



The Gold Standard
Premium quality carbon credits

**THE GOLD STANDARD:
Project Design Document for Gold Standard
Voluntary Offset projects**

(GS-VER-PDD)A

For more information, please contact The Gold Standard:

<http://www.cdmgoldstandard.org>
info@cdmgoldstandard.org

phone +41 61 283 09 16
fax +41 61 271 10 10

This document template was developed in April 2006 by: **ECOFYS**

The Gold Standard for VERs has received financial support from:



David
Suzuki
Foundation

SOLUTIONS ARE IN OUR NATURE

VOLUNTARY OFFSET PROJECTS

PROJECT DESIGN DOCUMENT FORM (GS-VER-PDD)
Version 01 - in effect as of: January 2006)

CONTENTS

- A. General description of project activity
- B. Application of a baseline methodology
- C. Duration of the project activity / Crediting period
- D. Application of a monitoring methodology and plan
- E. Estimation of GHG emissions by sources
- F. Environmental impacts
- G. Stakeholders' comments

Annexes

- Annex 1 Contact information on participants in the project activity
- Annex 2 Baseline information
- Annex 3 Monitoring plan
- Annex 4 Coordinates of the wind turbines
- Annex 5 Country risk premium of Turkey
- Annex 6 List of Invitees to the Initial Stakeholder Consultation Meeting

SECTION A. General description of project activity

A.1 Title of the project activity

Title: Rotor Elektrik Uretim Osmaniye Wind Farm
Version: 01-07
Date: 03/12/2008

A.2. Description of the project activity**Project summary:**

Located in the Gokcedag Mountains of Osmaniye province in southeast Turkey, Rotor Elektrik Uretim Osmaniye Wind Farm (hereafter referred to as 'the Project') consists of 54 wind turbines with a rated power of 2.5 MW each, providing a total installed capacity of 135 MW and an expected annual electricity generation of 466,742MWh¹. The turbines are General Electric (GE) Energy model 2.5xl, and will be installed and operated by Rotor Elektrik Uretim A.S. (hereafter referred to as 'the Project Developer'), a subsidiary of Zorlu Enerji Elektrik Uretim A.S. Turkey.

The project will supply the Turkish National Grid (hereafter referred to as 'the Grid') with zero emission energy, generated by the wind resources of the Gokcedag Mountain area. Electricity currently generated by the grid is relatively carbon intensive, with a combined margin emission factor of 0.648 tCO₂/MWh. The project is expected to reduce emissions of greenhouse gases by an estimated 302,675 tCO₂e/year during the first 7-year crediting period.

Apart from the wind turbines, the project site includes transmission line towers, a switchboard area, and a control building. The plant will be connected to the grid through the 154 kVA Bahçe Transformer Centre via a 7.5 km power transmission line.

The Project area is 1,362,434.73m²², and is mountainous terrain comprised of narrow ridges perpendicular to the prevailing westerly winds. An optimized layout of the wind farm identified the locations of the turbines accounting for highest wind energy potential, terrain slope, prevailing wind direction, and a minimum distance of 2.5 times the rotor diameter between wind turbines³. GE 2.5xl wind turbines have an 85 m hub height, and a 100m rotor diameter (Figure 1). The turbines will be manufactured at GE Energy facilities, and shipped to the project site for installation,. The project is expected to be partially commissioned by the end of March 2009 with 15 turbines commissioned on that date, and an additional 6 turbines commissioned per month following that date, to reach full commissioning anticipated in November 2009.

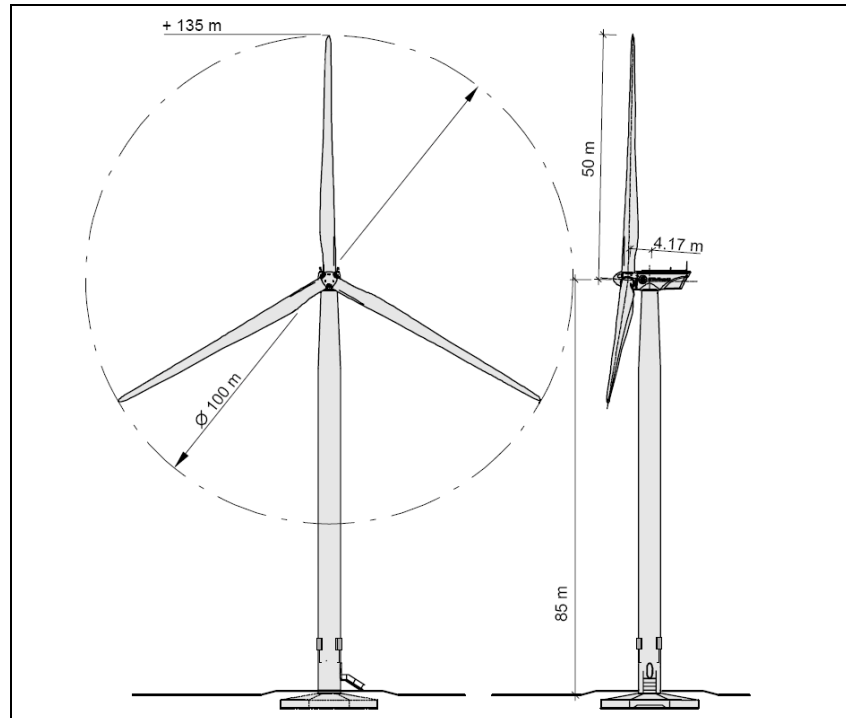
¹ At 75% "exceedence" [sic] level. Source: Osmaniye Wind Power Plant Micrositing Report (11/09/07), by Dr. Ferdi Turksoy, EMD International AS, 2007 p.43 Table 17.

The results are based on digital terrain data modelling with 3-years of wind data, as provided by Zorlu Enerji (from masts located on site). Results account for potential energy losses for availability, blade fouling, icing, high wind hysteresis) electrical efficiency, substation maintenance, and utility downtime.

² Permit number: No: B.18.1.OGM.0.07.05.241.0104 142/ 190, from the Ministry of Forestry and Environment, issued on 07/05/08. It will be made available to the DOE upon request.

³ Osmaniye Wind Power Plant Micrositing Report (11/09/07), by Dr. Ferdi Turksoy, EMD International AS, 2007p. 34.

Figure 1. General Electric 2.5xl wind turbine dimensions



Timeline of the Project:

The start date of Osmaniye Wind Farm is the date of signature of the contract with GE for the purchase of the wind turbines (21/08/2007).

VER consideration is demonstrated via a board meeting dated 26/07/2007 during which Mr. Sinan Ak was appointed to negotiate with potential carbon developers for the application of the project for carbon financing.

Following that, Zorlu contacted EcoSecurities and a final VERPA was signed in January 2008. The Ministry of Forestry and Environment issued a land use permit on 07/05/2008, approving the construction of the wind farm on forestry land because of the related public benefits. The Initial Stakeholder Consultation was initiated afterwards, and a stakeholder consultation event was co-organized with Zorlu on 19/06/2008.

On 19/12/2003, the Electricity Market Regulatory Authority (EMRA) issued a production license to the wind farm for 150 wind turbines with 900kW installed capacity each. Between 2003 and 2007, Zorlu subcontracted EMD International to finalise a micrositing study based on 3-year wind measurements conducted on site. On 25/10/2007, EMRA approved the changes to the design from 150 turbines to 54 turbines with 2.5MW installed capacity each.

On 25/01/2005, the Ministry of Forestry and Environment issued an exemption for EIA study to the project, following the completion of a preliminary environmental assessment or Project Introduction File in compliance with the Turkish EIA Law. Osmaniye City Council issued an urban planning permit to the project on 06/04/2008.

Contribution to sustainable development:

The Project makes greater use of wind renewable energy generation resources for sustainable energy production with the following contributions:

Environmental impacts:

- Reduces greenhouse gas emissions (GHG), mainly CO₂, and harmful pollutants (mainly SO_x, NO_x, and particulate matter) by displacing energy from thermal power plants.
- Decreases Turkey's dependence on fossil fuels.

Socio-economic impacts:

- Creates employment opportunities in the area where the project is located, during Project construction and operation.
- Enables the transfer of knowledge as GE will train site employees in the installation, operation, and maintenance of the wind turbines.
- Contributes to local and regional economy, since cables, transformers, construction equipment, and subcontractors are procured locally.
- Diversifies the sources of electricity generation, and supports Turkey in meeting its growing energy demands.
- Reduces dependence on foreign sources of energy, thereby strengthening Turkey's energy security and self sufficiency.
- Assists Turkey in accelerating the commercialization of grid-connected renewable energy technologies and markets in the country.

Results from the sustainable development matrix:

Based on Gold Standard guidelines, the Project is assessed against a set of sustainability indicators, highlighting its impact on the local/regional/global environment, social sustainability and development, and economic and technological development (Table 1).

Table 1. Sustainable Development Matrix

Component Indicators	Score (-2 to +2)
Local/regional/global environment	
1. Water quality	0
2. Air quality (emissions other than GHG)	+2
3. Other pollutants (Total Suspended Particles, Odours)	0
4. Soil condition (quality and quantity)	0
5. Biodiversity	0
<i>Subtotal</i>	+2
Social sustainability and development	
6. Employment (job quality)*	+1
7. Livelihood of the poor	+1
8. Human and institutional capacity	+1
<i>Subtotal</i>	+3

Economic and technological development	
9. Employment (numbers)*	+1
10. Balance of payments (sustainability)	0
11. Technological self reliance	+1
<i>Subtotal</i>	+2
TOTAL	+7

Explanation of the indicators:

A Local / global environmental sustainability

1. Water quality (0)

This technology has limited impact on water resources in general. There is no running surface water at the Project Site. The turbine foundations are built at a depth of around 3.9 m, which is highly unlikely to affect any groundwater⁴. In order to determine if there is a groundwater aquifer under the project site, drilling up to 30m deep took place at the location of wind turbine foundations. No aquifers were observed up to this depth, confirming that the Project will not alter groundwater flow patterns⁵.

2. Air Quality (+2)

By connecting to the Grid, the project decreases Turkey's dependence on thermal power sources, and indirectly reduces the emissions of fossil fuel pollutants (i.e. SO_x, NO_x, and particulate matter)⁶.

3. Other pollutants (0)

Construction phase

Impacts on air quality are limited to those arising from the construction phase of the Project. These are predominantly as a result of dust emissions produced by land excavation, transport, and discharge. The project developer will limit dust emissions by avoiding scattering, enclosing transportation vehicles and excavated material with plastic protection sheeting, keeping the roads wet, and operating vehicles at low speeds⁷.

Operation

The only potentially toxic or hazardous materials from wind turbines are relatively small amounts of lubricants, hydraulic, and insulating fluids. Contamination of surface or ground water, or soils is highly unlikely given that these state-of-the-art wind turbines are equipped with oil absorption systems specifically to prevent such leaks. In the

⁴ Foundation conduit plan of the 135 MW Osmaniye wind power plant

⁵ Environmental and social impact assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd. Page 20.

⁶ Refer to Table 3 and [http://www.teias.gov.tr/list2006/31\(40-06\).xls](http://www.teias.gov.tr/list2006/31(40-06).xls) for the electricity generation mix of Turkey highlighting the dependence on thermal power plants. Also see http://tonto.eia.doe.gov/country/country_time_series.cfm?fips=TU#elec for the energy profile of Turkey highlighting the import of fossil fuels.

⁷ Environmental and social impact assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd. Page 28.

event of uncontrolled leakage, oil and grease are collected in the bottom part of the nacelle enclosure. Each wind turbine is equipped with a series of smaller oil collection systems for individual wind turbine components⁸.

Noise from wind turbines is both aerodynamic and mechanical. Vibration damping and noise reduction from the gearbox and the generator are effected through elastometer elements⁹. This greatly reduces mechanical noise, and limits noise from the 2.5xl wind turbine to aerodynamic noise generated by blade rotation. Irrespective of wind speed and hub height, the GE 2.5xl wind turbine is not expected to have an audible tonality at a distance of more than 300 m¹⁰. The calculation of the projected noise levels from the wind turbines given the site conditions, highlight that at a distance of 1,000m from the wind farm, noise levels will be around 40dBA¹¹. The nearest residential community to the wind farm Gokmustafa, which, at 1,000 m distance from the site, will therefore not be affected by noise from the wind farm. It is important to note that with higher wind speeds, ambient wind noise will most likely mask any noise generated by the wind turbines¹².

4. Soil condition (0)

The project site is in a mountainous area owned by the Ministry of Environment and Forestry and is defined in three sections: Savranli (the western portion), Gokcedag (the central portion), and Aslanlibel (the eastern portion). Savranli is mainly an open area with some scattered trees; however there are several parts that are wooded on both sides of the ridge. Gokcedag is predominantly an open area, but covered by trees 2–4 m in height. Aslanlibel's ridges are also covered by similar height trees. The dominant tree species is *Pinus Brutia*, commonly referred to as 'Turkish Pine'.

The Project will clear young trees to open new roads and improve existing roads' condition, and install the wind turbines. The Project Developer received a permit from the Ministry of Environment and Forestry to use the land for construction and operation of the wind farm¹³. The Project Developer also paid a fee for tree cutting that will be used by the Ministry of Forestry for reforestation projects. Following the suggestions of local authorities including Osmaniye Forestry Department, the Project Developer will implement a forestation project on land provided by the Department of Forestry. The project developer is in the midst of negotiations with the Osmaniye Department of Forestry regarding the location, the species to be planted, and the planting schedule (which depends on the particular species). The monitoring plan can only therefore be updated once these specifics are defined and finalised.

5. Biodiversity (0)

Given its proximity to a human settlement (1 km), the project site has likely witnessed anthropogenic interventions that adversely affected vegetation coverage in some areas. An indicator to such disturbance is the existence of dirt roads.

⁸ GE Energy, Technical Documentation of Wind Turbine Generator Systems GE2.5xl, p.26

⁹ GE Energy, Technical Documentation of Wind Turbine Generator Systems GE2.5xl, p.13.

¹⁰ GE Energy, "Noise Emissions Characteristics, Normal Operation According to IEC", Technical Documentation Wind Turbine Generator Systems GE 2.5xl.

¹¹ Ruzgar Enerjisi Snatrali Ve Enerji Iletim Hatti", prepared by Bozat AS, 2004, p.17

¹² Rogers, A. et al, "Wind turbine noise issues", Renewable Energy Research Laboratory, University of Massachusetts at Amherst, June 2002, p.14.

¹³ Permit number: B.18.1.OGM.0.07.05.241.0104 142/ 190, issued on 07/05/08

An ecological survey conducted by Zorlu in 2004¹⁴ confirmed that there are no threatened species on site, and that the dominant species found on the terrain are ecologically tolerant, and can survive on disrupted terrain. This was confirmed in the environmental assessment conducted by an independent third party in October 2008, which states that the "...[Project] area does not have any importance as an IBA [Important Bird Area] or a habitat of migratory and local birds as supported by the findings of literature survey. Thus, it [the Project] is not expected to have any impacts on fauna species due to ongoing and future activities..."¹⁵

B Social sustainability and development

6. Employment (job quality) (+1)

Bahce District's economy relies predominantly on agriculture, with 49.5% of the working population being employed in this sector. Industry is not well developed, given the proximity of this district to Osmaniye, Adana, and Gaziantep¹⁶. The Project will employ a number of people from the surrounding villages both during construction and operation. During operation, assistant positions such as in switchyard operation and site supervision will be provided from local human power surrounding the project site.

7. Livelihood of the poor (+1)

Poverty Alleviation (0)

Despite its contribution to local employment opportunities, this project is not expected to significantly impact poverty levels in the region since it is not a labour intensive industry.

Livelihood of the poor (+1)

The project will provide a steady source of income for the employees from the surrounding villages. Unemployment rates in Osmaniye province are relatively high (14.9% in 2000 compared to the national average rate of 6.5% for the same year)¹⁷.

Furthermore, the project developer will not hinder access to the grazing fields around the wind turbines, which are being used by herders from the surrounding villages¹⁸.

The project might have an indirect positive impact to the local economy through the emergence of new small businesses and services to meet the needs of the wind farm employees and visitors.

Access to essential services (water, health, access to facilities etc.) (0)

No expected change.

Access to affordable clean energy services (0)

¹⁴ "Ruzgar Enerjisi Snatrali Ve Enerji Iletim Hatti", prepared by Bozat AS, 2004, pp. 23-26.

¹⁵ Environmental and social impact assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd. Page 25.

¹⁶ Environmental and social impact assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd. Page 30.

