



**The Gold Standard**  
Premium quality carbon credits


**THE GOLD STANDARD:  
Project Design Document for Gold Standard  
Voluntary Offset projects  
(GS-VER-PDD)**

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Explanatory information on how to complete the PDD and how to obtain Gold Standard registration can be found in the project developer's manual available on the Gold Standard website.

This template of the PDD is applicable for micro-, small- and large-scale projects. Note that the shaded boxes present information on the Gold Standard VER project development procedures. Project developers should delete these shaded boxes when preparing their PDD.

**VOLUNTARY OFFSET PROJECTS**

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

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## SECTION A. General description of project activity

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### A.1 Title of the project activity

Title: *Kuyucak 25.6 MW Wind Farm Project, Turkey*

Version: 09

Date: September 23<sup>rd</sup>, 2010

### A.2. Description of the project activity

The *Kuyucak 25.6 MW Wind Farm Project, Turkey*, hereafter referred to as the Project, involves a grid-connected onshore wind farm project in Manisa Province, consisting of 14 wind turbines with a total installed power generation capacity of 25.6 MW. The Project is being implemented by Alize Enerji Elektrik Üretim A.Ş., a subsidiary of Demirer Enerji based in Turkey. The Project aims to generate electricity from wind energy and feed it to the national electricity grid.

The project foresees to install 12 units of wind turbines with 2,000 kW and 2 units with 800 kW capacity each and to feed this electricity without storing to the national grid via a transmission line of 28 km length at the Soma B transformer station. The Project area is located in Demirtaş village, Kırkağaç district, Manisa province, Turkey.

According to the technical feasibility study, the Project is estimated to generate a net electricity amount of 112,763 MWh per year, resulting in annual emission reductions of 71,578 metric tonnes CO<sub>2</sub> equivalent and a total reduction of 501,047 tCO<sub>2-eq</sub> dispersed over a total of 7-year crediting period. The site preparation for the first wind turbines (construction of roads, transmission lines, etc.) is started in November 2009 and generation is expected to start in July 2010.

The Project will reduce greenhouse gas emissions by displacing electricity from grid connected fossil fuel fired power plants, thereby contributing to climate change mitigation along with other environmental benefits. Given an expected operational life of 25 years, the Project activity will continue to reduce emissions further after the end of the crediting period as well.

The Project has a license for 25.6 MW installed capacity since September 12<sup>th</sup>, 2007 issued by EMRA valid for 45 years.

#### **Contribution to sustainable development:**

The project significantly contributes to regional sustainable development in following ways:

- Reduction of:
  - electricity imports of Turkey,
  - dependency on fossil fuels and associated risks due to price variations;
- Diversification and assurance of energy supply;
- Reduction of greenhouse gas emissions and air pollutants (e.g. particulates, sulphur dioxide, nitrogen oxides etc.) in Turkey by displacing electricity from fossil fuel based power plants;
- Creation of jobs in Turkey and in the region during construction and operation phases;
- Support to local economy by procuring available services (like subcontractors) and equipment (like cables, transformer for the transmission line, turbine blades, general construction material, etc.) locally;
- Support to technology and knowhow transfer and development of the renewable energy sector in Turkey.

**Sustainable Development Screen:**

The project shows mainly neutral or positive scores according to the Gold Standard sustainability screen. No negative scores have been found.

**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)	Alize Enerji Elektrik Üretim A.Ş. (private entity) (a subsidiary of Demirer Enerji Üretim A.Ş.)	No
Turkey (host)	Mavi Consultants (private entity)	No

*Alize Enerji Elektrik Üretim A.Ş.* (private entity), the project operating company owned by Demirer Enerji Üretim A.Ş., shall be defined as the project participant. Contact details are given in Annex 1. Mavi Consultants act as consultant for this Project and are responsible for the transaction of the credits.

**A.4. Technical description of the project activity:**

**A.4.1. Location of the project activity:**

**Host Country Eligibility Check:**

*GS Manual for VER Project Developers: Section 3.2.2*

A Gold Standard voluntary offset project can be located in any country that does not have quantitative reduction target under the Kyoto Protocol. Turkey has officially signed the Kyoto Protocol on 26 August 2009. Turkey's position can be described as follows:

As of today, Turkey is an Annex I country. Annex I countries are potential carbon credit buyers. Turkey has, however, not set any emission reduction target; hence it is not listed as an Annex B country of the Kyoto Protocol and cannot participate to the Clean Development Mechanism (CDM) nor to the EU Emissions Trading Scheme (EU-ETS). Under these circumstances, the non-Kyoto market, which involves Voluntary Emission Reductions (VERs), is emerging in the country.

As of today, there is no DNA in Turkey. The National Focal Point of Turkey is the Ministry of Environment and Forestry. The Turkish National Focal Point has been involved in the consultation process as described in the section 3.4.3. for the Gold Standard Voluntary Project development, which significantly raised the awareness in the government about the issues around climate change and carbon trading.

Turkey has ratified the Kyoto Protocol but has no emission reduction obligations and is eligible as a host country for Gold Standard VER projects.

