞLAR GR-II (Isolated)	8,8	73,0	N.GAS	24.06.2005
AKÇA ENERJİ GR-III	8,7	65,4	N.GAS+NAPHTHA	14.12.2005
AYKA TEKSTİL GR-I	5,5	40,0	N. Gas	24.09.2005
BAYDEMİRLER GR IV-V-VI	6,2	51,4	N. Gas	04.02.2005
BOSEN GR-III	50,0	350,0	N. Gas	30.12.2005
ÇUMRA ŞEKER	16,0	40,0	N.GAS+LIGNITE	01.01.2005
ETİ MAD.(BAN.ASİT)GR-I	11,5	85,0	RENEW.+WASTES	15.07.2005
EVYAP GR I-II	5,1	30,0	N. Gas	27.08.2005
GRANİSER GRANİT GR-I	5,5	42,0	N. Gas	14.11.2005

HABAŞ ALİAĞA GR III	47,7	381,6	N. Gas	02.06.2005
HABAŞ ALİAĞA GR IV	47,7	381,6	N. Gas	21.09.2005
HABAŞ ALİAĞA GR-V	24,6	196,8	N. Gas	24.11.2005
HAYAT KAĞIT GR-I	7,5	56,0	N. Gas	27.05.2005
İÇDAŞ ÇELİK GR-I	135,0	1.080,0	IMPORTED COAL	30.11.2005
KAHRAMANMARAŞ KAĞIT GR-I	6,0	45,0	IMPORTED COAL	08.12.2005
KORUMA KLOR GR I-II-III	9,6	77,0	N. Gas	03.12.2005
KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	8,0	64,0	N. Gas	27.11.2005
MERCEDES BENZ TURK GR I-II-III-IV	8,3	68,0	N. Gas	04.02.2005
MODERN ENERJİ GR-III	8,4	62,9	N. Gas	14.06.2005
MODERN ENERJİ GR-II	6,7	50,4	N.GAS+LPG	14.06.2005
MOSB GR I-II-III-IV-V-VI-VII	84,8	434,0	N. Gas	01.03 - 01.08.2005
ORS RULMAN	12,4	99,4	N. Gas	25.08.2005
PAK GIDA (Kemalpaşa) GR-I	5,7	45,0	N. Gas	07.12.2005
TEZCAN GALVANİZ GR I-II	3,7	29,0	N. Gas	27.05.2005
YONGAPAN(KAST.ENTG) GR-II	5,2	32,7	N. Gas	25.05.2005
ZEYNEP GİYİM SAN. GR-I	1,2	9,0	N. Gas	07.07.2005
AK ENERJİ(K.paşa) GR- III	40,0	256,9	N. Gas	09.11.2005
AK ENERJİ(K.paşa) GR I-II	87,2	560,1	N. Gas	30.04.2005
ALTEK ALARKO GR I-II	60,1	420,0	N. Gas	14.10.2005
BİS ENERJİ GR VII	43,7	360,8	N. Gas	18.03.2005
CAN ENERJİ GR-I	3,9	28,0	N. Gas	25.08.2005
ÇEBİ ENERJİ BT	21,0	164,9	N. Gas	27.08.2005
ÇEBİ ENERJİ GT	43,4	340,1	N. Gas	23.08.2005
ENTEK ELK.A.Ş.KOÇ ÜNİ.GR I-II	2,3	19,0	N. Gas	07.02.2005
KAREGE GR IV-V	18,1	141,9	N. Gas	07.04.2005
KARKEY(SİLOPİ-4) GR-IV	6,2	47,2	Fuel Oil	30.06.2005
KARKEY(SİLOPİ-4) GR-V	6,8	51,9	Fuel Oil	23.12.2005
METEM ENERJİ(Hacışıramat) GR I-II	7,8	58,0	N. Gas	29.01.2005
METEM ENERJİ(Peliklik) GR I-II-III	11,7	89,0	N. Gas	29.01.2005
NOREN ENERJİ GR-I	8,7	70,0	N. Gas	24.08.2005
NUH ENERJİ-2 GR I	47,0	319,7	N. Gas	24.05.2005
ZORLU ENERJİ KAYSERİ GR-I-II-III	149,9	1.144,1	N. Gas	22.07.2005
ZORLU ENERJİ KAYSERİ GR-IV	38,6	294,9	N. Gas	26.10.2005
ZORLU ENERJİ YALOVA GR I-II	15,9	122,0	N. Gas	26.11.2005
TEKTUĞ(Kargılık) GR I-II	23,9	83,0	Hydro (Run of River)	25.04.2005
İÇTAŞ ENERJİ(Yukarı Mercan) GR I-II	14,2	44,0	Hydro (Run of River)	02.05.2005
MURATLI GR I-II	115,0	444,0	Hydro (with Dam)	03.06.2005
BEREKET EN.(DALAMAN) GR XIII-XIV-XV	7,5	35,8	Hydro (Run of River)	16.07.2005
YAMULA GRUP I-II	100,0	422,0	Hydro (with Dam)	31.07.2005
SUNJÜT(RES) GR I-II	1,2	2,4	Wind	23.04.2005
EKOTEN TEKSTİL GR-I	1,9	15	N. Gas	16.02.2006
ERAK GİYİM GR-I	1,4	12,0	N. Gas	22.02.2006
ALARKO ALTEK GR-III	21,9	147,0	Steam	23.02.2006
AYDIN ÖRME GR-I	7,5	60,0	N. Gas	25.02.2006
NUH ENERJİ-2 GR-II	26,1	183,0	Steam	02.03.2006
MARMARA ELEKTRİK (Çorlu) GR-I	8,7	71,0	N. Gas	13.04.2006
MARMARA PAMUK(Çorlu) GR-I	8,7	71,0	N. Gas	13.04.2006