¹⁷ Environmental and social impact assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd. Page 29.

¹⁸ Environmental and social impact assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd. Page 41.

The project will supply electricity to the Grid, but will not increase the number of households connected to the grid, since the Project's electrical output is of a high voltage unusable directly at the household level.

8. Human and institutional capacity (+1):

Empowerment (0) & Gender Equality (0)

The project will not directly interfere in community life, and hence will not have significant impacts on empowering local communities or women.

Education / skills (+1)

The project improves local and national skills in wind energy management. GE provided training courses (in Germany) for personnel from Osmaniye Wind Farm in September 2008, on the operation and maintenance of the 2.5xl turbines, as well as in the use of personal protective equipment,¹⁹ Those trained will pass their knowledge onto site operators from the surrounding villages.

C Economic and technological development

9. Employment (numbers) (+1)

The project is not labor intensive, however it will expand employment opportunities employment at the local and provincial levels by hiring people from the surrounding villages in full time positions. Unemployment rates in Osmaniye province are relatively high (14.9% in 2000 compared to the national average rate of 6.5% for the same year)²⁰.

10. Sustainability of the balance of payment (0)

The project will increase local energy production, reducing reliance on external energy sources such as imported fuels²¹. Turkey's balance of payments from this project as compared to that of the baseline is difficult to track, since it falls outside the authority of the Project Developer.

11. Technological self reliance (+1)

The project will improve local and national skills in wind energy, and will transfer technological knowledge to Turkey, hence forging the way for further technological self reliance²².

This project meets the Gold Standard sustainability guidelines since:

- None of the indicators score (-2)

¹⁹ Training certificates were provided to the DOE during validation.

²⁰ Environmental and Social Impact Assessment (ESIA) for the Bahce windfarm project (135MW), by Dokay Engineering and Consultancy Ltd., p.29.

²¹ Check http://tonto.eia.doe.gov/country/country_time_series.cfm?fips=TU#elec for the energy profile of Turkey highlighting the import of fossil fuels.

²² Check the training information for transfer of knowledge under Human and Institutional Capacity

- None of the subtotals is negative
- The total is positive (+7)

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)	Rotor Elektrik Uretim A.S.	No

Full contact information for the project participants is provided in Annex 1. EcoSecurities is the Gold Standard consultant for this project.

Republic of Turkey: Host country. Turkey has not yet ratified the Kyoto Protocol. The Ministry of Environment and Forestry is the National Focal Point for UNFCCC Article 6²³, and hence is the contact for climate change related projects.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

Gokcedag Mountains, Turkey
GPS coordinates (approximate 'centre' of turbine array): 37° 10' 01.65" North and 36° 36' 30.43" East.

A.4.1.1. Host Party(ies):

Turkey

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

Bahçe district, Osmaniye province

A.4.1.3. City/Town/Community etc:

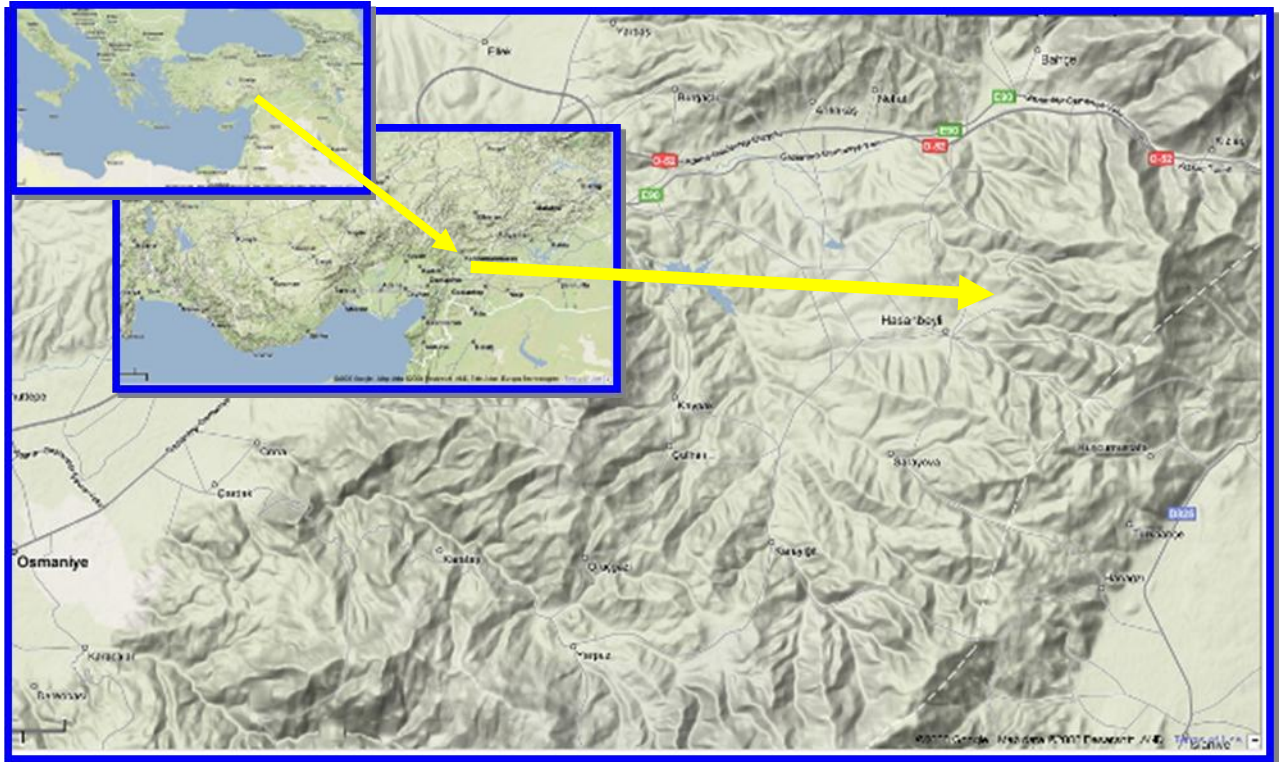
Between Bahçe and Hasanbeyli towns

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

The project is located in the Gokcedag Mountains (Sayranli, Kircalar, Aslanlibeltepe, Ancinar), and aligned North-South between Bahçe and Hasanbeyli towns, in Osmaniye Province in southeastern Turkey. Access is via the Transit European Motorway (TEM), then following local roads after Bahçe

²³ <http://maindb.unfccc.int/public/nfp.pl?mode=wim>

Figure 2. Detailed project location (see yellow marker)



Location of Rotor Elektrik Osmaniye Wind Project relative to Eastern Mediterranean, Southern Europe, Syria-Turkey border and to Osmaniye city, Bahce and Hasanbeyli villages

A.4.2. Size of the project:

The project is expected to reduce emissions by 302,675 tCO₂e/year. According to the Gold Standard VER Project Developer's Manual the project qualifies as a large scale project.. The risks to deliver of the emission reductions are mainly related to climatic conditions. Given that this is a wind project, and in spite of the fact that a detailed micro-siting report (over a 3-year time span) has been conducted by a reputable 3rd party (EMD International A/S from Denmark), the fact is that wind projects lend themselves to unpredictability of natural resources.

A.4.3. Category(ies) of project activity:

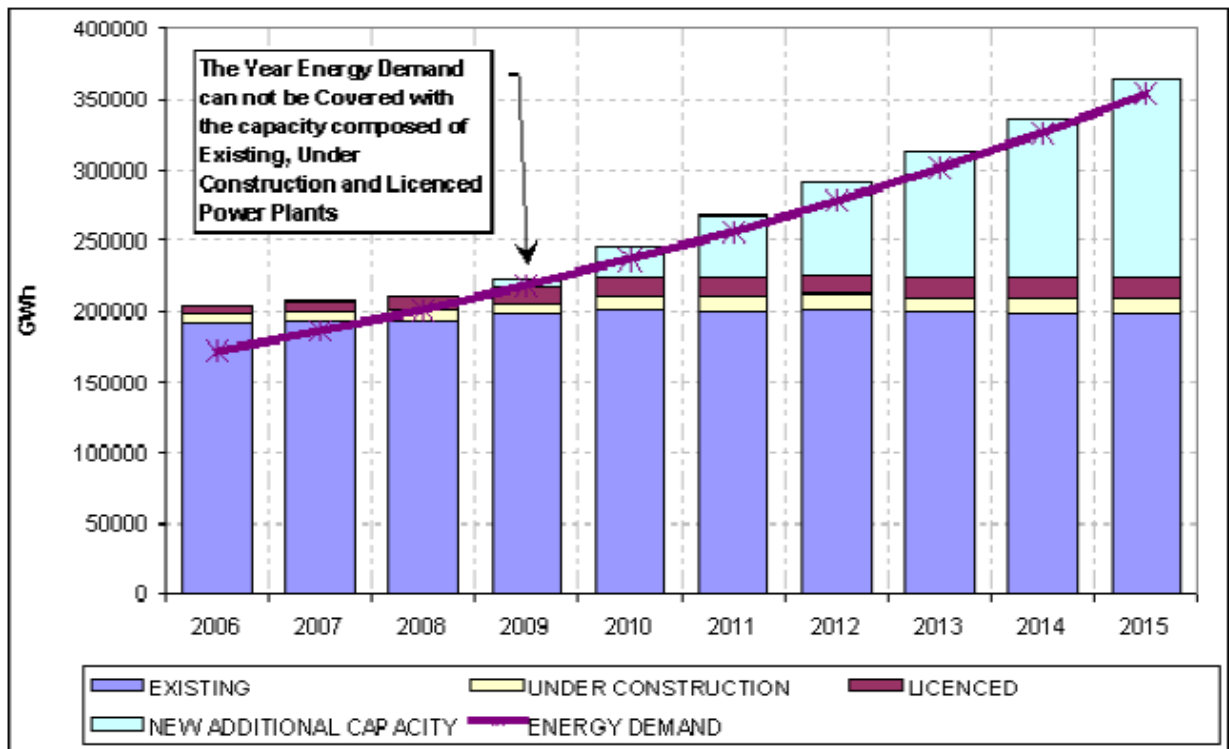
As per the latest Gold Standard VER Project Developer's Manual, Appendix A, the project falls under the category:

A.1. -- Renewable Energy.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

The Project reduces GHG emissions by substituting fossil fuel generated electricity. The Project is expected to generate 466,742 MWh of electricity per year without emitting GHGs. Turkey faces an increase in electricity demand, which is expected to exceed generation capacity between 2008 and 2009 (see Figure 3). Recent years have already shown a rapid increase in installed capacity to meet this increasing energy demand. In Turkey, the grid generation mix is dominated by fossil fuel fired power plants. In 2006 the share of installed wind capacity was only 0.1%. This is expected to grow to 0.6% in 2007.

Figure 3. Supply and demand projection of Turkey 2006-2015²⁴



A.4.4.1. Estimated amount of emission reductions over the crediting period:

With an estimated annual electricity generation of 466,742 MWh/year, and an average grid emission factor of 0.648 tCO₂e/MWh, the project will result in 302,675 tCO₂e emission reductions per year. The total emission reductions over the first 7-year crediting period will be 2,017,833 tCO₂e.

²⁴ <http://www.teias.gov.tr/eng/ApkProjection/CapacityProjectionJune2006.pdf>

Table 2. Ex-ante emission reductions of the Project for the first 7-years of operation

Years	Annual estimation of emission reductions (tCO₂e)
2009 (Apr – Dec)	158,021
2010	302,675
2011	302,675
2012	302,675
2013	302,675
2014	302,675
2015	302,675
2016 (Jan – Mar)	75,668
Total emission reductions (tCO₂e)	2,049,739
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tCO₂e)	292,820

SECTION B. Application of a baseline methodology

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

The United Nations approved consolidated baseline methodology applicable to this project is ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, Version 7²⁵.

ACM0002 refers to the following tools:

- “Tool for the demonstration and assessment of additionality”, Version 05, adopted at EB 39²⁶, and
- “Tool to calculate the emission factor for an electricity system”, Version 01, Annex 12, EB 35²⁷.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

ACM0002 is applicable to this project activity because it fulfils the required criteria:

- The project consists of a wind power electricity capacity addition and is a grid-connected electricity generation project;
- The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity; and
- 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.2. Description of how the methodology is applied in the context of the project activity:

This Project follows the methodology described in the ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”, Version 07. The expected net electricity generation ($EG_{net,y}$) is 466,742 MWh/year. The grid emission factor ($EF_{grid,CM,y}$) is calculated according to the “Tool to calculate the emission factor for an electricity system”²⁸. As per the tool, the following six steps for calculation of emission reductions have been applied:

Step 1. Identification of the relevant electrical power system

According to the “Tool to calculate the emission factor for an electricity system”, Version 01, a project electricity system has to be defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity, and that can be dispatched without significant transmission constraints. Therefore, in this project activity the project electricity system includes the project site and all power plants attached to the Interconnected Turkish National Grid.

For imports from connected electricity systems located in another host country(ies), the emission factor is 0 tCO₂/MWh.

²⁵ http://cdm.unfccc.int/UserManagement/FileStorage/CDMWf_AM_323M30IDF1IH6AG3GRCJ4PKR9CKM7P

²⁶ http://cdm.unfccc.int/methodologies/PAMethodologies/AdditionalityTools/Additionality_tool.pdf

²⁷ http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

²⁸ http://cdm.unfccc.int/methodologies/Tools/EB35_repan12_Tool_grid_emission.pdf

Step 2. Selection of an operating margin (OM) method

According to the “Tool to calculate the emission factor for an electricity system”, in calculating the operating margin grid emission factor in a given year y ($EF_{grid,OM,y}$), project developers have the option of selecting from four potential methods:

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch Data Analysis OM, or
- (d) Average OM.

Options (b) and (c) are not selected due to the limited availability of data for Turkey. Option (d) is not selected since low-cost / must run resources²⁹ do not constitute more than 50% of total grid generation. Option (a) is therefore selected since low-cost / must run resources constitute less than 50% of total grid generation (see Table 3). Furthermore, there is no indication that coal is used as must-run, and no nuclear energy plants are located in Turkey.

Table 3. Breakdown by source of the electricity generation for the five most recent years of the Turkish Grid³⁰

		2006	2005	2004	2003	2002	Average
Total Generation	[GWh]	176,300	161,956	150,698	140,581	129,400	151,787
Low-cost / must run generation	[GWh]	44,465	39,714	46,235	35,480	34,978	40,174
Low-cost / must run generation proportion	[%]	25	25	31	25	27	26

Since the Simple OM calculation (option a) is selected, the emission factor is calculated by the generation-weighted average emissions per electricity unit (tCO_2/GWh), and averaged over the past three years of all generating sources serving the system, not including low-cost / must run power plants.

The tool gives two options for the calculation of $EF_{grid,OM,y}$;

- *Ex-ante* option
A 3-year generation-weighted average, based on the most recent data available at the time of submission of the VER-PDD to the DOE for validation, without the requirement to monitor and recalculate the emissions factor during the crediting period, or
- *Ex-post* option
The year in which the project activity displaces grid electricity, with the requirement that the emissions factor to be updated annually during monitoring.

For this project the *ex-ante* approach is selected. Data for calculating the three year average is obtained from the period 2004 – 2006, the most recent data available at the time of PDD submission to the DOE.

²⁹ Low-cost/must run resources include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation

³⁰ [http://www.teias.gov.tr/ist2006/31\(40-06\).xls](http://www.teias.gov.tr/ist2006/31(40-06).xls)

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

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must run plants / units. It may be calculated:

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

As fuel consumption and average efficiency data for each power plant / unit are not available, Option C is used for simple OM calculation.

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

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,y} * NCV_{i,y} * EF_{CO_2,i,y}}{EG_y} \quad (1)$$

where:

$EF_{grid,OM,y}$	Simple operating margin CO ₂ emission factor in year y (tCO ₂ /GWh)
$FC_{i,y}$	Amount of fossil fuel type <i>i</i> consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type <i>i</i> in year y (GJ / mass or volume unit)
$EF_{CO_2,i}$	CO ₂ emission factor of fossil fuel type <i>i</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)

For the calculation of the Simple OM, the amount of fuel consumption ($FC_{i,y}$) is taken from website of TEIAS³¹, the official source of related data. Fuel consumption values for the relevant years are in Table 4 below.