**A.4.1.1. Host Party(ies):**

Turkey

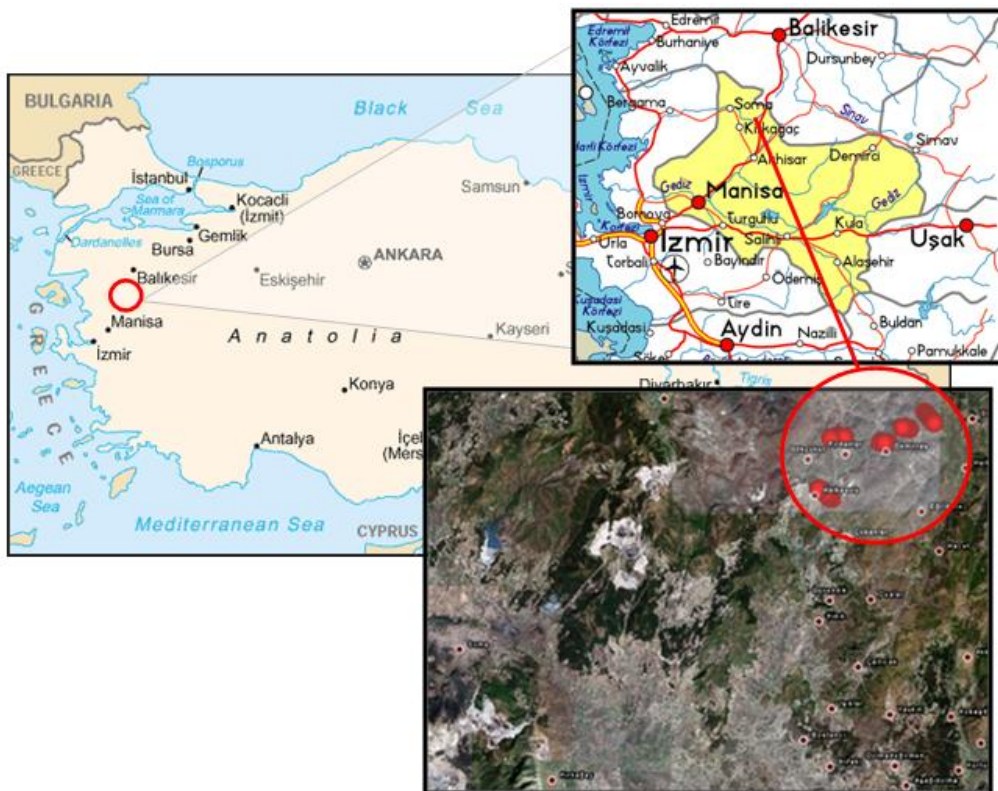
**A.4.1.2. Region/State/Province etc.:**

Manisa province, Turkey

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

The project is located in Kuyucak region, Demirtaş village (distance 1.5 km), Akçakırsak village (distance 3 km), Gölcük town (distance 2.1 km), Kocaiskan village (3.4 km), Kırkağaç town (distance 35 km), Manisa province (distance 100 km). The geographical location of the Project covers an area around 39° 17' N, 27 ° 53' E approximately.

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



**Figure 1. Project location**

Details about the geographical position of the Project Activity can be found in Annex 5. Please note that the micrositing work is not finalized and accurate locations of the turbines are not decided yet.

**A.4.2. Size of the project:**

The Project is expected to reduce **71,578 tCO<sub>2</sub>e** annually. As specified in the Gold Standard VER Manual for Project Developers, the project qualifies as a large-scale project.

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

The Project activity falls under category “A.1. Renewable Energy (Electricity/Heat)”, as specified in Appendix A of the Gold Standard VER Manual for Project Developers and is therefore eligible under the Gold Standard.

**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 Activity involves the generation of renewable energy from wind. It thereby displaces grid electricity that is partly generated from fossil fuel fired power plants. The wind-driven blades are connected to an electricity generator, which produces electrical energy and supplies it to the grid without storage.

Enercon, a German turbine manufacturer, has been selected as equipment provider due to the quality of its products in terms of high reliability, grid friendliness, low maintenance requirements and low noise levels. The turbines will be delivered from Germany to the project site. Blades and towers will be produced in Turkey.

The Project includes 12 units of gearless, variable speed, variable pitch control Enercon<sup>1</sup> E70 wind turbines (rotor diameter 71 m) with an output of 2,000 kW each and sweeping surface of 3,959 m<sup>2</sup> and 2 units of E44 wind turbine (rotor diameter 44m) with a rated output of 800 kW and sweeping surface of 1,521 m<sup>2</sup>. Although Enercon E44 type wind turbines have a design capacity of 900 kW, their technical properties will be changed for the Project Activity such that their maximum output will be limited to 800 kW. The project activity is expected to supply 112,763 MWh of net electricity per year to the national grid via a 154 kV transmission line of 28 km length at the Soma B transformer station.

When the wind speed is low, the wind farm will draw some electricity from the grid, which has to be produced partly by fossil fuel fired power plants. Although power augmentation during such wind fluctuations may be necessary, these amounts are negligible and are already accounted for by considering only the net electricity generation of the Project.

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

The Project is estimated to export a net electricity amount of 112,763 MWh per year to the electricity grid, which will result in 71,578 tCO<sub>2</sub> of emission reductions annually. The total emission reduction over the 7-year crediting period is 501,047 tCO<sub>2</sub>, dispersed over years 2010-2017.

**Table 1. Estimated emission reductions of the project activity over the crediting period**

Year	Annual estimation of emission reductions in tonnes of CO <sub>2</sub> e
2010	36,279
2011	71,578
2012	71,578
2013	71,578
2014	71,578
2015	71,578
2016	71,578
2017	35,299
<b>Total emission reductions (tonnes of CO<sub>2</sub> e)</b>	<b>501,047 tCO<sub>2</sub> over 7 years</b>
<b>Annual average over the crediting period of estimated reductions (tonnes of CO<sub>2</sub>e)</b>	<b>71,578</b>

The amount of VERs actually generated by the project will vary depending on the metered power supply of the project. The project is designed and planned according to 21 years crediting period. After the first crediting period of 7 years, project participants are planning to extend it 2 times more by undergoing the validation process again.