ENTEK (Köseköy) GR-IV	47,6	411,0	N. Gas	14.04.2006
ELSE TEKSTİL (Çorlu) GRI-II	3,2	25,0	N. Gas	15.04.2006
SÖNMEZ ELEKTRİK (Çorlu) GRI-II	17,5	141,0	N. Gas	03.05.2006
MENDERES ELEKTRİK GR-I	8,0	56,0	Geothermal	10.05.2006
KASTAMONU ENTEGRE (Balıkesir) GR-I	7,5	48,0	N. Gas	24.05.2006
BOZ ENERJİ GR-I	8,7	60,0	N. Gas	09.06.2006
ADANA ATIK SU ARITMA TESİSİ	0,8	6,0	Biogas	09.06.2006
AMYLUM NİŞASTA (ADANA)	14,3	80,0	N. Gas	09.06.2006
ŞIKMAKAS (Çorlu) GR-I	1,6	13,0	N. Gas	22.06.2006
ELBİSTAN B GR-III	360,0	2.340,0	Lignite	23.06.2006
ANTALYA ENERJİ GR I-II-III-IV	34,9	279,0	N. Gas	29.06.2006
HAYAT TEM. VE SAĞLIK GR I-II	15,0	94,0	N. Gas	30.06.2006
EKOLOJİK EN. (Kemerburgaz) GR-I	1,0	8,0	Waste Heat	31.07.2006
EROĞLU GİYİM (Çorlu) GR-I	1,2	9,0	N. Gas	01.08.2006
CAM İŞ ELEKTRİK (Mersin) GR-I	126,1	1.008,0	N. Gas	13.09.2006
ELBİSTAN B GR-II	360,0	2.340,0	Lignite	17.09.2006
YILDIZ ENT. AĞAÇ (Kocaeli) GR-I	6,2	40,0	N. Gas	21.09.2006
ÇERKEZKÖY ENERJİ GR-I	49,2	403,0	N. Gas	06.10.2006
ENTEK (Köseköy) GR-V	37,0	319,6	N. Gas	03.11.2006
ITC-KA EN. MAMAK TOP.M. GR I-II-III	4,2	33,5	Waste Heat	03.11.2006
ELBİSTAN B GR-IV	360,0	2.340,0	Lignite	13.11.2006
ÇIRAĞAN SARAYI GR-I	1,3	11,0	N. Gas	01.12.2006
ERTÜRK ELEKTRİK Tepe RES GR-I	0,9	3,0	Wind	22.12.2006
AKMAYA (Lüleburgaz) GR-I	6,9	48,0	N. Gas	23.12.2006
BURGAZ (Lüleburgaz) GR-I	6,9	55,0	N. Gas	23.12.2006
ŞANLIURFA GR I-II	51,8	124,0	Hydro (Run of River)	01.03.2006
BEREKET ENERJİ GÖKYAR HES 3 Grup	11,6	43,0	Hydro (Run of River)	05.05.2006
MOLU EN. Zamantı Bahçelik GR I-II	4,2	30,0	Hydro (Run of River)	31.05.2006
SU ENERJİ (Balıkesir) GR I-II	4,6	19,0	Hydro (Run of River)	27.06.2006
BEREKET EN. (Mentaş Reg) GR I-II	26,6	111,0	Hydro (Run of River)	31.07.2006
EKİN (Başaran Hes) (Nazilli)	0,6	5,0	Hydro (Run of River)	11.08.2006
ERE (Sugözü rg. Kızıldüz hes) GR I-II	15,4	55,0	Hydro (Run of River)	08.09.2006
ERE (AKSU REG. Ve ŞAHMALLAR HES) GR I-II	14,0	45,0	Hydro (Run of River)	16.11.2006
TEKTUĞ (Kalealtı) GR I-II	15,0	52,0	Hydro (Run of River)	30.11.2006
BEREKET EN. (Mentaş Reg) GR III	13,3	55,6	Hydro (Run of River)	13.12.2006
HABAŞ (ALİAĞA-ADDITION)	9,1	35,3	N. Gas	02.05.2007
MODERN ENERJİ	5,2	38,0	N. Gas	2007
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kadıköy Hast.)	0,5	4,0	N. Gas	19.06.2007
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Kozyatağı Hast.)	0,6	5,0	N. Gas	23.10.2007
Acıbadem Sağlık Hiz.ve Tic.A.Ş(Nilüfer/BURSA)	1,3	11,0	N. Gas	28.08.2007
AKATEKS Tekstil Sanayi ve Ticaret A.Ş.	1,8	14,0	N. Gas	30.07.2007
FLOKSER TEKSTİL SAN.AŞ.(Çatalça/istanbul)	2,1	17,0	N. Gas	03.12.2007
FLOKSER TEKSTİL SAN.AŞ.(Çatalça/istanbul)	2,1	17,0	N. Gas	03.12.2007
FRİTOLAY GIDA SAN.VE TİC. AŞ.	0,5	4,0	N. Gas	23.01.2007
KIVANÇ TEKSTİL SAN.ve TİC.A.Ş.	3,9	33,0	N. Gas	20.03.2007
KİL-SAN KİL SAN.VE TİC. A.Ş	3,2	25,0	N. Gas	19.02.2007
SÜPERBOY BOYA SAN.ve Tic.Ltd.Şti.	1,0	8,0	N. Gas	05.12.2007
SWİSS OTEL (Anadolu Japan Turizm A.Ş (İstanbul)	1,6	11,0	N. Gas	01.08.2007