Table 4. Fuel consumption of generation sources connected to the grid (2004-2006)

Fuel Type	FC _{i,y} unit [Ton, except for Natural Gas (NG) (1000 m ³)]		
	2006	2005	2004
Hard Coal	5,617,863	5,259,058	4,564,713
Lignite	50,583,810	48,319,143	33,776,660
Fuel Oil	1,746,370	2,005,899	2,403,338
Diesel Oil	61,501	28,442	29,141

³¹ <http://www.teias.gov.tr/eng/>

LPG	33	12,908	12,637
Nafta	13,453	84,481	208,749
Natural Gas	17,034,548	15,756,764	13,325,721

The net calorific values (NCV_{i,y}) provided by TEIAS for the list of fuels used are summarized in Table 5.

Table 5. NCV for fuels used in Turkey for 2006³²

Fuel Type	Fuel Consumption (Ton [except NG 10 ³])	Heating Value (Tcal/year)	Heating Value (GJ ³³ /Ton [except NG GJ/10 ³ m ³])
Hard Coal	5,617,863	29,504	21.99
Lignite	50,583,810	83,932	6.95
Fuel Oil	1,746,370	16,769	40.20
Diesel Oil	61,501	627	42.68
LPG	33	0	0
Naphta	13,453	141	43.88
Natural Gas	17,034,548	150,588	37.01

The Emission Factor of fossil fuel types (EF_{CO₂,i,y}) is taken from IPCC guidelines for national greenhouse gas inventory, and presented in Table 6.

Table 6. Emission Factor for fuels used in Turkey³⁴

Fuel Type	EF _{CO₂,i,y} (tCO ₂ /GJ)
Hard Coal	0.08950
Lignite	0.09090
Fuel Oil	0.07550
Diesel Oil	0.07260
LPG	0.06160
Naphta	0.06930
Natural Gas	0.05430

The electricity generated and supplied to the grid by all power sources serving the system, not including low-cost / must run power plants / units (EG_{gross,y}) is obtained from TEIAS (Turkish Electricity Transmission Company). Table 7 shows the gross electricity production for 2004-2006 produced from fossil fuel power sources.

³² <http://www.teias.gov.tr/ist2006/index.htm>

³³ Conversion Factor: 1Tcal = 4186.8 GJ

³⁴ IPCC 2006, Volume 2, chapter 1, table 1.4 http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Table 7. Gross Electricity Generated By Fossil Fuel Power Source 2004-2006 $EG_{gross,y}$ (GWh)³⁵

Fuel Type	2006	2005	2004
Hard Coal	14,216.60	13,246.20	11,998.1
Lignite	32,432.90	29,946.30	22,449.5
Fuel Oil	4,232.40	5,120.70	6689.9
Diesel Oil	57.70	2.50	7.3
LPG	0.10	33.70	33.4
Naphta	50.20	325.60	939.7
Natural Gas	80,691.20	73,444.90	62,241.8
Total GWh	131,681.10	122,119.90	104,359.7

The gross electricity production includes the electricity consumption of the power plants. To be able to calculate the net electricity fed into the grid by specific fuel sources, an average correction factor had to be calculated from the overall gross / net electricity generation data. The annual publication of TUIK (Turkish Statistical Institute) is the most accurate official source of data, which provides most up-to-date information to the public. This net to gross ratio is derived in Table 8.

Table 8. Average Correction Factor for Calculation of Net Electricity Production³⁶

	2001	2002	2003	2004	2005
Gross Production (GWh)	122,725	129,400	140,581	150,698	161,956
Auxiliary Consumption (GWh)	6,473	5,673	5,332	5,633	6,487
Net Production (GWh)	116,252	123,727	135,248	145,066	155,469
Relation (Net/Gross)	94.7%	95.6%	96.2%	96.3%	96.0%
Average Relation	96%				

The net electricity delivered to the grid by the fossil fuel plants ($EG_{net,y}$) is calculated in Table 9. The calculation of $EF_{grid,OM,y}$ requires the inclusion of electricity imports with an emission factor of 0 tCO₂/GWh. By including the imports in the electricity production this requirement is fulfilled.

Table 9. Net Electricity Production Using Fossil Fuel and Electricity Imports 2004-2006³⁷

	2004	2005	2006
Gross Production (GWh)	103,387	121,761	131,835
Net Production (GWh)	99,251	116,890	126,562
Electricity Imports (GWh)	464	636	573
Electricity Supplied to the grid (GWh)	99,715	117,526	127,135

The $EF_{grid,OM,y}$, as calculated via equation (1) using data from Tables 4 to 9 is 659 tCO₂e/GWh.

³⁵ [http://www.teias.gov.tr/ist2006/31\(40-06\).xls](http://www.teias.gov.tr/ist2006/31(40-06).xls)

³⁶ http://www.turkstat.gov.tr/yillik/stat_yearbook.pdf Table 14.4, p.231.

³⁷ <http://www.teias.gov.tr/ist2006/47.xls>

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

The sample group of power units (m) used to calculate the build margin consists of whichever is larger of:

- a) The set of five power units that have been built most recently, and
- 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 recently³⁸.

Option (b) has been chosen to identify this cohort of power units to be included in the build margin, since it is larger (in terms of power generation) than the result of (a). The list of the power plants is defined in Annex 2 (Baseline information) of this PDD.

Step 5. Calculation of the build margin emission factor.

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (2)$$

where:

$EF_{grid,BM,y}$	Build margin CO ₂ emissions factor in year y (tCO ₂ /GWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit m in year y (GWh)
$EF_{EL,m,y}$	CO ₂ emission factor of the power unit m in year y (tCO ₂ /GWh)

As per the “Tool to calculate the emission factor for an electricity system”, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance from the tool in ‘Step 3’ for simple OM, using options B1, B2, or B3, and using for y the most recent historical year for which power generation data is available, where m is the power units included in the build margin. As plant specific fuel consumption data is not available for Turkey, option B2 has been selected for the calculation of the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) as follows:

$$EF_{EL,m,y} = \frac{EF_{CO_2,m,i,y} * 3.6}{\eta_{m,y}} \quad (3)$$

where:

$EF_{EL,m,y}$	CO ₂ emission factor of the power unit m in year y (tCO ₂ /GWh)
$EF_{CO_2,m,i,y}$	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 (%)

Where several fuel types are used in the power unit, the lowest CO₂ emission factor for $EF_{CO_2,m,i,y}$ has been used. The average CO₂ emission factor of fuel types ($EF_{CO_2,m}$), and the average net energy conversion efficiency of the power plants ($\eta_{m,y}$) used for the calculation of emission factor of the power units ($EF_{EL,m,y}$) in equation (3) are presented in Table 10.

³⁸ If 20% falls on part capacity of a unit, that unit is fully included in the calculation

Table 10. Emission Factor of the Power Units

Fuel Type	EF _{CO₂,i,y} (tCO ₂ /GJ)	Efficiency factor (%)	Emission Factor of the power Unit EF _{EL,m,y} (tCO ₂ /MWh)
Hard Coal	0.08950	34.0	0.948
Lignite	0.09090	33.0	0.992
Fuel Oil	0.07550	35.0	0.777
Natural Gas	0.05430	46.0	0.425

The data for the electricity generated and delivered to the grid by power units (EG_{m,y}) are presented in Table 11.

Table 11. Electricity Generated by the Power Units Included in the Build Margin Calculation (GWh)

Fuel Type	2006	2005	2004	2003	Total
Hard Coal		1,125.00	337.50		1,462.50
Lignite	7,020.00	4,420.00			11,440.00
Fuel Oil		104.30	466.20		571.00
Natural Gas	4135.00	7,119.50	9187.70	692.30	21,134.00
Hydro & Renewable	376.00	871.00	46.00		1,293.00
Total GWh	11,531.00	13,639.80	10037.40	692.30	35,900,00

The EF_{grid,BM}, which is calculated via equation (2) and (3) using data from Tables 10 and 11, is 617 tCO₂e/GWh.

Step 6. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

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

where:

EF _{grid,CM,y}	Combined Margin emission factor in year y (tCO ₂ /GWh)
EF _{grid,OM,y}	Operating margin emission factor in year y (tCO ₂ /GWh)
EF _{grid,BM,y}	Build margin emission factor in year y (tCO ₂ /GWh)
w _{OM}	Weight of the operating margin emission factor
w _{BM}	Weight of the build margin emission factor

As the proposed project is a wind farm, the weights for the operating margin and build margin emission factors are 0.75 and 0.25 respectively, by default. Therefore, as per equation (4), the combined margin emission factor is:

$$EF_{grid,CM,y} = 648 \text{ tCO}_2\text{e/GWh.}$$

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:

$$PE_y = 0 \text{ tCO}_2\text{/year}$$

Leakage

The energy generating equipment is not transferred from or to another activity. Therefore leakage does not have to be taken into account, and:

$$LEy = 0 \text{ tCO}_2/\text{year}$$

B.3. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered VER project activity:
--

As mentioned in section B.1, the Project uses the 'Tool for the Demonstration and Assessment of Additionality' Version 05, from EB 39, to demonstrate additionality. The tool includes the following steps:

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

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

The following alternatives were identified:

Alternative 1 The proposed project activity without VERs. That is, construction of a wind farm with an installed capacity of 135 MW connected to the national grid, implemented without considering CDM revenues.

Alternative 2 Continuation of the current situation, where electricity is provided by the existing TEIAS Turkish Interconnected Grid.

Outcome of Step 1a

Two realistic and credible alternatives to the project activity remain.

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

The following applicable mandatory laws and regulations have been identified:

1. Electricity Market Law³⁹
2. Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy⁴⁰
3. Energy Efficiency Law⁴¹
4. Forest Law⁴²
5. Environment Law⁴³

³⁹ Law number 4628, enactment date 03/03/2001 <http://www.epdk.gov.tr/english/regulations/electricity.htm>

⁴⁰ Law number 5346, enactment date 18/05/2005 <http://www.eie.gov.tr/duyurular/YEK/LawonRenewableEnergyReources.pdf>

⁴¹ Law number 5627, enactment date 02/05/2007
http://www.eie.gov.tr/english/announcements/EV_kanunu/EnVer_kanunu_tercume_revize2707.doc

⁴² Law number 6831, enactment date 31/08/1956. Made available to the DOE upon request.

⁴³ Law number 2872. Published in official gazette No. 18132 on 11/08/83. Made available to the DOE upon request.

The resultant alternatives to the project as outlined in Step (1a) are all in compliance with all these applicable laws.

Outcome of Step 1b

Mandatory legislation and regulations for each alternative are taken into account in sub-step 1b. Based on the above analysis, the proposed project activity is not the only alternative amongst the project participants that is in compliance with mandatory regulations. Therefore, the proposed VER project activity may be additional.

Step 2. Investment Analysis

The purpose of investment analysis is to determine whether the proposed project activity is economically or financially less attractive without carbon revenues than the remaining alternatives. To conduct the investment analysis, the following sub-steps are adhered to:

Sub-step 2a. Determine appropriate analysis method

The 'Tool for the Demonstration and Assessment of Additionality', Version 05, from EB39, lists three possible analysis methods:

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

Since the proposed Project generates financial and economic benefits through the sales of electricity other than carbon revenues, Option I cannot be used.

Option II is only applicable to projects where alternatives should be similar investment projects in terms of generation capacity. Between Option II and Option III, benchmark financial analysis (Option III) is chosen.

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

According to the "Tool for the demonstration and assessment of additionality", Version 05, from EB39, a relevant benchmark for a project's IRR can be derived from government bond rates that have been increased by a suitable risk premium (to reflect private investment and/or project type).

- According to Bloomberg⁴⁴, an acknowledged independent source of financial data and investment information, the government bond in Turkey (also known as the "risk free rate") is 15.92%.
- Risk premiums generally reflect circumstances related both to the individual country where the investment is taking place and to the technology in question.
 - As per Bloomberg, the country risk for Turkey is currently 0.71%.
 - A reliable risk premium related to wind power projects (i.e. technology risk) could not be identified due to a lack of public information in this sector. However, it is well known that energy sector projects face overall levels of risk that may be higher than other sectors of the economy, and specifically wind power plants face significant levels of performance risk, related to climatic factors, as well as risks associated with the fact that this is a much newer technology than conventional thermal power generation projects. This suggests that a realistic risk premium for this type of

⁴⁴ Internal Bloomberg database (<http://www.bloomberg.com/>). Please refer to Annex 5: Print-out from internal database outlining country risk premium for the Turkey.

project would be higher than the 0.71% premium indicated by the country risk, suggesting that this approach is conservative.

Therefore, a realistic benchmark IRR for this type of project should be greater than the base investment threshold (Turkey government bonds) plus a risk premium, which given the actual figures referenced, is 16.63% (15.92% + 0.71%).

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

1. Parameters needed for calculation of key financial indicators

On 18/05/2005, the “Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electricity Energy”⁴⁵ was enacted. Article 6 of this law guarantees the purchase of electricity generated from renewable resources, at a 7-year fixed price based on Turkish currency, i.e. the average wholesale price as determined by the Electricity Market Regulatory Authority.

With the enactment of the “Law on Energy Efficiency”⁴⁶ on 02/05/2007, the purchase guarantee for electricity from renewable energy plants was extended from 7 to 10 years, at a price of €0.05/kWh. This new law can be considered as a step forward for the promotion of renewable energy, since it reduces the financial risks that these types of project face. However, this guaranteed price is insufficient to make wind energy projects financially viable.

According to the financial feasibility study of the proposed project, the parameters required for the calculation of key financial indicators are in Table 12. The study⁴⁷ was performed by Zorlu Enerji’s Finance Department (part of Zorlu Grubu) on 17/06/2008. The latter is ranked among the largest corporate groups in Turkey, given its total asset volume of approximately US \$8 billion, and number of employees (around 22,000). Zorlu Grubu is one of Turkey’s leading multi-sectoral conglomerates, with 64 subsidiaries, active in the areas of textiles, electronics, energy, ‘white goods’, and financial services, covering Turkey, the USA, Hong Kong, South Africa, and Russia.

Table 12. Basic Parameters for Financial Analysis

Parameter	Unit	Value
Installed capacity ⁴⁸	MW	135
Grid connected output ⁴⁹	MWh	466,742
Capital investment ⁵⁰	€ x 10 ⁶	181.326
Income tax rate ⁵¹	%	20
Expected tariff ⁵²	€/kWh	0.05
Expected VER price ⁵³	€/ tCO ₂ e	6.5

⁴⁵ <http://www.eie.gov.tr/duyurular/YEK/LawonRenewableEnergyReources.pdf>

⁴⁶ Article 17, p. 13 http://www.eie.gov.tr/english/announcements/EV_kanunu/EnVer_kanunu_tercume_revize2707.doc

⁴⁷ “080617_Rotor_Fizibilite-P75.xls”

⁴⁸ Contract for the sale of power generation equipment between GE and Rotor Elektrik Uretim A.S.

⁴⁹ Osmaniye Wind Power Plant Micrositing Report (11/09/07), by Dr. Ferdi Turksoy, EMD International AS, 2007, Table 17, p.43

⁵⁰ Rotor Elektrik Uretim, Financial Feasibility Study.

⁵¹ http://www.worldwide-tax.com/turkey/turkey_tax.asp

⁵² Rotor Elektrik Uretim, Financial Feasibility Study, and Article 17 of the “Law on Energy Efficiency” http://www.eie.gov.tr/english/announcements/EV_kanunu/EnVer_kanunu_tercume_revize2707.doc

⁵³ Rotor Elektrik Uretim, Financial Feasibility Study, made available to DOE upon request.

O&M	€/year	2,505,725
Project life time	years	20
Discount rate	%	16.63

2. Comparison of IRR for the proposed project and the financial benchmark

In accordance with benchmark analysis (Option III), if the financial indicators of the proposed project, such as the project IRR⁵⁴, are lower than the benchmark, the proposed project is not considered financially attractive.

Table 13 includes the project IRR with and without carbon revenues. Without the additional income to the project developer resulting from VER sales, the Equity IRR is 10.73%, which is lower than the financial benchmark. Thus, the proposed project is not financially attractive. Taking VER revenues into consideration, the Equity IRR increases to 14.24%, but remains lower than the financial benchmark. However, VER revenues provide an additional source of income to the project, in addition to intangible benefits to the country, such as:

- Diversification of energy sources in Turkey;
- Transfer of new technology and knowledge from technology provider General Electric to the Turkish project developer; and
- Decrease in Turkey's dependence on foreign energy sources with a simultaneous strengthening of the country's energy security and self sufficiency.

The proposed wind project with VER is consequently additional.