<sup>1</sup> Source: www.enercon.de

## **SECTION B. Application of a baseline methodology**

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

The latest version of the approved CDM large-scale methodology ACM0002, Version 07 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (dated December 14<sup>th</sup>, 2007) is applied for calculation of emission reductions. The ACM0002 methodology is hereafter referred to as the “baseline methodology”.

For baseline emission calculations, ACM0002, Version 07 refers to the “Tool to calculate the emission factor for an electricity system”, Version 01.1, which is used as well.

For additionality assessment, the “Tool for the demonstration and assessment of additionality”, Version 05.2 is used, which is hereafter referred to as the “additionality tool”.

All calculations in this section are performed in a conservative manner in order to avoid overestimation of generated emission reductions. The applied data is based on official, publicly available data.

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

The ACM0002 baseline methodology has been chosen because of the following reasons:

- The project activity consists of the installation of wind turbines, which will export electricity to the national grid system;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;
- The Project supplies electricity to the national grid and thereby displaces electricity from fossil fuel based power plants connected to the grid.

### **B.2. Description of how the methodology is applied in the context of the project activity:**

The Project mainly involves electricity capacity addition, which reduces CO<sub>2</sub> through the substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. According to the baseline methodology, the emission reduction ER<sub>y</sub> by the project activity during a given year y is found as;

$$ER_y = BE_y - PE_y - LE_y \quad (1)$$

where BE<sub>y</sub> is calculated as;

$$BE_y = (EG_y - EG_{baseline}) * EF_{grid,CM,y} \quad (2)$$

The operation margin refers to a cohort of power plants that reflect the existing power plants whose *electricity generation* would be affected by the proposed project activity. The build margin refers to a cohort of power plants that reflect the type of power units whose *construction* would be affected by the proposed project activity.

The combined emission factor EF<sub>grid,CM,y</sub> for the project activity is calculated as a weighted average of Operating Margin emission factor and Build Margin emission factor as described in the baseline methodology;

$$EF_{grid,CM,y} = W_{OM} * EF_{grid,OM,y} + W_{BM} * EF_{grid,BM,y} \quad (3)$$

Definitions and explanations regarding the equations (1), (2) and (3) are given in Table 10.

**Data and parameters that are available at validation:**

<b>Data / Parameter:</b>	<b>GEN<sub>i,y</sub></b>
Data unit:	GWh
Description:	The gross electricity generation by fuel type i in year y (2002-2006)
Source of data used:	Turkish Electricity Transmission Company (TEİAŞ) website <a href="http://www.teias.gov.tr/istatistik2005/39.xls">http://www.teias.gov.tr/istatistik2005/39.xls</a> (2002-2005) <a href="http://www.teias.gov.tr/ist2006/36(06).xls">http://www.teias.gov.tr/ist2006/36(06).xls</a> (2006)
Value applied:	<b>Table 2. Gross and Net Electricity Generation [GWh] in Turkey</b>
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEİAŞ annually publishes official data regarding electricity generation. Average share of each source in the overall generation has been calculated.
Any comment:	

<b>Data / Parameter:</b>	<b>Net Electricity Generation<sub>y</sub></b>
Data unit:	GWh
Description:	The difference between the total quantity of electricity generated by power plants/units and the auxiliary electricity consumption of power plants/units.
Source of data used:	Turkish Electricity Transmission Company (TEİAŞ) website <a href="http://www.teias.gov.tr/ist2006/30(84-06).xls">http://www.teias.gov.tr/ist2006/30(84-06).xls</a> (2002-2006)
Value applied:	<b>Table 2. Gross and Net Electricity Generation [GWh] in Turkey</b>
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEİAŞ annually publishes official data regarding <i>total</i> net electricity generation, but its <i>breakdown</i> by fuel type is unavailable.
Any comment:	

<b>Data / Parameter:</b>	<b>Net Delivery Ratio<sub>y</sub></b>
Data unit:	-
Description:	The ratio of the total Net Electricity Generation to the total Gross Electricity Generation in year y.
Source of data used:	Net Electricity Generation and Gross Electricity Generation data from <a href="http://www.teias.gov.tr/ist2006/30(84-06).xls">http://www.teias.gov.tr/ist2006/30(84-06).xls</a> <a href="http://www.teias.gov.tr/istatistik2005/39.xls">http://www.teias.gov.tr/istatistik2005/39.xls</a> (2002-2005) <a href="http://www.teias.gov.tr/ist2006/36(06).xls">http://www.teias.gov.tr/ist2006/36(06).xls</a> (2006)
Value applied:	<b>Table 2. Gross and Net Electricity Generation [GWh] in Turkey</b>
Justification of the choice of data or description of measurement methods and procedures actually applied :	Electricity delivered to the grid by each power plant/unit or fuel source is unavailable. The Net Delivery Ratio <sub>y</sub> is used for approximating the net electricity amount delivered to the grid by power plants/units except lc-mr sources (GEN <sub>y</sub> ).
Any comment:	This is a conservative assumption, since in general thermal power plants consume more energy for auxiliaries than e.g. hydro plants. This assumption leads to higher net electricity amounts and lower emission reductions.