TAV Esenboğa Yatırım Yapım ve İşetme AŞ.	3,9	33,0	N. Gas	19.09.2007
KARTONSAN	5,0	40,0	Liqued Fuel + N.Gas	2007
ESKİŞEHİR END. ENERJİ	3,5	26,8	Liqued Fuel + N.Gas	2007
İGSAŞ	2,2	15,2	Liqued Fuel + N.Gas	2007
ITC-KA Enerji Üretim Aş.(Mamak)(Addition)	1,4	11,0	Waste Heat	22.05.2007
BİS Enerji Üretim AŞ.(Bursa)(Addition)	43,0	354,0	N. Gas	30.05.2007
Aliağa Çakmaktepe Enerji A.Ş.(Aliağa/İZMİR)	34,8	278,0	N. Gas	13.09.2007
BİS Enerji Üretim AŞ.(Bursa)(Addition)	48,0	396,0	N. Gas	30.08.2007
BOSEN ENERJİ ELEKTRİK AŞ.	142,8	1.071,0	N. Gas	18.01.2007
SAYENERJİ ELEKTRİK ÜRETİM AŞ. (Kayseri/OSB)	5,9	47,0	N. Gas	03.07.2007
T ENERJİ ÜRETİM AŞ.(İSTANBUL)	1,6	13,0	N. Gas	04.04.2007
ZORLU EN.Kayseri (1 GT Addition)	7,2	59,0	N. Gas	17.01.2007
SİİRT	25,6	190,0	Fuel Oil	2007
Mardin Kızıltepe	34,1	250,0	Fuel Oil	2007
KAREN	24,3	180,0	Fuel Oil	2007
İDİL 2 (PS3 A- 2)	24,4	180,0	Fuel Oil	2007
BORÇKA HES	300,6	1.039,0	Hydro (With Dam)	27.02.2007
TEKTUĞ(Keban River)	5,0	32,0	Hydro (run of river)	08.05.2007
YPM Ener.Yat.AŞ.(Altıntepe Hydro)	4,0	18,0	Hydro (run of river)	06.06.2007
YPM Ener.Yat.AŞ.(Beypınar Hydro)	3,6	18,0	Hydro (run of river)	06.06.2007
YPM Ener.Yat.AŞ.(Konak Hydro)	4,0	19,0	Hydro (run of river)	19.07.2007
KARASU HES-Andırın	2,4	19,0	Hydro (run of river)	28.11.2007
İSKUR TEKSTİL (SÜLEYMANLI HES)	4,6	18,0	Hydro (run of river)	30.12.2007
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)	6,3	27,0	Hydro (run of river)	03.05.2007
ÖZGÜR ELK.AŞ.(K.MARAŞ)(Tahta)(Addition)	6,3	27,0	Hydro (run of river)	24.05.2007
TOTAL	**5.897,4**	**39.860,5**		