Table 13. Project IRR of the proposed project

Condition	Equity IRR [%]
Without VER revenue	10.73
With VER revenue	14.24

Sub-step 2d. Sensitivity analysis

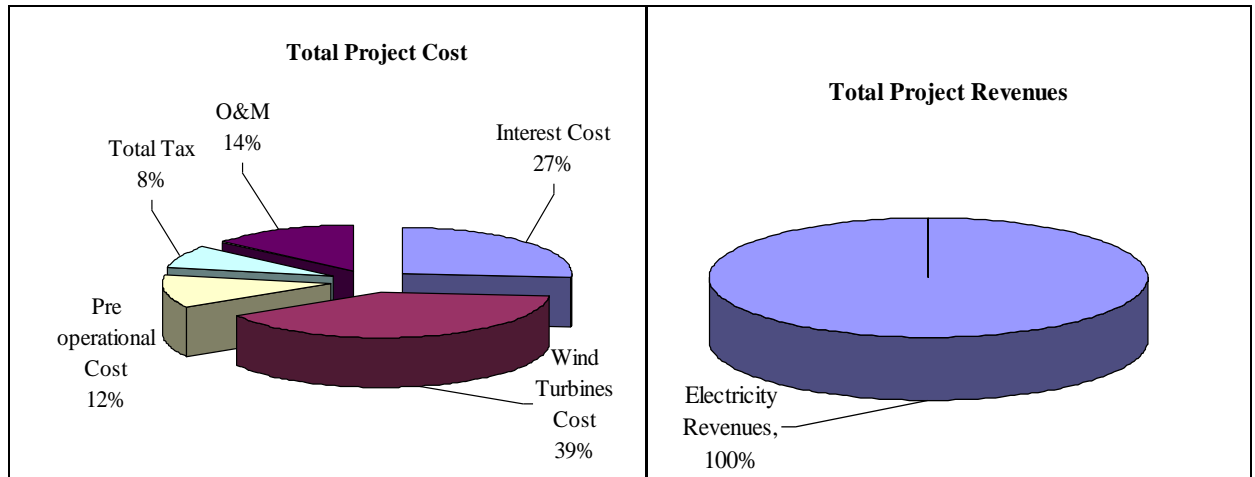
As per Annex 35 "Guidance on the Assessment of Investment Analysis"⁵⁵, from EB 39, only variables (including initial investment cost) that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. For the proposed project, four parameters have been identified based on Figure 4:

- 1) Wind turbine cost
- 2) Expected tariff
- 3) Annual electricity generation
- 4) Interest rate

⁵⁴ For Benchmark Analysis, the IRR shall be calculated as equity IRR, according to the "Tool for the demonstration and assessment of additionality", Version 05, from EB39

⁵⁵ http://cdm.unfccc.int/EB/039/eb39_repan35.pdf

Figure 4. Contribution of different variables to project cost and revenues



Although the impact of annual electricity generation on IRR is the same as the impact resulting from electricity tariff deviation, the impact of annual electricity generation is considered in the sensitivity analysis since the likelihood of change for each parameter varies.

The results of the sensitivity analysis are in Table 14.

Table 14. IRR results of Sensitivity Analysis

Scenario	% Change to reach 16.63% IRR benchmark
Wind turbine cost	-18.8%
Electricity tariff	+14.0%
Annual electricity generation	+14.0%
Interest rate	-38.2%

These variations do not reflect a realistic range of assumptions for the input parameters of the financial analysis as detailed:

- **Wind Turbine Cost:**
A 18.8% decrease in wind turbines costs is highly unlikely given that worldwide wind turbines cost has been on the increase recently due to higher commodity prices (e.g. steel and oil)⁵⁶, increasing demand, shortages in certain turbine components, up-scaling of turbine size (and hub height), and improved sophistication of turbine design (e.g. improved grid interactions)⁵⁷. GE is unable to keep up with a growing demand for wind turbines⁵⁸.
- **Electricity tariff:** The Energy Efficiency Law defines a range of €0.050 - .055/KWh for the purchase of electricity from renewable energy sources for 10 years, for plants put in operation prior to 2012. This shows that the maximum possible increase in tariff is 10% $([(.055 - .050)/.050] \times 100\% = 10\% \text{ increase})$. The

⁵⁶ <http://blogs.wsj.com/environmentalcapital/2008/05/27/premium-juice-power-plant-construction-costs-rise/>

⁵⁷ <http://www.treehugger.com/files/2008/05/wind-turbine-costs-increased-offshore-power.php>
<http://www1.eere.energy.gov/windandhydro/pdfs/43025.pdf>

⁵⁸ <http://www.treehugger.com/files/2008/04/ge-wind-power-fast.php>

Renewable Energy Law encourages free competition between power plants in order to lower the cost of power production and thereby electricity tariffs. However, since a majority of power plants in Turkey are still state-owned, Turkey can control supply and hence influence prices. Overall, competition for “must run” wind farms is difficult because they cannot control their output in response to market demand, contrary to conventional power plants (which can adapt generation to actual demand). In view of these arguments, proposed Project electricity tariffs cannot increase by 14%, and as such the 16.63% benchmark is unlikely to be reached this way.

- **Annual electricity generation:**

The annual electricity generation used to calculate the equity IRR is based on the micro-siting study of the project (466,742 MWh). In this study, under the worst and best case scenarios, the electricity generation will not fluctuate above or below 10% the adopted generation levels as summarized in Table 15. Therefore, a 14% increase in annually generated electricity is highly unlikely.

Table 15. Projected Net Annual Electricity Production (AEP)⁵⁹

Probability of ‘exceedence’ [sic] [%]	Net AEP [MWh/yr]	
75	466,742	
90	425,881	-9.7% from 75% ‘exceedence’ [sic] level
50	512,141	+9.7% from 75% ‘exceedence’ [sic] level

- **Interest rate:**

Chances of a decrease in interest rates by 38.2% in Turkey are very unlikely. In June 2008, the Monetary Policy Committee of the Central Bank of Turkey decided to increase borrowing rates. Further increases are expected when the Central Bank considers them necessary in light of developments in global markets, external demand and fiscal policy implementation in Turkey⁶⁰. Furthermore, the European Central Bank raised its benchmark interest rate in June 2007 by a quarter point. This is considered the ninth increase since December 2005⁶¹.

These results illustrate that only with highly improbable unrealistic circumstances would it be possible to reach the Equity IRR benchmark. It is therefore fair and conservative to conclude that the Equity IRR was lower than the benchmark for a realistic range of assumptions for the sensitivity analysis input parameters, and that the Project was not financially attractive without Carbon revenues. This demonstrates that the Project activity would not have been implemented without the VER revenues.

Outcome of Step 2:

Sensitivity analysis shows that VER revenues will improve the Project’s financial indicators. However, the Project’s Equity IRR is unable to reach the benchmark, supporting the conclusion that the proposed Project is unlikely to be financially attractive.

Step 3. Barrier analysis

This step is used to determine whether the proposed project activity faces barriers that:

⁵⁹ Osmaniye Wind Power Plant Micro-siting Report (11/09/07), by Dr. Ferdi Turksoy, EMD International AS, 2007 p.43 Table 17.

⁶⁰ <http://www.tcmb.gov.tr/yeni/eng/> (press release in interest rates dated : 16.06.08)

⁶¹ <http://www.iht.com/articles/2007/06/06/business/ecb.php>

- a) Prevent the implementation of this type of proposed project activity; and
- b) Do not prevent the implementation of at least one of the alternatives.

The following sub-steps are followed:

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity

Establish that there are barriers that would prevent the implementation of the type of proposed project activity from being carried out, if the project activity was not registered as a VER activity. These barriers include:

Investment barriers

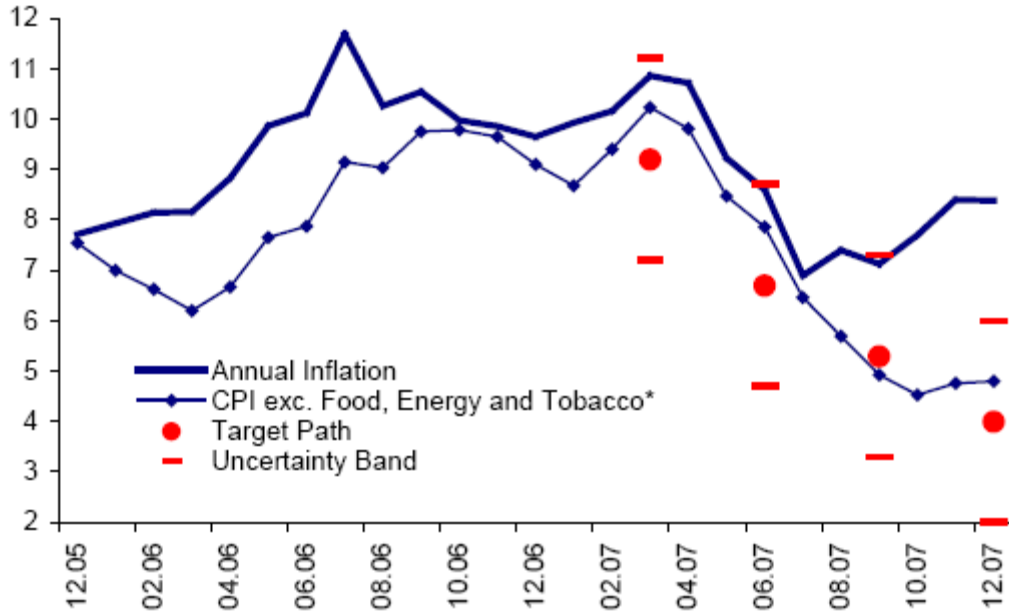
The lack of financial incentives is the primary barrier for renewable energy investments in Turkey. The carbon market provides an innovative enabling environment for renewable electricity generation sources. The following barriers apply to wind power projects in Turkey:

- *High level of financing and long payback period*
In general, wind farm investment costs are about 40% higher than those of a comparable coal-fired power plant, in terms of cost per unit of installed capacity (\$/MWh). Furthermore, the utilization hours of wind farms are about one third of those of a coal-fired power plant⁶². Therefore, the high initial investment cost leads to a long payback period and a higher investment risk on project financing.
- *Low project IRR*
The Internal Rate of Return (IRR) of the project without VER revenue was too low to secure project financing as summarized in Table 13 (above).
- *Country risk*
Despite the evident macroeconomic progress that Turkey has been experiencing, the country's inflation rate and financial markets remain unstable, rendering Turkey less attractive for longer term investments such as wind power⁶³. In 2007, the Turkish inflation rate exceeded expectations for that year (Figure 5), and was high compared to other countries (Figure 6).

⁶² <http://www.bwea.com/energy/rely.html>

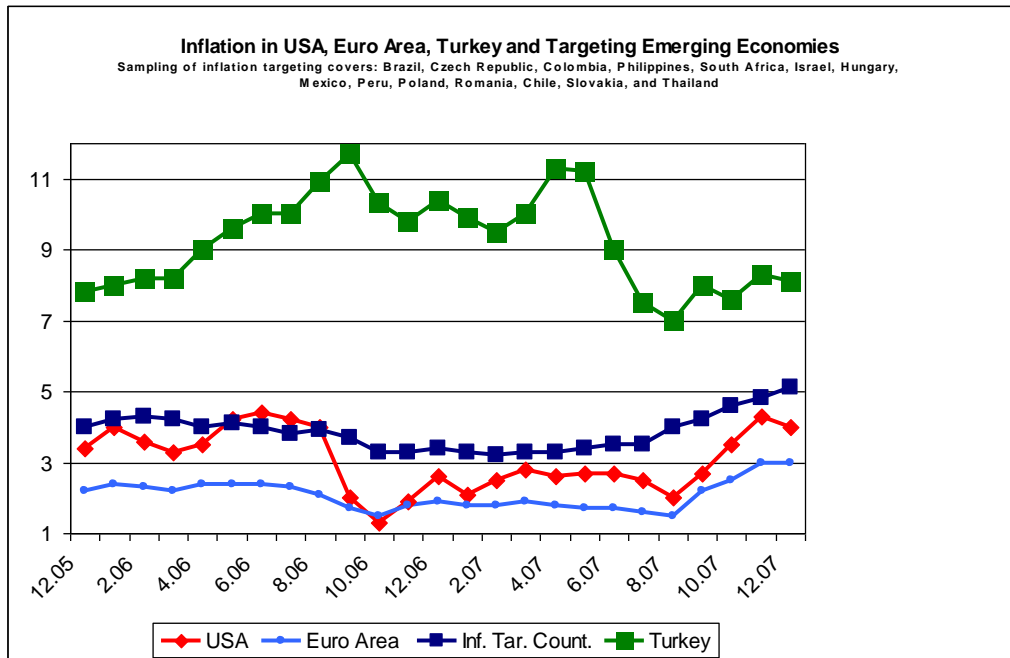
⁶³ <http://www.oecd.org/dataoecd/50/53/37529636.pdf>. See also "Overview of the Inflation Report January 2008", issued by Central Bank of the Republic of Turkey <http://www.tcmb.gov.tr/yeni/eng/>

Figure 5. Annual CPI Inflation and Target Path in Turkey⁶⁴



* "Food" item covers food and non-alcoholic beverages; "Tobacco" item covers alcoholic beverages and tobacco products. Source: TURKSTAT, CBT.

Figure 6. International Developments in Inflation and the Difference between Turkey and Other Countries⁶⁵



⁶⁴ <http://www.tcmb.gov.tr/yeni/eng/>

⁶⁵ <http://www.tcmb.gov.tr/yeni/eng/>

- *High fluctuation in the exchange rate*
The project participant has obtained a loan fixed to the Euro. The operation and maintenance costs of the project are in Turkish Lira (YTL). The electricity tariff ranges between €0.50 – 0.55 /KWh, but is paid in YTL. Furthermore, the electricity invoices are paid one month after their issuance, and are consequently affected by exchange rate fluctuations. The year-to-year exchange rate fluctuation (between the Euro and the YTL), as highlighted in Table 16, add significant economic risk to the project's cash flow.

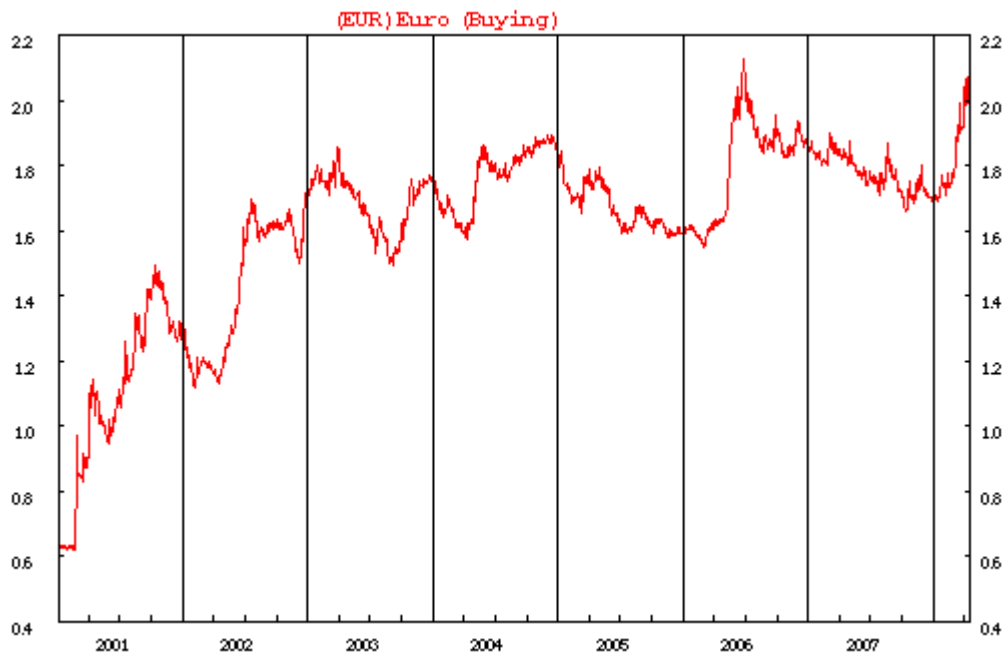
Table 16. Average fluctuation for the exchange rate of YTL vs. Euro for the years 2001 - 2007⁶⁶

Year	Exchange Rate (1 Euro = XX YTL)		Yearly Fluctuation [%]*	Average Fluctuation Rate [%]**
	January	December		
2001	0.619	1.268	+104.8	25.8
2002	1.281	1.703	+32.9	
2003	1.719	1.745	+1.5	
2004	1.757	1.827	+4.0	
2005	1.823	1.590	-12.8	
2006	1.587	1.859	+17.1	
2007	1.851	1.710	-7.6	

*December as compared to January = [(December value - January value) / January value] x 100%

**Average of absolute value of annual fluctuation

Figure 6. Exchange rate YTL vs. Euro⁶⁷



- *Limited incentives for renewable energy:*

⁶⁶ <http://evds.tcmb.gov.tr/yeni/cbt-uk.html>

⁶⁷ <http://evds.tcmb.gov.tr/fame/webfactory/evdpw/gif/2008.gif>

- Grid usage fee
TEIAS' fee for usage of the public grid is defined by the installed capacity and not the actual output of the power plant⁶⁸. Such a fee is less of a burden to conventional power plants, which use 70-85% of their installed capacity to generate electricity, compared to wind power plants, which use only about 30% of their capacity⁶⁹. Such a system favors conventional power plants. This barrier clearly discourages investment in wind farms (Alternative 1) compared to Alternative 2 (thermal power plant).
- High Value Added Tax
Since the wind turbines are imported from Germany and Spain⁷⁰, their spare parts, when needed, will have to be imported as well. Rotor Elektrik has been exempted from paying VAT for the wind turbines but not for their spare parts. They are subject to 18% Value Added Tax, 'VAT'.