<b>Data / Parameter:</b>	<b>GEN<sub>y</sub></b>
Data unit:	GWh
Description:	The net electricity delivered to the grid in year y
Source of data used:	Calculation steps (for each year y): 1. Gross electricity generation excluding lc-mr sources = Total gross electricity generation from all sources - total gross electricity generation from lc-mr sources 2. Net electricity generation excluding lc-mr sources = Gross electricity generation except lc-mr sources * Net Delivery Ratio 3. Net electricity delivered to the grid except lc-mr sources = Net electricity generation except lc-mr sources + Imports
Value applied:	Table 13. Electricity Supply to Grid Equation (4)
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

<b>Data / Parameter:</b>	$FC_{i,y}$
Data unit:	ton or 1000 m <sup>3</sup>
Description:	Total amount of fossil fuel type i consumed by power plants/units in year y
Source of data used:	Turkish Electricity Transmission Company (TEİAŞ) website <a href="http://www.teias.gov.tr/istatistik2005/46.xls">http://www.teias.gov.tr/istatistik2005/46.xls</a> (2002-2005) <a href="http://www.teias.gov.tr/ist2006/43.xls">http://www.teias.gov.tr/ist2006/43.xls</a> (2006)
Value applied:	Table 14. NCVs and Emission Factors of Fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	Fuel consumption breakdown by power plant/unit is unavailable, total consumption amounts are published annually by TEİAŞ. These data are used together with $HV_{i,y}$ for calculating the NCV of each fuel type i.
Any comment:	The total amount of fossil fuels consumed by power plants/units also includes supplementary firing in cogeneration plants for seasonal heat generation. Since detailed information about it is unavailable, so it could not have been filtered out. However, most power plants do not utilize excess heat and this effect can be neglected. Wood waste, liquid sulphur, black liquor, bitumen pyrite, sulphur cake, coke gas, coke oven gas, black furnace gas and refinery gas amounts are not included in the official data, which is a conservative approach.

<b>Data / Parameter:</b>	$HV_{i,y}$
Data unit:	Tcal
Description:	Heating values of fuels consumed in thermal power plants in Turkey by the electric utilities
Source of data used:	<a href="http://www.teias.gov.tr/istatistik2005/47.xls">http://www.teias.gov.tr/istatistik2005/47.xls</a> <a href="http://www.teias.gov.tr/ist2006/45.xls">http://www.teias.gov.tr/ist2006/45.xls</a>
Value applied:	Table 14. NCVs and Emission Factors of Fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are used together with $FC_{i,y}$ for calculating the $NCV_{i,y}$ .
Any comment:	The publicly available data do not sub-categorize the coal amount by type for 2006. For harmonization with guideline reference figures, "hard coal" is assumed as <i>sub-bituminous coal</i> and "imported coal" is assumed as <i>other-bituminous coal</i> , which have similar corresponding NCVs.

<b>Data / Parameter:</b>	<b>NCV<sub>i,y</sub></b>
Data unit:	TJ/kt or TJ/milion m <sup>3</sup>
Description:	Net calorific value of fossil fuel type i in year y
Source of data used:	Net calorific values of fuels used for power generation are not provided directly, but they are calculated as average by dividing HV <sub>i,y</sub> by FC <sub>i,y</sub> , both of which are officially published.
Value applied:	Table 14. NCVs and Emission Factors of Fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since NCVs can be calculated, IPCC guideline figures are not used.
Any comment:	2006 breakdown of fuel consumption data do not differentiate between coal types. 2006 hard coal consumption of IPPs and autoproducers are regarded as other-bituminous coal, which do not distort the NCV figures.

<b>Data / Parameter:</b>	<b>EF<sub>CO2,i,y</sub></b>
Data unit:	tCO <sub>2</sub> /TJ
Description:	CO <sub>2</sub> emission factor of fossil fuel type i in year y
Source of data used:	The lower limits of the 95% confidence interval stated in the “2006 IPCC Guidelines for National Greenhouse Gas Inventories”, Volume 2, Chapter 1 (energy) Table 1.4.
Value applied:	Table 14. NCVs and Emission Factors of Fuels Table 4. CO <sub>2</sub> Emissions of Recent Capacity Additions by Fuel Type
Justification of the choice of data or description of measurement methods and procedures actually applied :	Emission factors are locally not available for Turkey, and there exist no national or regional average default figures, therefore industry guidelines are used instead.
Any comment:	

<b>Data / Parameter:</b>	E <sub>y</sub>
Data unit:	GWh
Description:	Net electricity imports delivered to the grid in year y
Source of data used:	Turkish Electricity Transmission Company (TEİAŞ) website <a href="http://www.teias.gov.tr/ist2006/23.xls">http://www.teias.gov.tr/ist2006/23.xls</a>
Value applied:	Table 13. Electricity Supply to Grid
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is the total electricity imported and delivered to the national grid from connected electricity systems (neighbour countries).
Any comment:	

<b>Data / Parameter:</b>	<b>Electricity Capacity Additions</b>
Data unit:	-
Description:	Power plants which are most recently taken into operation
Source of data used:	Turkish Electricity Transmission Company (TEİAŞ) TEİAŞ Capacity Projection 2007-2016 Study <a href="http://www.teias.gov.tr/istatistik2005/7.xls">http://www.teias.gov.tr/istatistik2005/7.xls</a> <a href="http://www.teias.gov.tr/istat2004/7.xls">http://www.teias.gov.tr/istat2004/7.xls</a> <a href="http://www.teias.gov.tr/istatistik/7.xls">http://www.teias.gov.tr/istatistik/7.xls</a>
Value applied:	Table 17. Recent Capacity Additions 2003-2006
Justification of the choice of data or description of measurement methods and procedures actually applied :	Average generation values are used for hydro power plants. Since capacity additions between 2004-2006 are not sufficiently large, a natural gas / naphtha power plant has been included as well, which was taken into operation in year 2003.
Any comment:	As the methodology suggests, isolated and retrofitted power plants/units as well as performance revisions are not regarded.