Table 17: Thermal to electricity efficiency calculations for each fuel type (2007-2008)*

Natural Gas	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Natural Gas Consumption for Electricity Generation [Tcal]	85,463	94,787	100,716	112,044	117,464	140,350	150,588	179,149
Natural Gas Consumption for Electricity Generation [GWh]	99,393	110,237	117,133	130,307	136,611	163,227	175,134	208,350
Electricity Generation by Gas fired PPs [GWh]	46,217	49,549	52,497	63,536	62,242	73,445	80,691	95,025
Electrical Efficiency Natural Gas Plants	46.50%	44.95%	44.82%	48.76%	45.56%	45.00%	46.07%	45.61%
Average of 8 last years	**45.91%**							

Lignite	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Lignite Consumption for Electricity Generation [Tcal]	92,168	91,539	75,923	63,607	61,018	68,513	83,932	100,320
Lignite Consumption for Electricity Generation [GWh]	107,191	106,460	88,298	73,975	70,964	79,681	97,613	116,672
Electricity Generation by Lignite fired PPs [GWh]	34,367	34,372	28,056	23,590	22,450	29,946	32,433	38,295
Electrical Efficieny Lignite Plants	32.06%	32.29%	31.77%	31.89%	31.64%	37.58%	33.23%	32.82%
Average of 8 last years	**32.91%**							

Coal	2000	2001	2002	2003	2004	2005	2006	2007
Coal Consumption for Electricity Generation [Tcal]	7,854	9,167	8,622	18,613	24,518	26,535	29,504	32,115
Coal Consumption for Electricity Generation [GWh]	9,134	10,661	10,027	21,647	28,514	30,860	34,313	37,350
Electricity Generation by Coal fired PPs [GWh]	3,819	4,046	4,093	8,663	11,998	13,246	14,217	15,136
Electrical Efficiency Coal Plants	41.81%	37.95%	40.82%	40.02%	42.08%	42.92%	41.43%	40.53%
Average of 8 last years	**40.94%**							

Oil	2000	2001	2002	2003	2004	2005	2006	2007
Oil Consumption for Electricity Generation [Tcal]	35,619	34,155	33,965	30,125	25,557	20,591	17,537	22,069
Oil Consumption for Electricity Generation [GWh]	41,425	39,722	39,501	35,035	29,723	23,947	20,396	25,666
Electricity Generation by Fuel Oil fired PPs [GWh]	9,311	10,366	10,744	9,196	7,670	5,483	4,340	6,527
Electrical Efficiency Fuel Oil Plants	22.48%	26.10%	27.20%	26.25%	25.81%	22.89%	21.28%	25.43%
Average of 8 last years	**24.68%**							

**** TCal is converted to GWh by multiplying with 1.163. See: Source: http://de.wikipedia.org/wiki/Kalorie and Recknagel/Sprenger/Schramek 2001: Taschenbuch für Heizung + Klima Technik***

Annex 3

MONITORING INFORMATION

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