Technological barriers

The minimal share of installed wind power capacity in Turkey (lower than 0.2%⁷¹) reflects the technological risks associated to this power source. The hardware is often imported and highly advanced, with no local spare parts supply. Larger operation and maintenance reserves would need to be maintained for such eventualities, as would apply to the GE 2.5xl wind turbine to be used in the Project. Furthermore, GE's 2.5xl wind turbines are the largest onshore GE model with a rotor diameter of 100 meters (an increase of 12 meters over the previous model 2.5MW wind turbine). In order to overcome the technology risks, GE provided training courses (in Germany) on the operation and maintenance of the WTG2.5xl turbines, as well as in the use of personal protective equipment, for 6 of Zorlu's Osmaniye Wind Farm personnel during September 2008.

Barriers due to prevailing practice

The majority of wind farms in Turkey are characterised by small installed capacity, and are developed as Build Operate Transfer (BOT) projects (or as VER projects) (see Table 15). Rotor Elektrik's 135 MW wind power project involves higher risks, as it is the world's largest installation of General Electric (GE) Energy's latest 2.5xl wind turbines, and will more than double the country's installed wind capacity⁷². According to the European Wind Energy Association, Turkey had 84 MW of installed wind capacity at the beginning of 2007, accounting for an increase of only 65 MW compared to the start of 2006⁷³.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)

The aforementioned barriers are largely specific to wind power projects. They have minimal impact on the alternatives that are included in the baseline scenario of ACM0002, namely electricity generation by existing grid-connected power plants.

⁶⁸ <http://www.epdk.org.tr/english/Tariffs/Transmission.htm>

⁶⁹ <http://www.bwea.com/energy/rely.html>

⁷⁰ http://www.gepower.com/about/press/en/2007_press/070307.htm

⁷¹ <http://www.teias.gov.tr/ist2006/13.xls>

⁷² http://www.gepower.com/about/press/en/2007_press/070307.htm

⁷³ http://www.gepower.com/about/press/en/2007_press/070307.htm

Step 4. Common practice analysis

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

At the time of writing the PDD⁷⁴, the Energy Market Regulatory Authority (EPDK) had issued 57 licenses for wind power plants⁷⁵, of which 10 are already operational (See Table 15). Figure 7 shows the wind power plant distribution for Turkey.

Table 17. Operational Wind Projects in Turkey⁷⁶

Project Name	Project Developer	Commissioning Date	Installed Capacity [MW]	Location	Notes
1. Ceres - Delta Plastik End ⁷⁷	Demirer Holding	1998	1.74	İzmir-Çeşme	
2. Ares	Güçbirliği Holding	1998	7.2	İzmir-Çeşme	BOT
3. Bores Bozcaada ⁷⁸	Demirer Holding	2000	10.2	Çanakkale-Bozcaada	BOT
4. Sunjüt ⁷⁹	Demirer Eerji	2003	1.2	İstanbul-Hadımköy	
5. Bares II ⁸⁰	Bilgin Elektrik Investment Holding	I/2006	30	Balıkesir-Bandırma	Voluntary carbon offset project
6. Tepe	Ertürk Holding	II/2006	0.85	İstanbul-Silivri	
7. Mare Manastır ⁸¹	Enercon-Demirer	I/2007	39.2	İzmir-Çeşme	Gold Standard carbon offset project
8. Karakurt ⁸²	Deniz Elektrik	I/2007	10.8	Manisa-Akhisar	Voluntary carbon offset project
9. Anemon Intepe ⁸³	Anemon Elektrik	I/2007	30.4	Çanakkale-Intepe	Gold Standard carbon offset project
10. Sebenoba ⁸⁴	Deniz Elektrik	I/2008	30	Hatay-Samandağ	Voluntary carbon offset project

⁷⁴ April 23rd 2008

⁷⁵ <http://www.epdk.org.tr/lisanssorgu/elektriklisanssorgu.htm>

⁷⁶ http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3781&Ebene1_ID=49&Ebene2_ID=1116&mode=3

⁷⁷ <http://www.demirerholding.com/otoproduktor/ceres/index.html>

⁷⁸ <http://www.demirerholding.com/>

⁷⁹ <http://www.demirerholding.com/otoproduktor/sunjut/index.html>

⁸⁰ "First Turkish Carbon Transaction" <http://www.eep.org/newsletters/newsletter060720.htm>

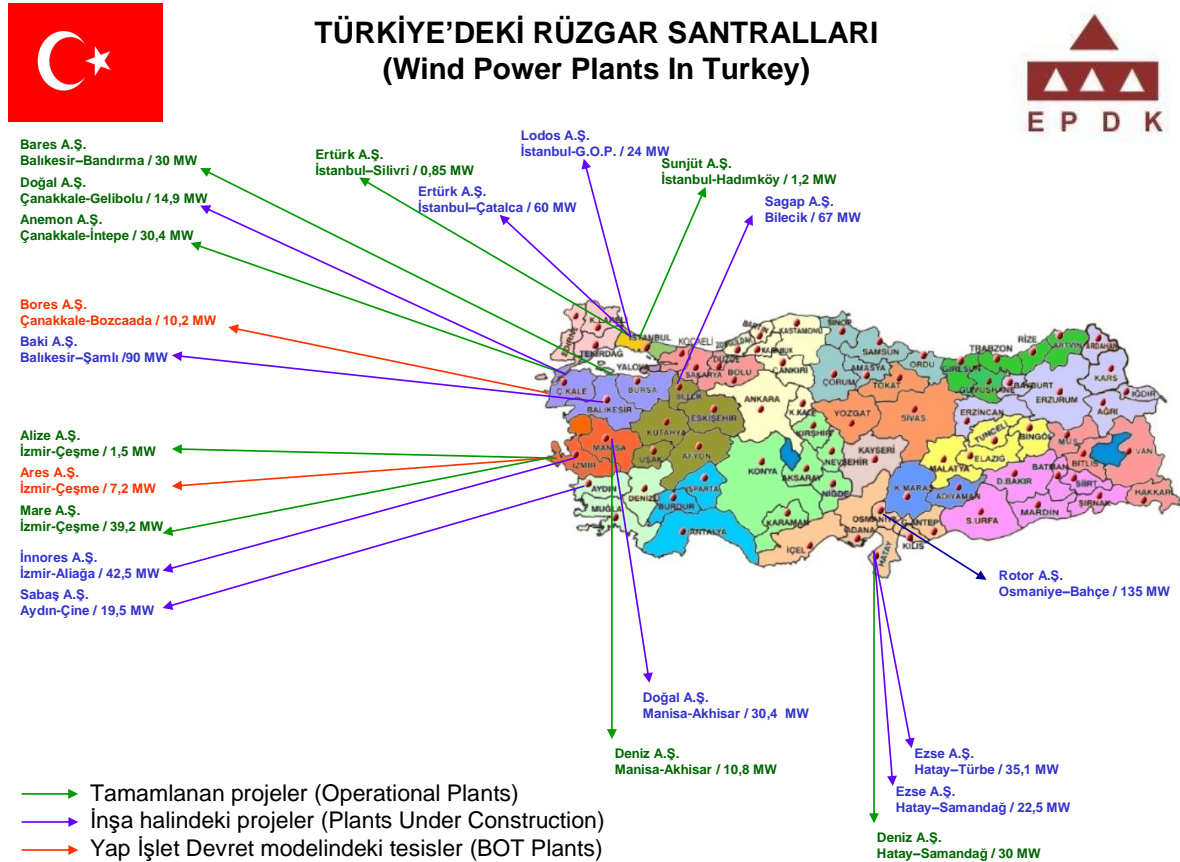
⁸¹ Registered under the Gold Standard <http://www.cdmgoldstandard.org/dataproject.php?action=show&id=64>

⁸² http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3784&Ebene1_ID=49&Ebene2_ID=1152&mode=3

⁸³ Registered under the Gold Standard <http://www.cdmgoldstandard.org/dataproject.php?action=show&id=42>

⁸⁴ http://www.netinform.net/KE/Wegweiser/Guide2.aspx?ID=3781&Ebene1_ID=49&Ebene2_ID=1116&mode=3

Figure 7. Wind Power Plants in Turkey⁸⁵



According to Table 17, the majority of the projects already operating are either:

- Significantly smaller than the Osmaniye Rotor Elektrik Project;
- Built Operate Transfer (BOT) projects, hence facing less technological and investment barriers than the proposed Project; or
- Operating under voluntary carbon emission reduction standards (such as the Gold Standard).

No wind farms of a comparable size to the project activity have been built in Turkey, and no windfarm larger than 10MW has been built in the absence of Carbon Finance. Therefore the project activity is the first of its kind, and would not be viable without carbon credit financing.

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

As detailed in Table 16, the wind farms connected to the national grid differ from the proposed Project in installed capacity and operation practices (i.e. operating as BOT plants and not privately owned). The remaining projects that are comparable to the Project activity in terms of installed capacity are being developed as VER projects. Thus, no similar options remain, indicating that wind farms of similar output to the proposed Project at Osmaniye are far from being common practice in Turkey unless they are voluntary carbon offset projects. It is therefore fair and conservative to conclude that the Project is the first of its kind in Turkey, is not common practice, and can therefore be considered additional.

⁸⁵ Title and legend translated from Turkish <http://www.epdk.org.tr/lisans/elektrik/yek/yek.html>

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

Emission sources:

According to methodology ACM002, the only emission sources are the emissions associated with the electricity that is displaced from the grid. These are calculated as the electricity supplied to the grid multiplied by an emission factor for the grid.

Spatial extent:

According to ACM002, the geographic and system boundaries for the relevant electricity grid must be clearly identified and information on the characteristics of the grid is available. Correspondingly, in this project activity the project boundaries include the project site and all power plants attached to the Turkish National Grid.

The activities and emission sources considered within the project boundaries are listed in Table 18.

Table 18 Summary of gases/sources included in the project boundary (and justification/explanation where gases/sources are excluded.

	Source	Gas	Included?	Justification/Explanation
Baseline	CO ₂ emissions from electricity generation in Turkish electricity grid that is displaced due to the project activity	CO ₂	Yes	The major source of emissions in the baseline.
		N ₂ O	No	Minor emission source.
		CH ₄	No	Minor emission source.
Project Activity	Construction and operation of WPP	CO ₂	No	Project emissions are negligible during construction and non-existent during operation.

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

Date of completing the final draft of this baseline section: 07/07/2008

The baseline has been prepared by EcoSecurities in consultation with Rotor Elektrik Uretim.

Company name: EcoSecurities
 Visiting Address: Saba Tower 1, Office #506
 Jumeirah Lakes Towers
 P. O. Box 346002
 Dubai
 United Arab Emirates
 Contact Person: Amin Bekai
 Telephone number: +971 4 427 0309
 Fax number: +971 4 427 0308
 e-mail: amin.bekai@ecosecurities.com

EcoSecurities is not a project participant
 Detailed baseline information is attached in Annex 2.

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:

The start date of Osmaniye Wind Farm is the date of signature of the contract with GE for the purchase of the wind turbines (21/08/2007).

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

The expected lifetime of the project is 20 years⁸⁶

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

C.2.1. Renewable crediting period

The project will use a renewable crediting period of 3x7 years

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

The crediting period will start on 30/03/2009, which is the expected commissioning date of the Project.

C.2.1.2. Length of the first crediting period:

7 years, 0 months

C.2.2. Fixed crediting period:

N/A

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

⁸⁶ GE Energy, Technical Documentation of Wind Turbine Generator Systems GE2.5xl, p.10

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

The project applied the approved consolidated baseline methodology ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, version 7

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

The monitoring methodology ACM0002 is applicable to this project activity because it fulfils the required criteria:

- The project consists of a wind power electricity capacity addition and is a grid-connected electricity generation project;
- The project does not involve switching from fossil fuel use to renewable energy at the site of the project activity; and
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

D.2. 1. OPTION 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 Build Margin, see baseline description), the only information to be monitored is the amount of electricity fed into the grid by Rotor Elektrik Osmaniye Wind Farm.

The data collected will be kept by Rotor Elektrik during the crediting period, and for two years after the last issuance of VERs for the Rotor Elektrik Osmaniye Wind Farm project activity for that crediting period.

As the emission factors are calculated *ex ante* for the period of 7 years, the Combined Margin will be recalculated at any renewal of the crediting period using the valid baseline methodology ACM0002.

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number <i>(Please use numbers to ease cross-referencing to D.3)</i>	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
N/A								

D.2.1.2. Data to be collected in order to monitor project performance on the most sensitive sustainable development indicators:

ID number	Sustainable Development Indicator	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)
ID1	Employment (job quality)	Types of jobs created by the project, monitored by the contracts signed with the employees	<i>Employment contracts with employees</i>	<i>M</i>
ID2	Employment (numbers)	Number of full time equivalent jobs created by the project, monitored by the contracts signed with the employees	<i>Employment contracts with employees</i>	<i>M</i>
ID3	Noise level (dBA)	Monthly noise level for one year starting full operation of the Project, at the nearest inhabited area to the Project i.e. Gokmustafa village	<i>dBA</i>	<i>M</i>
ID4	Access of local stakeholders to the project site	Roads within the project site have been sporadically closed during construction for safety reasons, and will fully re-open to the public after construction. The only fenced in areas will be those surrounding the turbine mast bases. During subsequent verifications, the verifying DOE may interview muhtars (i.e. "Mayors") or other local stakeholders to confirm site access.	<i>Opinion of the verifying DOE</i>	<i>M</i>

D.2.1.3. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

Project emissions are zero.

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/paper)	Comment
N/A								

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

Baseline emissions are estimated by using the following formula:

$$BE_y = EG_y * EF_y$$

Where:

BE_y Baseline emissions [tCO2e]
 EG_y Annual electricity supplied by the project to the grid [MWh]
 EF_y Baseline emission factor [tCO2e/MWh]
 y Refers to a given year

D.2.2. OPTION 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured(m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
ID 5	EGy Annual electricity supplied by the project to the grid	Metering Device from Project owner and TEIAS	MWh	M	Continuously	100 %	Electronic	Net electricity supplied by the project activity to the grid will be monitored continuously using a cumulative electricity meter. Data will be archived monthly. Values will be double checked against receipts of sale.

Since only the indicators that are critical for a major positive contribution to sustainable development are monitored and verified according to Gold Standard requirements, sustainable indicators scoring +1 (minor positive impact) and 0 (no or negligible impacts) were not included in the monitoring plan (see section A.2).

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.):

Not applicable since the generation of electricity by a wind farm does not result in GHG emissions.

D.2.3. Treatment of leakage in the monitoring plan

No leakage is identified for this project.

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
N/A								

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

N/A

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

See section B.2

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored

This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the proposed project are controlled and reported. This requires an on going monitoring of the project to ensure performance according to its design and that claimed Voluntary Emission Reductions (VERs) are actually achieved.

The monitoring plan provides the requirements and instructions for:

- Establishing and maintaining the appropriate monitoring systems for electricity generated by the project;
- Quality control of the measurements;
- Procedures for the periodic calculation of GHG emission reductions;
- Assigning monitoring responsibilities to personnel;
- Data storage and filing system;
- Preparing for the requirements of an independent, third party auditor or verifier.

Monitoring System

The amount of electricity generated by the project and fed to the national grid will be monitored continuously by two metering devices. The collected data will be kept by both Rotor Elektrik Uretim and TEİAŞ during the crediting period, and stored at least two years after the last issuance of VER credits for the Rotor Elektrik Osmaniye wind farm project activity in the concerning crediting period.