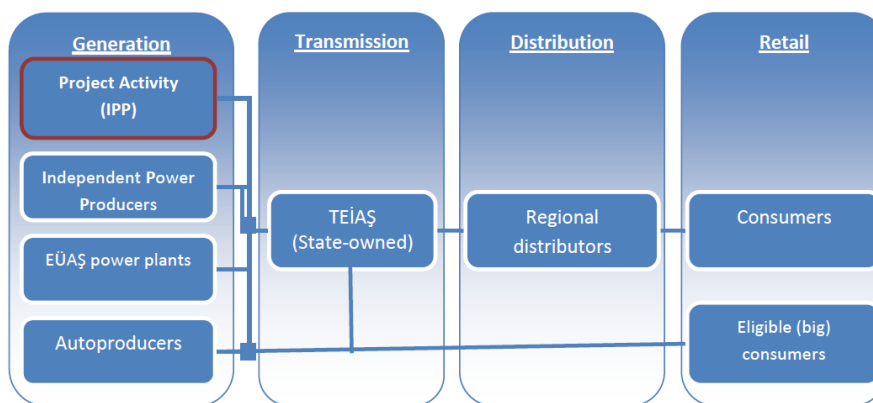
<b>Data / Parameter:</b>	$\eta_{m,y}$
Data unit:	%
Description:	Average net energy conversion efficiency of power unit m in year y
Source of data used:	UNFCCC methodological tool "Tool to calculate the emission factor for an electricity system" v.01.1 Annex I
Value applied:	Table 4. CO2 Emissions of Recent Capacity Additions by Fuel Type
Justification of the choice of data or description of measurement methods and procedures actually applied :	There is no official efficiency values available based on each power plant or each fuel type in Turkey.  Most natural gas power plants in Turkey are combined cycle, most coal power plants operate sub-critical and most liquid fuel power plants adopt an open cycle technology.
Any comment:	

**Ex-ante calculation of emission reductions:**

**STEP 1. Identify the relevant electric power system**

A *project electricity system* is defined by the *spatial extent* of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. There is no officially available and published delineation of the project electricity system and connected electricity systems for Turkey. In the Turkish electricity system, power plants can be dispatched without significant transmission losses. In this respect, the spatial extent of the Project Boundary is defined as the *national electricity grid* of Turkey.

Some power plants, which are not connected to the national grid and are operated stand-alone, are included in the project boundary, since no detailed data are available to filter them out. However the share of these stand-alone power plants in overall gross generation is negligibly small<sup>2</sup>. These are some of the so-called *autoproducers*, who mostly cover their own seasonal energy demand peaks with their own stand-alone thermal power plants.



**Figure 2. Overview of the Turkish electricity system**

<sup>2</sup> Around 0.2% for recent years (<http://www.teias.gov.tr/istat2004/44.xls>, <http://www.teias.gov.tr/istatistik2005/45.xls>, <http://www.teias.gov.tr/ist2006/41.xls>)

A likely transmission line construction is not considered in BM emission factor calculations. Turkey imports electrical power from and exports to neighbour countries<sup>3</sup>, which are defined as *connected electricity systems* for the Project. According to the baseline methodology, imports are regarded as a power source delivering electricity to the grid with an OM emission factor of 0 tCO<sub>2</sub>, since electricity being imported is purchased from connected electricity systems located in other countries.

## STEP 2. Select an operating margin (OM) method

There exists no nuclear power plant in Turkey, and there is no indication that coal or lignite is obviously used as must-run. Hydro, geothermal, wind power plants and other renewables are included as low-cost/must-run resources, hereafter referred as *lc-mr*, which turns out to be 26.5% of the total electricity generation on average between years 2002 and 2006:

**Table 2. Gross and Net Electricity Generation [GWh] in Turkey**

		2002	2003	2004	2005	2006	Avg. Share
	<b>Coal</b>	4,093	8,663	11,998	13,246	14,217	6.7%
	<b>Lignite</b>	28,056	23,590	22,450	29,946	32,433	18.0%
	<b>Fuel Oil</b>	9,505	8,153	6,690	5,121	4,232	4.6%
	<b>Diesel oil</b>	271	4	7	3	58	0.1%
	<b>LPG</b>	35	3	33	34	0	0.0%
	<b>Naphtha &amp; Asphaltite</b>	933	1,036	940	326	50	0.5%
	<b>Natural Gas</b>	52,497	63,536	62,242	73,445	80,691	43.6%
<b>low cost-must run</b>	<b>Renew, &amp; Wastes</b>	174	116	104	122	154	0.1%
	<b>Hydro</b>	33,684	35,330	46,084	39,561	44,244	26.3%
	<b>Geothermal</b>	105	89	93	94	94	0.1%
	<b>Wind</b>	48	61	58	59	127	0.0%
	<b>Gross Total</b>	129,400	140,581	150,698	161,956	176,300	<b>100%</b>
	<b>Gross Total, excluding lc-mr resources</b>	95,389	104,985	104,360	122,120	131,681	<b>73.5%</b>
	<b>Net generation</b>	123,727	135,248	145,066	155,469	169,543	
	<b>Net Delivery Ratio [%]</b>	95.6%	96.2%	96.3%	96.0%	96.2%	

<sup>3</sup> Since 2001: Exports to Georgia, Azerbaijan, Iraq, Syria. Imports from Bulgaria, Iran, Turkmenistan, Georgia. Sources: <http://www.teias.gov.tr/ist2006/49.xls>, <http://www.teias.gov.tr/ist2006/47.xls>

The baseline methodology allows a choice among four methods for the calculation of OM emission factor;

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

There exist no publicly available data for the dispatch data analysis (c) or for the simple adjusted OM (b). Since the average share of electricity generation by lc-mr plants for five most recent years is found to be less than 50%, option (a) is chosen. The simple OM emission factor can be calculated using either of the two data vintages:

- *Ex-ante option*, where a 3-year generation-weighted average based on the most recent data is used. Monitoring and recalculation of the emission factor is not required, or
- *Ex-post option*, where the data of the year is used, in which the project activity displaces grid electricity. Yearly update of the emission factor is required.