The measurements are made at the main switchyard at 154 kV high voltage level. The losses before this point will be accounted for by the project owner⁸⁷. The measurements are made by two measuring devices (primary measuring device and secondary measuring device⁸⁸). The primary device is used for the billing of the electricity and the amount of VERs generated. Both measuring devices are continuously measuring electricity. The measuring devices' specifications are in accordance with the measurement

⁸⁷ <http://www.teias.gov.tr/yonetmelikler/meters.doc> Article 10 and provisional Article 4- b.1

⁸⁸ <http://www.teias.gov.tr/yonetmelikler/meters.doc> Article 11

communiqué of Turkey⁸⁹ (Turkish Standards and International Electro Technical Commission Standards). Both of the devices are sealed⁹⁰ by TEİAŞ. Officials from TEİAŞ will perform the measurements for both the primary and secondary device (each month). An invoice (receipt of sale) is prepared by TEİAŞ and delivered to Rotor Elektrik Uretim.

As the measuring devices are sealed by TEİAŞ, Rotor Enerji cannot intervene with the devices; hence Rotor Elektrik Uretim cannot perform maintenance or calibration by itself. TEİAŞ is responsible for calibration and maintenance of the devices. If any difference occurs between the primary and secondary device, TEİAŞ performs the necessary maintenance and calibration. Since the electricity generation data is used for the billing and accounting between TEİAŞ and Rotor Elektrik Uretim, the production data is of high quality.

At the end of one monitoring period, which is planned to generally last one year, 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.

Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
ID5: Net quantity of electricity delivered to the grid (EG_y)	Low	The metering equipment will be properly calibrated and checked periodically for accuracy. The meters' accuracy shall meet the minimum qualifications of IEC-EN 60687 0.2S class and IEC-EN 61268 0.2S class, and shall be placed in closed and seal-able panels at the connection point of generation facilities with the network, at the connection point of distribution systems with transmission network to ensure that it monitors only the net electricity supplied to the grid. Rules for meter accuracy are laid down in the TEİAŞ connection agreement. ⁹¹ In addition to the main meter a reserve meter of the same type will be installed to exclude the possibility of data loss.

D.4. Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

As described above, the only relevant data that has to be monitored is the net electricity generation (EG_y) per year. The overall responsibility for monitoring and reporting issues is with Rotor Elektrik Uretim that has a specialized monitoring department controlled and supervised by the Customer Relations Department of Zorlu Enerji in Istanbul working through a SCADA system (*Supervisory Control And Data Acquisition*). The department receives real time data from meters of all power plants operated by Zorlu

⁸⁹ <http://www.teias.gov.tr/yonetmelikler/meters.doc>

⁹⁰ <http://www.teias.gov.tr/yonetmelikler/meters.doc> Article 10

⁹¹ <http://www.teias.gov.tr/yonetmelikler/meters.doc> Article 11

Enerji. Osmaniye wind power plant will be connected to the same system, allowing continuous monitoring of the plant's electricity generation. The system also allows controlling additional power plant data such as energy losses, and ambient air temperature around the power plant. Therefore, it is possible to supervise each power plant's production, planning, and controlling activities separately.

Procedures for monitoring and reporting

The reading of the measurement devices is performed by authorized representatives of TEİAŞ (grid operator) in the presence of Rotor Elektrik representative⁹². The monthly readings shall be recorded in the meter reading minutes and shall then be signed by both parties.

QA/QC procedures

QA: The measuring devices are sealed by TEİAŞ

QC: The measurements are made by two measuring devices (primary measuring device and secondary measuring device). The primary device is used for the billing of the electricity and the amount of VERs generated. The secondary device functions as quality control.

Procedures for the calibration of metering equipment

It is the responsibility of TEİAŞ to calibrate the devices. If any difference occurs between the primary and secondary devices, TEİAŞ performs necessary maintenance and calibration (Section D.3 of the PDD)

Training

No special training is need for monitoring of power generation from Osmaniye wind farm given Zorlu's experience in monitoring its various power plants through its central control SCADA system. Other types of training have been conducted by GE to 6 of Osmaniye power plant staff including O&M of the wind farm given .

Maintenance

TEİAŞ is responsible for calibration and maintenance of the measuring devices. If any difference occurs between primary and secondary device TEİAŞ performs necessary maintenance and calibration (Section D.3 of the PDD)

D.5 Name of person/entity determining the monitoring methodology:
--

See section B.5 of the PDD for the contact information.

⁹² <http://www.emra.gov.tr/english/regulations/electric/settlement/settlement.doc> Article 13

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

The project activity does not result in the emission of greenhouse gases.

E.2. Estimated leakage:

No leakage can be attributed to the project activity.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

There are no project emissions from E.1 and E.2.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

As per Section B.2, carbon emission factor for the Turkish grid is 648 tCO₂/GWh.

The estimated amount of produced electricity is 466.742 GWh/year.

The baseline emissions are estimated as 302,675 tCO₂-eq/year

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

The overall emission reductions from the project activity are based solely on emissions from E.4.

E.6. Table providing values obtained when applying formulae above:

Year	Estimation of project activity emission reductions [tCO ₂ e]	Estimation of baseline emission reduction [tCO ₂ e]	Estimation of leakage [tCO ₂ e]	Estimation of emission reductions [tCO ₂ e]
2009 (Apr – Dec)	158,021	0	0	158,021
2010	302,675	0	0	302,675
2011	302,675	0	0	302,675
2012	302,675	0	0	302,675
2013	302,675	0	0	302,675
2014	302,675	0	0	302,675
2015	302,675	0	0	302,675
2016 (Jan – Mar)	75,665	0	0	75,665
Total	2,049,739	0	0	2,049,739

SECTION F. Environmental impacts

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

No Environmental Impact Assessment (EIA) has been performed for the proposed VER project activity, for the following reasons:

- The project has been exempted from an EIA by the Ministry of Forestry and Environment of Turkey⁹³
- The results of the sustainability indicators show:
 - o No negative indicator
 - o No total or subtotal negative
- The analysis of the environmental and socioeconomic questionnaires indicates that the significant impacts highlighted by the stakeholders have already been taken into account by the project developer as analysed in Table 19 (See Section F.2), except for Question 16 on employment, which is the reason why it is included in the monitoring plan.

Despite the exemption from carrying out an Environmental Impact Assessment for the Project, the Project Developer subcontracted a renowned Turkish environmental consultancy to conduct a detailed Environment and Social Impact Assessment (ESIA) for the Project.

⁹³ Exemption made available to the DOE upon request

F.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:

Table 19 Analysis of the environmental and socioeconomic questionnaires from the Initial Stakeholder Consultation Event

	Response	Likelihood that the impact will result in a significant effect	Comments / Mitigation Measures
Q3 – Will the project release pollutants or any hazardous, toxic, or noxious substances to the air?	Yes (2 out of 59) Dust emissions	1	Limited to construction phase, this impact will be mitigated by making sure that vehicles move slowly, excavation material is covered with plastic sheeting, and roads are kept wet ⁹⁴ .
Q4 - Will the project cause noise and vibration, or release of light, heat energy, or electromagnetic radiation?	Yes (14 out of 60) Noise level	1	The wind turbines will effectively not be heard beyond 300 metres ⁹⁵ . Given that the nearest dwelling is 1,000m away from the project site ⁹⁶ , there will be no sound impact.
Q8 – Are there any areas in or around the project site which are used by protected, important, or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?	Yes (9 out of 57)	1	The project is located in a forestry zone owned by the Ministry of Forestry and Environment who issued a permit for the operation of this wind farm due to its manifold public benefits ⁹⁷ . The project site does not host habitats for threatened species (see Project Introduction File ⁹⁸), and based on this, the Ministry of Forestry and Environment has granted the project a permit for operation, in addition to an exemption from having to conduct an Environmental Impact Assessment.

⁹⁴ “Ruzgar Enerjisi Snatrali Ve Enerji Iletim Hatti”, Bozat AS, 2004.

⁹⁵ GE Energy, “Noise Emissions Characteristics, Normal Operation According to IEC”, Technical Documentation Wind Turbine Generator Systems GE 2.5xl.

⁹⁶ “Ruzgar Enerjisi Snatrali Ve Enerji Iletim Hatti”, Bozat AS, 2004, p.17

⁹⁷ Permit number: B.18.1.OGM.0.07.05.241.0104 142/ 190, issued on 07/05/08

⁹⁸ “Ruzgar Enerjisi Snatrali Ve Enerji Iletim Hatti”, Bozat AS, 2004.

Q9 – Are there any inland, coastal, marine, or underground waters inn or around the project site which could be affected by the project?	Yes (5 out of 59) Groundwater	2	This project does not leave an impact on groundwater. The drilling work for foundation analysis reaching 30 m depth will not affect groundwater flow ⁹⁹ . The wind turbine foundations and the electricity cables connecting the wind turbines are located at 3.9 m and 1m underground depth respectively. Hence, the project will not affect groundwater resources ¹⁰⁰ .
Q10 – Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which would cause the project to present environmental problems?	Yes (12 out of 57) Earthquakes	3	The geological and geotechnical conditions of the site have been taken into account for the design of the wind turbines, in order to ensure that the turbines are resistant to earthquakes. The design works have been approved by the Kandilli Observatory and Earthquake Research Institute of Bogazici University, Turkey ¹⁰¹ .
Q15 – Will there be any risk of accidents during construction or operation of the Project which could affect human health?	Yes (26 out of 55)	7	All Zorlu Holding projects follow Zorlu Holding Health and Safety guidelines to ensure that employees are protected from injury. Osmaniye wind farm site managers are responsible for maintaining safe and healthy working conditions on site, by implementing safety plans via staff training, meetings, inspections and site supervision.
Q16 – Will the project result in social changes, for example, in demography, traditional lifestyles, employment?	Yes (34 out of 58) Employment	13	This technology is not labor intensive, but local employment is a priority for the project developer who will hire local manpower in operation positions. The 25 expected full-time positions that will be occupied by locals are in site security and switchboard operation and management.
Q19 – Is the project in a location where it is likely to be highly visible to many people?	Yes (31 out of 55)	6	The project developer carried out a visual impact assessment using GIS tools to evaluate the visual impact of the project on surrounding towns. The results highlight that the potential impact will be minimal.

⁹⁹ Email with Mr. Gunal Ozenirler from Dokay Ltd. Dated July 2004, 2008.

¹⁰⁰ Foundation conduit plan of the 135 MW Osmaniye wind power plant

¹⁰¹ Aydinoglu, M. Osmaniye RES Turbin Temeli Statik ve Betonarme Hesabi (Turbin No. T6) Inceleme Raporu. Kandilli Rasathanesi ve Deprem Arastirma Entitutususu, May 2008

Q22 – Are there any areas in or around the project location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, and minerals, which could be affected by the project?	Yes (5 out of 49)	3	The project is used for grazing by herders from Gokmustafa village. The project developer will not limit the herders' access to grazing lands.
Q23 – Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding, or extreme or adverse climatic conditions e.g. temperature, inversions, fogs, severes winds, which could cause the project to present socio-economic problems?	Yes (9 out of 56) Earthquakes	2	See response to Q10.

SECTION G. Stakeholders' comments

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

Initial Stakeholder Consultation:

The initial stakeholder consultation process consisted of

- A stakeholder consultation meeting on June 19, 2008 held at the Industrial Profession High School (Endüstri Meslek Lisesi) in Bahçe
- Feedback solicitation from meeting absentees from June 25th to July 3rd, by sending the project summary and environmental and socioeconomic questionnaire by courier

Invitations for the meeting were circulated through:

- Direct invitation letters including a project summary were sent on May 30th, 2008, to 54 direct stakeholders from the national, regional, and local levels in Turkey (Annex 6)
- Announcements in 3 regional newspapers (Bahçe Gundemi & Bahçe'nin Sesi on June 16, and Haber Gazete on June 19)
- Poster announcements in the surrounding villages

90 people attended the meeting, including representatives from:

- National level: the Ministry of Environment and Forestry
- Regional level: Turkish Electricity Transmission and Distribution Companies (TEIAS Adana), Osmaniye Province Parliament, and the Osmaniye Environment and Forestry Department.
- Local level: Local authorities from Osmaniye province including municipalities, Mukhtars (village heads), Bahçe Governor, local police, teachers from Bahçe, Bahçe Educational Works Department, and Bahçe Industrial zone cooperative.

During the meeting, Mr. Gökmen Topuz opened the meeting by introducing Zorlu Enerji and the Wind Power Plant project in Bahçe and its application for Gold Standard certification with assistance from EcoSecurities.

Mr. Mustafa Eroğlu, from Osmaniye's Environment and Forestry Department followed, supported the project with general information about forested regions in Turkey and Osmaniye, and the importance of renewable energy projects to mitigate climate change

Detailed information about the wind farm was presented by Mr. Halil Çınar and Mr. Tarık Çoban from Zorlu Enerji. They explained the importance of wind as a clean energy source, and focused on the 3-year wind measurement study conducted by EMD Int'l illustrating the expected electricity generation of the plant, the location of the wind turbines on the topographic maps of the region, and the virtual layout of the farm on site photos. They also highlighted the construction works related to the project i.e. opening roads, transportation and installation of the turbines.

Ms. Ebru Kilic from Il Tekno introduced the audience to the Gold Standard, explaining the stakeholder consultation process as per the GS guidelines, and stressing the importance of sustainability assessment under the Gold Standard. She then went through the sustainability matrix stopping at the assessment of each indicator. Following

the sustainability matrix, Ms. Kilic guided the audience through the environmental and socioeconomic questionnaire and opened the floor for questions and answers.

Attendants were invited to express their comments about the project through a Q&A session, and by filling the environmental and socioeconomic impacts questionnaire.

Following the event, on June 25th and 26th, Il Tekno circulated the socio-economic questionnaire and project summary to the meeting absentees (from the list of 54 invitees), and gave them until July 8th to return the completed questionnaire, and raise comments about the project. Four questionnaires were returned, from: Osmaniye Governorate, the Association in Support of Contemporary Living (Çagdas Yasami Destekleme Dernegi), the General Directorate of Electrical Power Survey and Development Administration (EIEI), and TEMA Foundation¹⁰².

The four questionnaires received from the absentees highlighted positive comments regarding the project, such as:

- There is minimal noise expected from the GE 2.5xl turbines, and there is no expected project impact on water resources (EIEI);
- The project site is not a habitat of important species, and Zorlu has enough capacity to manage occupational risks (TEMA foundation);
- No harmful impact of the project on the surrounding environment (Governorate of Osmaniye).

Main Stakeholder Consultation:

The Main Stakeholder Consultation process took place from August 20th to October 18th 2008, and was organized by Rotor Elektrik Uretim A.S., EcoSecurities Group PLC, and Il Tekno A.S. It consisted of:

- Circulating the project documentation¹⁰³ to the list of 54 stakeholders who were invited to the Initial Stakeholder Consultation. The documents were sent out between August 20 and 28, 2008, and the stakeholders were given until October 17 to respond with comments.
- Publishing the PDD on TUV-Rheinland website for international stakeholder comments. The international stakeholder consultation was closed on October 17, 2008.

During the Main Stakeholder Consultation, only one comment was received from the Turkish stakeholders from Osmaniye Special Provincial Administration highlighting the following:

- Hiring locals for the security jobs would result in the local people being more sensitive to protect the project site
- It would be an advantage for DHMI to carry the Radar Station to a place where the road maintenance costs would be lower (where there is no road problem). DHMI (General Directorate of State Airports Authority of Turkey) goes for a tender regarding road maintenance every year.
- If you can send the translation of the PDD, we can also submit our comments about it

¹⁰² The Turkish Foundation for Combating Soil Erosion

¹⁰³ The circulated documented included the Project Design Document in English, an extensive summary of the PDD in Turkish, and the Initial Stakeholder Consultation report in Turkish.

Zorlu responded in Turkish to the comments (see Annex A):

- Priority is given to local people for employment based on the specialty and duties of the job. We are happy to inform you that we got the support of Gökmustafa, Savranli and Kizlaç Villages which are adjacent to the project site.
- Relocating of the radar station is on the agenda of the relevant administration. A tender will be conducted by DHMI for the radar stations including the one on the project site. DHMI is the authorized entity to decide on the new location and relocation of the Radar station according to the needs and specifications of the subject.
- The Turkish version of the PDD will be sent by EcoSecurities.

Given that the Project Design Document is an extensive technical document, and considering that the Project Summary¹⁰⁴ in Turkish covers the main points in the PDD, EcoSecurities deemed the translation of the PDD to Turkish unnecessary, and sent a response in Turkish (see Annex B) to the Osmaniye Special Provincial Administration translating as follows:

We are writing in response to your letter dated 14 August 2008, in which you requested a Turkish translation of the Project Design Document (PDD) of Osmaniye Wind Farm project. Kindly note that the Project Summary in Turkish that we have sent you covers in detail the content of the PDD, which is an extensive technical document of more than 60 pages. The content of the Turkish summary will give you enough information to decide whether you have additional clarifications to request. EcoSecurities will be happy to reply to specific questions related to the Project Summary and hence the PDD.

Aside from this comment, no feedback was received from other stakeholders and from the international stakeholder consultation, hence closing the overall stakeholder consultation process.

G.2. Summary of the comments received:

The comments received on the project were during the initial stakeholder consultation meeting. The attendees expressed their opinion and raised questions to Rotor Elektrik Uretim representatives, who answered the comments during the meeting. The comments raised and responses received are summarised in Table 20.

Table 20. Comments and responses received during the stakeholder consultation meeting

Comment	Response
How many of the wind turbines are located in Bahçe and in Hasanbeyli?	Most of the wind turbines are located in Bahçe; nearly 20 of them are located in Hasanbeyli.
Will excavation works during construction affect the water resources (groundwater and surface water spring) near the wind farm?	This technology has minimal impact on water resources in general. The foundation of the turbines and electricity cables connecting the turbines are at 3.9 m and 1m depth respectively, and will not impact groundwater.

¹⁰⁴ The Project Summary will be made available to the DOE upon request. It covered the following topics: Introduction to the PDD, Project Description, Carbon Emission Reduction estimates, Additionality, Sustainability Matrix, Summary of the Initial Stakeholder Consultation, Monitoring Plan, and Contact Information.

Will Zorlu hire people from the local towns? We appreciate your investment in Osmaniye, and we expect you to create employment for us.	This technology does not require much labour, but Zorlu will do its best to hire local people when possible.
How will you maintain security in the project site?	In the construction phase we will have watchmen, but permanent security is still being negotiated within Zorlu.
What are the benefits of this project for Turkey in general?	The project will produce approximately 500,000 MWh electricity per year, using an environmentally friendly technology which will contribute to the prevention of the energy deficit in Turkey.
Will Zorlu build a road in Hasanbeyli?	We will strive to achieve the best of our ability under social responsibilities.
We request you to limit cutting trees in the area where the wind farm will be located.	We agree to this point. However, we cannot avoid a certain level of tree cutting. The project has been approved by the Ministry of Forestry and Environment, and we have paid the ministry a fee for tree cutting as a way of compensating for the tree cutting necessitated by the project.
Is there a radiation threat from the project?	This technology does not emit radiation
What will be the impact from noise to the surrounding?	It will be minimal since the closest town is 1 km away from the site.
How will the project deal with the radar station close to the site?	We are communicating with the General Directorate of State Airports Authority of Turkey (DHMI) to displace the radar station, and expect to receive an approval on this matter soon. In the meantime, we will avoid locating wind turbines in the vicinity of the station.

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

Based on the comments received by the stakeholders, Rotor Elektrik Uretim will:

- Give local employment priority for assistant operation positions. The expected positions that will be occupied by locals are around 25 full time positions in site security and switchboard operation and management.
- Continue its communications with the General Directorate of State Airports Authority of Turkey (DHMI) to change the current location of the radar station

Other comments have already been taken into account as part of the project design, such as the management of earthquake risks in the design of the wind turbines, mitigation of dust emissions during construction, and assessment of the project's visual impact on the surrounding landscape.

Following the project validation, and as part of its corporate social responsibility efforts, the Project Developer is planning to implement a number of micro projects in the Osmaniye province. The Project Developer subcontracted a Turkish consultancy firm to run a socio economic and needs assessment survey in the villages of Bahce, Gokmustafa, Hasanbeyli, and Savranli. The results of the survey will be shared at an open meeting with local stakeholders who will be involved in the selection of the micro projects.

Following the suggestions of local authorities including Osmaniye Forestry Department, the Project Developer will implement a forestation project including 2,000 trees over 3 hectares of land provided by the Department of Forestry. The Project Developer is also working on the rehabilitation of Ataturk primary school garden in Bahce, and on the development of wind energy awareness brochures that will be distributed to primary schools in the region upon the approval of the governor of Osmaniye.

Annex 1

Contact Information on Participants in the Project Activity

Host Country Project Participant

Organization:	Rotor Elektrik Uretim A.S.
Street/P.O.Box:	Avcilar 34310
Building:	Zorlu Plaza
City:	Istanbul
State/Region:	
Postfix/ZIP:	
Country:	Turkey
Telephone:	+90 212 456 23 00
FAX:	+90 212 422 00 99
E-Mail:	yagmur.ozdemir@zorlu.com
URL:	
Represented by:	
Title:	Project Finance Manager
Salutation:	Mr.
Last Name:	Ozdemir
Middle Name:	
First Name:	Yagmur
Department:	
Mobile:	
Direct FAX:	Same as above
Direct tel:	Same as above
Personal E-Mail:	yagmur.ozdemir@zorlu.com

Project Annex 1 participant

Organization:	EcoSecurities Group Plc.
Street/P.O.Box:	40 Dawson Street
Building:	
City:	Dublin
State/Region:	
Postfix/ZIP:	02
Country:	Ireland
Telephone:	+353 1613 9814
FAX:	+353 1672 4716
E-Mail:	cdm@ecosecurities.com
URL:	www.ecosecurities.com
Title:	Company Secretary
Salutation:	Mr.
Last Name:	Browne
Middle Name:	
First Name:	Patrick
Mobile:	
Direct FAX:	Same as above
Direct tel:	Same as above

Personal E-Mail:	cdm@ecosecurities.com
Organization:	EcoSecurities Group Plc.

Annex 2

Baseline Information

Table 21 Capacity addition in 2003 used for calculating the Build Margin

Power Plant	Installed Capacity [MW]	Fuel Type	Generation Capacity [GWh]	Commissioning Date
Yİ DÜZELTME-REVISED	83.1	NG	692.3	31/12/2003
2003 Total NG			692.3	

Table 22 Capacity addition in 2004 used for calculating the Build Margin

Power Plant	Installed Capacity [MW]	Fuel Type	Generation Capacity [GWh]	Commissioning Date
ÇOLAKOĞLU(KAPASİTE ARTIRIMI)	45.0	Coal	337.5	05/05/2004
2004 Total Coal			337.5	
GÜL ENERJİ GR-II	12.5	HFO	96.5	03/06/2004
KARKEY-II 3+3 DGM	54.3	HFO	369.7	12/11/2004
2004 Total HFO			466.2	
ENERJİ-SA ADANA 1 BT	49.8	NG	322.9	23/06/2004
TÜPRAŞ BATMAN GR V	1.5	NG	4.1	2003
BAHARİYE MENSUCAT (İzole)	1.0	NG	7.0	01/01/2004
ANKARA D.G.(BAYMİNA) GR-I-II-III	798.0	NG	6,500.0	08/01/2004
ENTEK GR-IV	31.1	NG	255.7	12/02/2004
ATATEKS 2 GM	5.6	NG	45.0	20/02/2004
TANRIVERDİ 4 GM	4.7	NG	38.7	24/03/2004
TEKBOY TEKSTİL 1 GM	2.2	NG	16.0	18/05/2004
KOMBASSAN KAĞIT GIDA VE TEKS	5.5	NG	38.1	09/06/2004
AYEN ÖSTİM ENERJİ ÜRETİM	31.1	NG	264.1	11/06/2004
BİS ENERJİ 2 GT	73.0	NG	602.7	16/06/2004
ŞAHİNLER ENERJİ 1 GM	3.2	NG	22.2	29/06/2004
BESLER GR-2, BT (5,2+7,5)	12.7	NG	97.7	07/07/2004
ÇELİK ENERJİ ÜR.ŞTİ. 2 GM	2.4	NG	18.6	09/07/2004
OTOPRODÜKTÖR(DÜZELTME)	6.4	NG	43.2	20/07/2004
KOMBASSAN KAĞ. MATBAA GIDA	5.5	NG	35.7	24/09/2004
AYEN ÖSTİM ENERJİ ÜRETİM(BT)	9.9	NG	84.0	01/10/2004
HABAŞ ALİAĞA GRUP I-II	89.2	NG	713.9	08/10/2004
STANDART PROFİL 3 GM	6.7	NG	49.2	22/10/2004
ALTINMARKA GIDA GR I-II-III	3.6	NG	28.8	17/12/2004
2004 Total NG			9,187.7	

ERE(BİR KAPILI HES) GRUP-I	48.5	Hydro	17.0	11/03/2004
ELTA ELK(DODURGA) GR-I-II-III-IV	4.1	Hydro	0.0	26/04/2004
İSKUR TEKSTİL(SÜLEYMANLI) GR I-II	4.6	Hydro	4.0	28/04/2004
BEREKET EN.(Feslek Hes) Gr-1-2	9.5	Hydro	25.0	05/08/2004
2004 Total Renewable			46.0	
2004 Total Generation Capacity used for calculating the Build Margin			10,037.4	

Table 23 Capacity addition in 2005 used for calculating the Build Margin

Power Plant	Installed Capacity [MW]	Fuel Type	Generation Capacity [GWh]	Commissioning Date
İÇDAŞ ÇELİK GR-I	135.000	Coal	1,080.0	30/11/2005
KAHRAMANMARAŞ KAĞIT GR-I	6.000	Coal	45.0	08/12/2005
2005 Total Coal			1,125.0	
ÇAN GR I	160.000	Lignite	1,040.0	15/02/2005
ÇAN GR II	160.000	Lignite	1,040.0	15/03/2005
ELBİSTAN-B GR I	360.000	Lignite	2,340.0	15/02/2005
2005 Total Lignite			4,420.0	
OTOP DÜZELTME	2.109	HFO	5.2	
KARKEY(SILOPİ-4) GR-IV	6.150	HFO	47.2	30/06/2005
KARKEY(SILOPİ-4) GR-V	6.750	HFO	51.9	23/12/2005
2005 Total HFO			104.3	
OTOP DÜZELTME	0.612	NG	1.8	
AKBAŞLAR GR-II(İZOLE)	8.830	NG	73.0	24/06/2005
AKÇA ENERJİ GR-III	8.730	NG	65.4	14/12/2005
AYKA TEKSTİL GR-I	5.500	NG	40.0	24/09/2005
BAYDEMİRLER GR IV-V-VI	6.210	NG	51.4	04/02/2005
BOSEN GR-III	50.000	NG	350.0	30/12/2005
ÇUMRA ŞEKER	16.000	NG	40.0	01/01/2005
EVYAP GR I-II	5.120	NG	30.0	27/08/2005
GRANİSER GRANİT GR-I	5.500	NG	42.0	14/11/2005
HABAŞ ALİAĞA GR III	47.694	NG	381.6	02/06/2005
HABAŞ ALİAĞA GR IV	47.694	NG	381.6	21/09/2005
HABAŞ ALİAĞA GR-V	24.600	NG	196.8	24/11/2005
HABAŞ ALİAĞA (DÜZELTME)	6.158	NG	49.3	24/11/2005
HAYAT KAĞIT GR-I	7.531	NG	56.0	27/05/2005
KORUMA KLOR GR I-II-III	9.600	NG	77.0	03/12/2005
KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	8.000	NG	64.0	27/11/2005
MERCEDES BENZ TURK GR I-II-III-IV	8.280	NG	68.0	04/02/2005
MODERN ENERJİ GR-III	8.380	NG	62.9	14/06/2005
MODERN ENERJİ GR-II	6.720	NG	50.4	14/06/2005
MOSB GR I-II-III-IV-V-VI-VII	84.834	NG	434.0	01.03 - 01.08.2005

ORS RULMAN	12.420	NG	99.4	25/08/2005
PAK GIDA(Kemalpaşa) GR-I	5.670	NG	45.0	07/12/2005
TEZCAN GALVANİZ GR I-II	3.664	NG	29.0	27/05/2005
YONGAPAN(KAST.ENTG) GR-II	5.200	NG	32.7	25/05/2005
ZEYNEP GİYİM SAN. GR-I	1.165	NG	9.0	07/07/2005
AK ENERJİ(K.paşa) GR- III	40.000	NG	256.9	09/11/2005
AK ENERJİ(K.paşa) GR I-II	87.200	NG	560.1	30/04/2005
ALTEK ALARKO GR I-II	60.100	NG	420.0	14/10/2005
BİS ENERJİ GR VII	43.700	NG	360.8	18/03/2005
CAN ENERJİ GR-I	3.900	NG	28.0	25/08/2005
ÇEBİ ENERJİ BT	21.000	NG	164.9	27/08/2005
ÇEBİ ENERJİ GT	43.366	NG	340.1	23/08/2005
ENTEK ELK.A.Ş.KOÇ ÜNİ.GR I-II	2.332	NG	19.0	07/02/2005
KAREGE GR IV-V	18.060	NG	141.9	07/04/2005
METEM ENERJİ(Hacışiramat) GR I-II	7.832	NG	58.0	29/01/2005
METEM ENERJİ(Peliklik) GR I-II-III	11.748	NG	89.0	29/01/2005
NOREN ENERJİ GR-I	8.730	NG	70.0	24/08/2005
NUH ENERJİ-2 GR I	46.950	NG	319.7	24/05/2005
ZORLU ENERJİ KAYSERİ GR-I-II-III	149.871	NG	1,144.1	22/07/2005
ZORLU ENERJİ KAYSERİ GR-IV	38.630	NG	294.9	26/10/2005
ZORLU ENERJİ YALOVA GR I-II	15.930	NG	122.0	26/11/2005
2005 Total NG			7,119.5	
TEKTUĞ(Kargılık) GR I-II	23.900	Hydro	19.0	25/04/2005
İÇTAŞ ENERJİ(Yukarı Mercan) GR I-II	14.190	Hydro	20.0	22/05/2005
MURATLI GR I-II	115.000	Hydro	400.0	03/06/2005
BEREKET EN.(DALAMAN) GR XIII-XIV-XV	7.500	Hydro	0.0	16/07/2005
YAMULA GRUP I-II	100.000	Hydro	345.0	31/07/2005
ETİ MAD.(BAN.ASİT)GR-I	11.500	Renewable	85.0	15/07/2005
SUNJÜT(RES) GR I-II	1.200	Wind	2.0	23/04/2005
2005 Total Renewable			871.0	
2005 Total Generation Capacity used for calculating the Build Margin			13,639.8	

Table 24 Capacity addition in 2006 used for calculating the Build Margin

Power Plant	Installed Capacity [MW]	Fuel Type	Generation Capacity [GWh]	Commissioning Date
EÜAŞ	1,080.0	Lignite	7,020.0	2006
2006 Total Lignite			7020.0	
OTOPRODÜKTÖR	143.5	NG	1,086.2	2006
SERBEST ÜR.ŞTİ.	389.8	NG	3,048.8	2006
2006 Total NG			4,135.0	
SERBEST ÜR.ŞTİ.	46.8	Wind	164.5	2006

Data and parameters not monitored

Data / Parameter:	EG_{gross,y}
Data unit:	GWh
Description:	Turkey's Gross Electricity Generated by primary energy source for the five most recent years (2002-2006)
Source of data used:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/ist2006/31(40-06).xls
Value applied:	Table 2
Justification of the choice of data or description of measurement methods and procedures actually applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	FC_{i,y}
Data unit:	Ton (m ³ for Natural Gas)
Description:	Amount of fossil fuels consumed in thermal power plants in Turkey by the electric utilities (2004 until 2006)
Source of data used:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/ist2006/42.xls for 2004 and 2005 fuel consumption data http://www.teias.gov.tr/ist2006/43.xls for 2006 fuel consumption
Value applied:	Table 3
Justification of the choice of data or description of measurement methods and procedures actually applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

Data / Parameter:	NCV
Data unit:	TJ/Ton (TJ/m ³ used for Natural Gas)
Description:	Net calorific value of fossil fuel type
Source of data used:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/ist2006/45.xls
Value applied:	Table 4
Justification of the choice of data or description of measurement methods and procedures actually applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	In order to convert to required units, a conversion factor of 4.187 joules/Cal is used.