The *ex-ante option* is selected to carry out the baseline methodology for the Project.

Official emission figures of Turkey submitted to UNFCCC are available for the time period 2002-2004<sup>4</sup>. No newer official emission figures have been published. Identification of the OM emission figures for a more recent time range requires calculations. Therefore, official 2004 CO<sub>2</sub> emissions data stemming from electricity generation are used directly, whereas 2005 - 2006 emissions are calculated.

### **STEP 3. Calculate the operating margin emission factor according to the selected method**

The Simple OM emission factor is calculated as the generation weighted average CO<sub>2</sub> emissions per unit net electricity generation of all generating power plants serving the system, excluding lc-mr sources using one of the following approaches;

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

Since power plant-specific data required by Options A and B are unavailable, Option C is selected. Option C can be used, as only renewable sources are considered as lc-mr power sources and the quantity of electricity supplied to the grid by these sources is known. According to the "Tool to calculate the emission factor for an electricity system" v.01.1;

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<sup>4</sup> UNFCCC 2006 National GHG Emission Inventory. (add download source)

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} * NCV_{i,y} * EF_{CO2,i,y}}{GEN_y} \quad (4)$$

Definitions and details to the parameters in Equation (4) are given in Table 11. As a result, the Simple OM emission factor is found as below;

**Table 3. Calculation of the OM emission factor**

Parameter	2004	2005	2006
CO <sub>2</sub> Emissions [ktCO <sub>2</sub> ]	76,185 <sup>5</sup>	74,426	82,787
GEN <sub>y</sub> [GWh]	100,923	117,864	127,208
EF <sub>grid,OMsimple,y</sub> [tCO <sub>2</sub> /MWh]	0.755	0.631	0.651
OM emission factor [tCO <sub>2</sub> /MWh]	<b>0.679</b>		

#### **STEP4. Identify the cohort of power units to be included in the build margin**

In this step, a generation-weighted average emission factor is calculated based on a sample of power plants, which have been taken into operation recently. The sample group of power plants/units *m* used to calculate the build margin consists of either:

- (a) The set of five power units that have been built most recently
- (b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

For conducting the calculations, option (b) is selected, because this option results in a larger electricity generation. In terms of vintage data, there are two options available:

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

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

Option 1 is selected.

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<sup>5</sup> Official 2004 emission figure stemming from electricity generation activities (Source: Statistical Year Book 2006, page 20). Used directly since the identified lc-mr sources (mostly hydro) do not generate CO<sub>2</sub> emissions.

The data of the most recent commissioned power plants are being published by the Turkish Electricity Transmission Company (TEİAŞ) on an annual basis. For build margin calculations, the power plants/units taken into operation between 2003 and 2006 are included in the cohort of power units. Performance revisions, modifications, retrofits and dismantlings of power plants or are stand-alone have been excluded from the samples list for the build margin calculations.

Total capacity additions between the years 2004 -2006 are not sufficiently large to constitute 20% of the system generation; therefore for the sake of conservative approach a natural gas fired power plant from 2003 capacity additions is included as well. The final sample group represents a total generation capacity addition of 35,436 GWh and exceeds 20% of the 2006 gross electricity generation, which is 176,300 GWh. Please see Annex 2, Table 17 for details.

#### STEP 5. Calculate the build margin emission factor

The build margin emission factor is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows;

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} * EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (5)$$

The  $EF_{EL,m,y}$  is found as;

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} * 3,6}{\eta_{m,y}} \quad (6)$$

Definitions and explanations regarding Equations (5) and (6) are given in Table 12.

**Table 4. CO<sub>2</sub> Emissions of Recent Capacity Additions by Fuel Type**

Fuel Type	Generation of New Capacity Additions, GWh	Average Efficiency, $\eta$	Emission Factor, tCO <sub>2</sub> /TJ	CO <sub>2</sub> Emissions, ktCO <sub>2</sub>
Coal	1,462.5	39.0%	89.5	1,208
Lignite	11,440.0	39.0%	90.9	9,599
Fuel Oil	565.3	39.5%	75.5	389
Diesel oil	4.1	39.5%	72.6	3
LPG	0.0	60.0%	61.6	0
Naphtha & Aphaltite	322.9	39.5%	69.3	204
Natural Gas	19,592.0	60%	54.3	6,383
Renewables and wastes	127.0	0%	0	0
Hydro	1,754.9	0%	0	0
Geothermal & Wind	167.4	0%	0	0
<b>Total</b>	<b>35,436</b>			<b>17,786</b>
<b>Build Margin EF</b>	<b>0.502</b>			

Power plant-specific data are unavailable in Turkey; therefore CO<sub>2</sub> emissions are calculated based on fuel type consumed in sample power plants/units. As data regarding electricity generation efficiency rates in Turkey are not available either, industry guidelines are used<sup>6</sup> in a conservative approach. When selecting the power plants, revisions and dismantled plants have been discarded, as the methodology suggests.

Using the Equation (5), the total CO<sub>2</sub> emissions (17,786 ktCO<sub>2</sub>) of the sample power plants are divided by the total electricity generated (35,436 GWh), and the build margin emission factor EF<sub>grid,BM,y</sub> is found to be **0.502 tCO<sub>2</sub>/MWh**. Further information is available in Annex 2, Table 18.