Data / Parameter:	EF_{CO2,i,y}
Data unit:	tCO ₂ /GJ
Description:	Default CO ₂ emission factor of fossil 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 Chapter 1 of Volume 2 (Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventory http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

Value applied:	Table 5
Justification of the choice of data or description of measurement methods and procedures actually applied:	There is no information on the fuel specific default emission factor in Turkey, hence, IPCC values have been used as referred to in the "Tool to calculate the emission factor for an electricity system (version 1)".
Any comment:	

Data / Parameter:	Auxiliary Consumption
Data unit:	GWh
Description:	Auxiliary Consumption of thermal power plants connected to the national grid
Source of data used:	TUIK (Turkish Statistical Institute) http://www.turkstat.gov.tr/yillik/stat_yearbook.pdf Table 14.4, p.231.
Value applied:	Table 7
Justification of the choice of data or description of measurement methods and procedures actually applied:	The annual publication of TUIK (Turkish Statistical Institute) is the most accurate official source of data, which provides most up-to-date information publicly available.
Any comment:	

Data / Parameter:	Electricity Imports
Data unit:	GWh
Description:	Electricity imported to the grid from other countries
Source of data used:	Turkish Electricity Transmission Company (TEIAS) http://www.teias.gov.tr/ist2006/47.xls
Value applied:	Table 8
Justification of the choice of data or description of measurement methods and procedures actually applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	

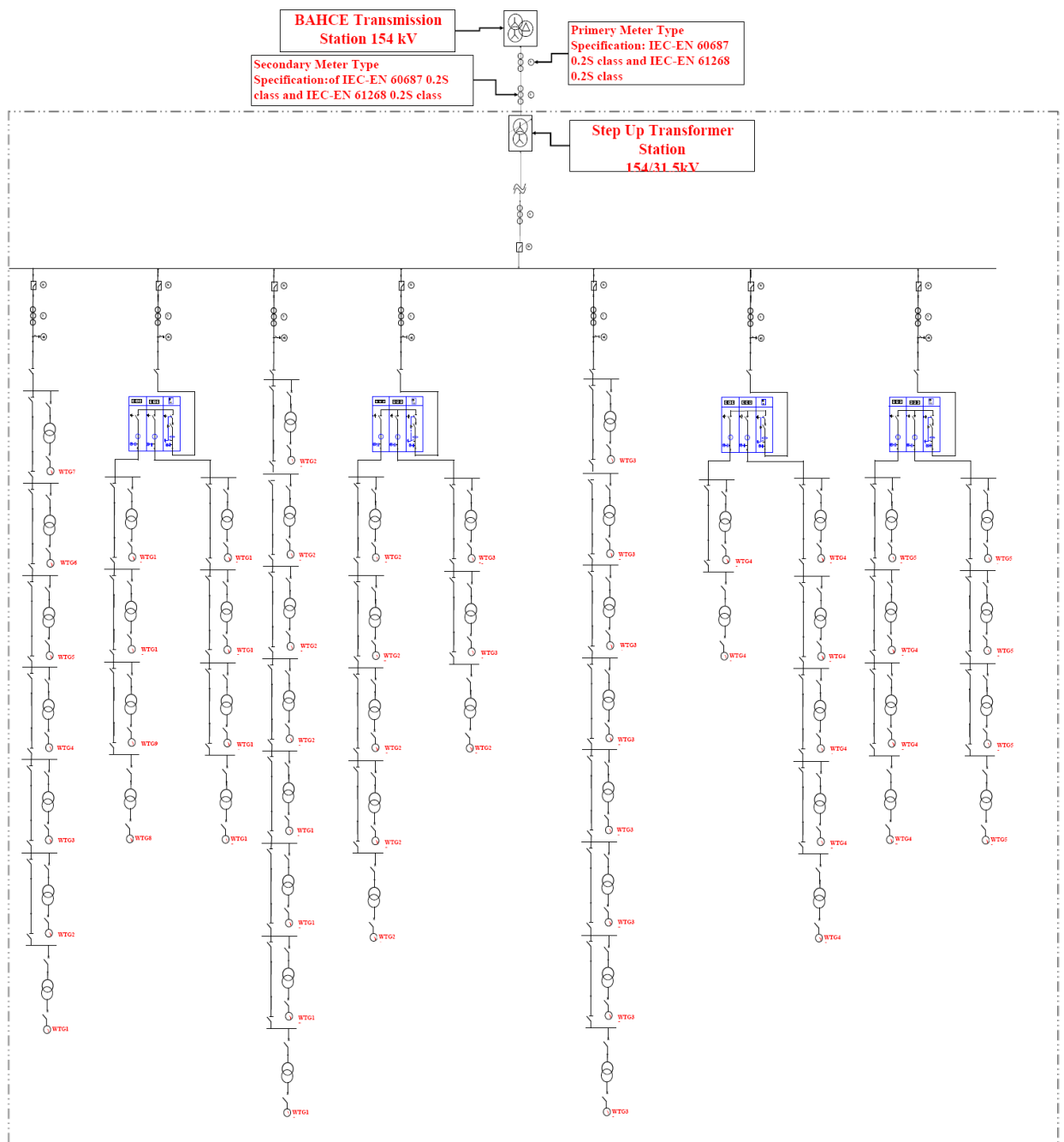
Data / Parameter:	η
Data unit:	%
Description:	Average net energy conversion efficiency of power unit
Source of data used:	"Environmental Map" published by Environmental Inventory Head Department under Ministry of Environment and Forestry. http://www.cedgm.gov.tr/dosya/cevreatlasi/atlasin_metni.pdf (page 197, table X.3.1)
Value applied:	Table 9
Justification of the choice of data or description of measurement methods and procedures actually applied:	The average values of thermal power plants in Turkey are taken from the report "Environmental Map" published by the Ministry of Environment and Forestry.
Any comment:	

Data / Parameter:	Capacity additions
Data unit:	Name of the plant; Installed capacity (MW); Fuel type; Generation capacity (GWh); Commissioning date
Description:	Set of power capacity additions in the electricity system that comprise 20% of the system generation (in GWh) and that have been built most recently
Source of data used:	Turkish Electricity Transmission Company (TEIAS) Generation units put into operation in 2003; 2004; 2005; 2006 http://www.teias.gov.tr/istatistik/7.xls for 2003 http://www.teias.gov.tr/istat2004/7.xls for 2004 http://www.teias.gov.tr/istatistik2005/7.xls for 2005 http://www.teias.gov.tr/ist2006/8.xls for 2006 http://www.teias.gov.tr/ist2006/9.xls for 2006
Value applied:	Table 8
Justification of the choice of data or description of measurement methods and procedures actually applied:	TEIAS (Turkish Electricity Transmission Company) is the official source for the related data, hence providing the most up-to-date and accurate information available.
Any comment:	For set of power plants put into operation in 2006, and to be conservative we assume that all the thermal power plants are using NG except for 3 plants that are using Lignite as per TEIAS

Annex 3

Monitoring Plan

The scheme below shows the connection points of Rotor Elektrik Osmaniye Wind Farm Project with the national grid. The wind farm is connected to the national grid through Bahce transformer station on (154 kV) high voltage level. Two electricity meters are installed at Rotor Elektrik Osmaniye Wind Farm. These meters are working in Series (attach schematic diagram showing the meters). 54 wind turbines are connected to the meters through a step-up transformer 31.5kV/154 kV.



Annex 4

Coordinates of the wind turbines

Turbine	East	North	Height (m)
T01	286,373	4,117,827	962
T02	286,349	4,117,575	990
T03	286,337	4,117,321	1,051
T04	286,349	4,117,056	1,101
T05	286,330	4,116,806	1,128
T06	286,416	4,116,567	1,150
T07	286,486	4,116,265	1,220
T08	287,213	4,116,561	1,210
T09	287,223	4,116,302	1,246
T10	287,154	4,116,050	1,291
T11	287,104	4,115,807	1,312
T12	287,178	4,115,570	1,319
T13	287,332	4,115,369	1,353
T14	287,418	4,115,136	1,411
T15	287,342	4,114,883	1,403
T16	288,114	4,117,650	1,080
T17	288,102	4,117,403	1,130
T18	288,137	4,117,157	1,206
T19	288,297	4,116,933	1,220
T20	288,337	4,116,686	1,221
T21	288,378	4,116,435	1,250
T22	288,460	4,116,196	1,306
T23	288,479	4,115,949	1,347
T24	288,752	4,115,228	1,591
T25	288,895	4,115,026	1,600
T26	289,131	4,114,871	1,622
T27	289,086	4,114,626	1,620
T28	288,992	4,114,399	1,595
T29	288,926	4,114,166	1,580
T30	288,848	4,113,937	1,549
T31	288,817	4,113,691	1,559
T32	288,754	4,113,450	1,606
T33	288,761	4,113,198	1,560
T34	288,748	4,112,946	1,533
T35	288,724	4,112,692	1,480
T36	288,696	4,112,441	1,478
T37	288,770	4,112,201	1,433

T38	288,891	4,111,982	1,375
T39	289,002	4,111,758	1,346
T40	287,937	4,111,590	1,353
T41	288,047	4,111,359	1,350
T42	287,915	4,111,138	1,288
T43	288,123	4,110,891	1,230
T44	287,996	4,110,684	1,220
T45	287,833	4,110,481	1,206
T46	287,750	4,110,246	1,178
T47	292,237	4,115,698	1,134
T48	292,221	4,115,395	1,139
T49	292,334	4,115,101	1,158
T50	292,379	4,114,804	1,133
T51	292,900	4,115,640	1,081
T52	292,952	4,115,356	1,100
T53	293,023	4,115,078	1,116
T54	293,112	4,114,798	1,111



Annex 5

Country risk premium of Turkey

<HELP> for explanation, <MENU> for similar functions. EquityEQRP

EQUITY RISK PREMIUM

BASE COUNTRY DATA			
Country	TURKEY		
ISO Code	TRY		
Expected Market Return	16.630		
Risk Free Rate	15.920		
Country Premium	0.710		

EQUITY SPECIFIC DATA			
Akbank TAS	AKBNK TI		
Applied Beta	1.091	Beta	1.091
		Equity Risk Premium	0.77

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2008 Bloomberg Finance L.P.
H251-160-1 15-Apr-2008 10:40:32

Annex 6

List of Invitees to the Initial Stakeholder Consultation Meeting

Name	Institution	Title	Attendance
NATIONAL LEVEL			
1. Kemal BÜYÜKMIHÇI	General Directorate of Electrical Power Survey and Development Administration / EİEİ	General Manager	Responded to questionnaire by fax
2. Ahmet OCAK	Energy Market Regulatory Authority (EMRA) / EPDK Elektrik Piyasası Düzenleme, İzleme ve Değerlendirme Dairesi	Power Department Manager	
3. İsmet TURAN	Energy Market Regulatory Authority (EMRA)/ EPDK Elektrik Piyasası Düzenleme, İzleme ve Değerlendirme Dairesi	Wind Energy Department Manager	
4. Saffet DURAK	Energy Market Regulatory Authority (EMRA) / EPDK Elektrik Piyasası Düzenleme, İzleme ve Değerlendirme Dairesi	Energy Expert	
5. Faruk BEDİR	TEİAŞ / Turkish Electricity Transmission Company Çukurova High Distribution Plant	Operational Manager	
6. Yılmaz EĞERCİ	TEİAŞ / Turkish Electricity Transmission Company Transmission Plant Operations Department	Manager	
7. İbrahim ERTEN	TEDAŞ / Turkish Electricity Distribution Company	Operational Manager	
8. Mustafa ŞAHİN	Turkish Ministry of Environment and Forestry / T.C. Çevre ve Orman Bakanlığı	Air Quality Management Department Manager	Yes (represented by Sebahattin Dokmeci)
9. Hayati ÇETİN	Turkish Ministry of Energy and Natural Resources / T.C. Enerji ve Tabii Kaynaklar Bakanlığı	Environment and Technological Efficiency Department Manager	
10. Salahaddin KİREÇÇİ	Toroslar Elektrik Dağıtım A.Ş. (private company)	Manager	
NATIONAL NGOS			

11.	Dr. Demir İNAN	Clean Energy Foundation / Temiz Enerji Vakfı	President	
12.	Yeşim BEYLA	TEMA Foundation		
REGIONAL LEVEL				
13.	Mehmet ARSLAN	Ministry of Public works and settlement / Bayındırlık ve İskan Müdürlüğü – Osmaniye	Manager	
14.	Hamza TOR	Special Provincial Administration Osmaniye / İl Özel İdaresi	President	Yes
15.	Ertuğrul KILIÇKIRAN	Special Provincial Administration Osmaniye / İl Özel İdaresi	General Secretary	
16.	Ahmet GÖZNEK	Special Provincial Administration Osmaniye / İl Özel İdaresi		
17.	Cuma DEMİR	Special Provincial Administration / İl Özel İdaresi	Manager	
18.	Ahmet DOLĞUN	Environment and Forestry Department Osmaniye / İl Çevre Orman Müdürlüğü	Manager	
19.	Ayşe SARI	Environment and Forestry Department Osmaniye / İl Çevre Orman Müdürlüğü	Environmental Engineer	Yes
20.	Ruşen KALAYLI	Environment and Forestry Department Osmaniye / İl Çevre Orman Müdürlüğü	Assistant Manager	
21.	Mustafa EROĞLU	Environment and Forestry Department Osmaniye / İl Çevre Orman Müdürlüğü	Forestry works supervisor	Yes
22.	Faruk TÜRK	Osmaniye Province Parliament / İl Genel Meclisi	Member	
23.	Mehmet BİNBOĞA	Osmaniye Province Parliament / İl Genel Meclisi	Member	
24.	Osman MAZI	Osmaniye Province Parliament / İl Genel Meclisi	Member	
25.	Kemal ÖZDEMİR	Osmaniye Province Parliament / İl Genel Meclisi	Member	
26.	İsmet İPEK	Osmaniye Province Parliament / İl Genel Meclisi	Member	

27.	Mustafa ÇELİK	Osmaniye Province Parliament / İl Genel Meclisi	Member	Yes
28.	Eşref YAMAN	Osmaniye Province Parliament / İl Genel Meclisi	Member	Yes
29.	Hasan Basri YÜKSEL	Osmaniye Province Parliament / İl Genel Meclisi	Member	
30.	Hasan ÖZTÜRK	Osmaniye Province Parliament / İl Genel Meclisi	Member	
31.	Abuzer BULANIK	Osmaniye Province Parliament / İl Genel Meclisi	Member	
LOCAL LEVEL				
32.	Zübeyir KEMELEK		Governor of Osmaniye / Kaymakam	Responded to questionnaire by fax
33.	Davut ÇUHADAR	Osmaniye Municipality	Mayor	Yes
34.	Harun SARIFAKIOĞULLARI		Governor of Bahçe	Yes
35.	Murat ALTUNDIŞ	Bahçe Municipality	Mayor	Yes
36.	Ercan ÖZER		Governor of Hasanbeyli	Yes
37.	Yusuf TOZLUKLU	Hasanbeyli Municipality	Mayor	Yes
38.	İzzettin ÖZGİBAR	Bahçe Police Department / İlçe Emniyet Müdürlüğü	Police Chief	Yes
39.	Yücel Özdemir	Bahçe Gendarmerie Headquarters / İlçe Jandarma Komutanlığı	Lieutenant	
40.	Durmuş SAĞLAM	Bahçe Educational Works Department / İlçe Milli Eğitim Müdürlüğü	Operational Manager	Yes
41.	Metin URAL	Forestry Works Department Bahçe / Orman İşletme Şefi	Forestry Works Chief	
42.	Şaban ECE	TEDAŞ / Turkish Electricity Distribution Company – Bahçe office	Operation Chief	

43.	Metin ÖNAL	Association in Support of Contemporary Living / Çagdas Yasami Destekleme Derneği (ÇYDD)	President	Responded to questionnaire by fax
44.	Yasin AKSAY	Bahçe Gündemi Newspaper	Desk Editor	
45.	Levent ÇETİN	Haber Newspaper	Desk Editor	
46.	Murat YÜKSEL		Gökmustafa Mukhtar	Yes
47.	Ahmet BALI		Kaman Mukhtar	Yes
48.	Aziz ALTINTAŞ		Kızılaç Mukhtar	Yes
49.	Ramazan KARADAM		Savranlı Mukhtar	Yes
50.	Recep ALTUN		Yukarıkardere Mukhtar	Yes
GOLD STANDARD SUPPORTERS				
51.	Yunus ARIKAN	REC Turkey - Regional Environmental Centre	Climate Change Project Director	
52.	Gülçin ÖZSOY	REC Turkey - Regional Environmental Centre		
53.	Filiz DEMİRAYAK	WWF / Doğal Hayatı Koruma Vakfı	President	
54.	Hilal ATICI	Greenpeace Mediterranean Turkey Energy and Climate Change Campaign	Director	