#### STEP 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated by using Equation (3);

$$EF_{grid,CM,y} = 0.679 \text{ tCO}_2/\text{MWh} * 0.75 + 0.502 \text{ tCO}_2/\text{MWh} * 0.25 = \mathbf{0.635 \text{ tCO}_2/\text{MWh}}$$

#### Emission Reduction

The emission reduction is thus found by using Equations (1) and (2);

$$ER_y = EG_y * EF_{grid,CM,y} = 112,763 \text{ MWh} * 0.635 \text{ tCO}_2/\text{MWh} = \mathbf{71,578 \text{ tCO}_2}$$

Parameter	Definition	Value
EF <sub>grid,OM,y</sub>	Operating Margin Emission Factor in year y	0.679 tCO <sub>2</sub> /MWh
EF <sub>grid,BM,y</sub>	Build Margin Emission Factor in year y	0.502 tCO <sub>2</sub> /MWh
EF <sub>grid,CM,y</sub>	Combined Margin Emission Factor in year y	0.635 tCO <sub>2</sub> /MWh
EG <sub>y</sub>	Net electricity delivered to grid by the Project	112,763 MWh/a
ER <sub>y</sub>	Emission reduction in year y	71,578 tCO <sub>2</sub> /a

The project is expected to generate 57,154 MWh in 2010. The emission reductions are therefore foreseen as below;

**Table 5. Emission reductions of the project activity over the crediting period**

Year	Annual estimation of emission reduction [tCO <sub>2</sub> ]
2010	36,279
2011	71,578
2012	71,578
2013	71,578
2014	71,578
2015	71,578
2016	71,578
2017	35,299
<b>Total emission reductions [tCO<sub>2</sub>]</b>	<b>501,047 tCO<sub>2</sub> over 21 years</b>
<b>Annual average of estimated reductions over the crediting period [tCO<sub>2</sub>]</b>	<b>71,578</b>

<sup>6</sup> This is a conservative approach, as “Best Available Techniques” may not always apply to recently built power plants. Furthermore, for power plants fuelled by multiple fuel types, the fuel type with lower emission factor has conservatively been assumed.

**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:**

The Project activity consists of the installation of a new, grid-connected, renewable energy power plant. The respective baseline scenario would be the generation of grid-connected power, which would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system” v.01.1. The project activity is a green field investment, which does not modify or retrofit any existing electricity generation facility. The emission factors are calculated with the most recent data available at the date of PDD compilation. The additionality tool consists of the following steps;

- Identification of alternatives to the project activity;
- Investment analysis to determine that the proposed project activity is either: 1) not the most economically or financially attractive, or 2) not economically or financially feasible;
- Barriers analysis; and
- Common practice analysis.

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

This step involves the definition of realistic and credible alternatives to the project activity that can be part of the baseline scenario.

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

The Project involves the generation of electricity and sales of VER credits. It will help Turkey to stimulate and commercialise the use of grid connected renewable energy technologies and markets. The two alternatives identified to the project activity are;

**Alternative A.** The proposed project activity will be undertaken without the generation and sale of VER credits.

- The Project Owner's experience and knowledge is focused on wind energy only. The Project Owner has no alternative plan, e.g. hydro or fossil-fuel fired power plants that it would realize as an alternative option. The Project owner has no such power plant under its ownership, no intention or any license or permit application regarding such alternatives. Therefore the Project activity is the only scenario that the Project owner can realize. The revenues derived from the sale of voluntary emission reductions have been included in the financial feasibility analysis and preliminary negotiations with the bank, and the investment decision relies upon carbon trading. Since the project is not feasible for project participants without the sales of VER credits due to its low IRR, the Project will not be realized and this alternative cannot be considered as the baseline scenario. These statements will be further elaborated within the framework of a barrier analysis in this section.

**Alternative B.** Continuation of the current situation: The project activity is not realized and investors do not take any actions.

- In this alternative, the same amount of electricity to be produced by the project activity will be generated by other power plants connected to grid, where the energy mix is dominated by fossil fuel fired power plants.

No realistic and credible alternative scenarios to the proposed project activity can be identified that deliver electricity with comparable quality, properties and application areas. The national grid is already increasing its installed capacity through expansion of existing power plants and constructing new power plants. As similar activities, only wind farms are identified, since organisational, technical, economical and sustainability aspects of other renewable energy technologies (e.g. hydropower, geothermal, solar etc.) are not directly comparable to wind energy. Hydropower plants are not directly comparable to wind farms, since a specific HEPP that provides the same amount of energy can have much lower or higher plant load factors<sup>7</sup> (i.e. installed capacity and capital expenditure) than the Project activity, making it difficult to compare them on an economical basis. Environmental and social aspects of HEPPs also vary widely (some having serious negative impacts while others can have mitigated low impacts), therefore it would not be correct to suggest that HEPPs provide the same product (clean energy) as the Project does. Furthermore, several HEPPs in Turkey require additional revenues from carbon credits, therefore they should not be regarded as alternatives to the Project. For these reasons, hydropower technology cannot be considered as an alternative to the Project activity. There is no specific HEPP project by any investor that is known to be planned as an alternative to the Project activity. Other technologies like PV, solar thermal, geothermal<sup>8</sup> or biomass are also not plausible alternatives, because economic incentives are not high enough in Turkey to make them economically viable and financially feasible<sup>9</sup>. In the host country, electricity generated from these resources are priced the same as hydro, wind or thermal, and these technologies have not reached maturity to compete with them on the price basis<sup>10</sup>. Only a few biogas or geothermal power plants exist in Turkey, which are carbon projects. Commercial solar plants do not exist at all, showing that these are not alternatives to the Project either.

There is no indication (i.e. power generation license, relevant permits etc.) that another specific investor is or would be planning a specific renewable energy or thermal power plant in the host country as an alternative to the Project activity (that would be built in case the Project is not built)<sup>11</sup>. Thus, continuation of the current situation, with the electricity generated by the operation of grid connected power plants and by the addition of new generation sources in the Turkish National Grid can be considered as a realistic alternative for the project activity and no other alternatives other than both above mentioned alternatives have been considered as potential baseline scenarios.

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<sup>7</sup>Source: UNEP Risoe CDM Pipeline <http://cdmpipeline.org/publications/CDMpipeline.xlsx>

<sup>8</sup>Turkey has a geothermal heating potential rather than electricity generation. As of 2005, 170 future geothermal prospects had been identified in Turkey with 95% unsuitable for power generation. Source: [http://en.wikipedia.org/wiki/Geothermal\\_power\\_in\\_Turkey](http://en.wikipedia.org/wiki/Geothermal_power_in_Turkey)

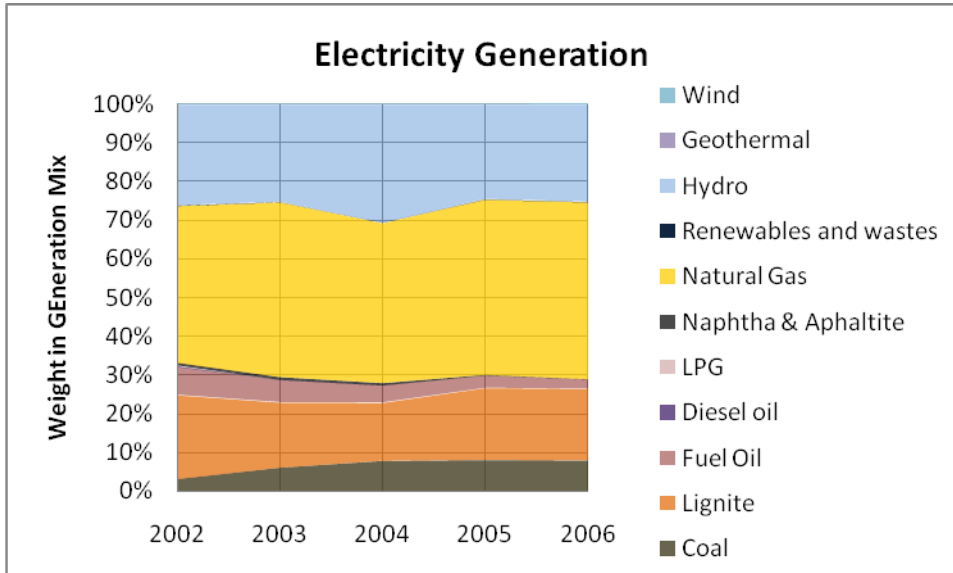
<sup>9</sup>Indicative, levelised, economic costs for renewable power exclusive of subsidies or policy incentives suggest that electricity costs of PV, solar thermal and biomass is high. Source:REN21 (2010) Renewables 2010, Global Status Report p.26 ([http://www.ren21.net/globalstatusreport/REN21\\_GSR\\_2010\\_full.pdf](http://www.ren21.net/globalstatusreport/REN21_GSR_2010_full.pdf))

<sup>10</sup>The Renewable Energy Law (Nr. 5346) sets a price cap of 5.5 EUR cents per kWh for electricity generated by renewable sources. The law does not distinguish between different renewable sources. Source: <http://www.epdk.gov.tr/mevzuat/diger/yenilenebilir/reseng.doc>

<sup>11</sup> <http://www.epdk.gov.tr/lisans/elektrik/lisansdatabase/verilentesistipi.asp>

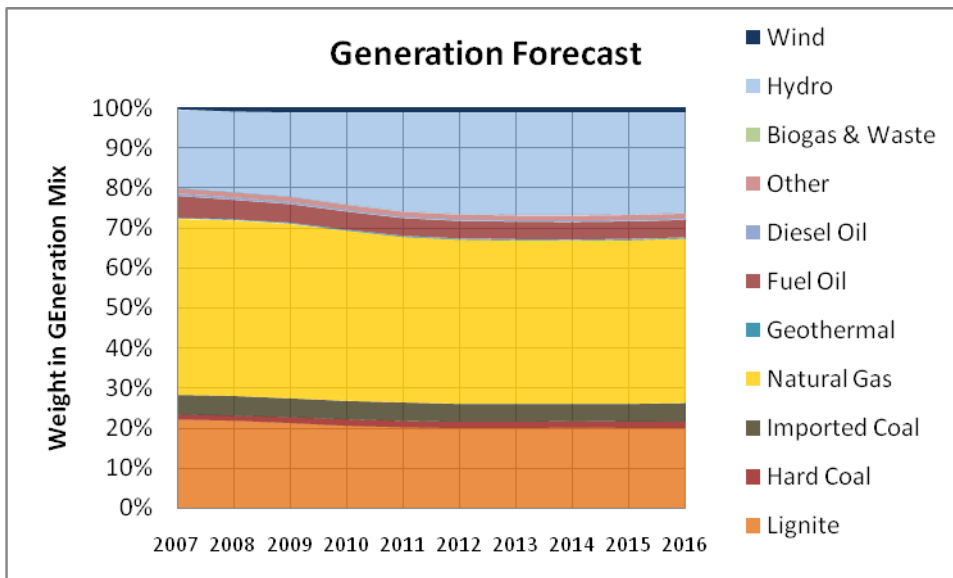
**Outcome of Step 1a:** Identified realistic and credible alternative scenario(s) to the project activity.

Alternative B is identified as the baseline scenario, since Alternative A is not applicable, which will be further elaborated in this section. According to the baseline scenario, the electricity delivered to grid will continue to be fed by a power plant portfolio, which is highly fossil fuel dominated and CO<sub>2</sub> intensive (see below).



**Figure 3. Electricity generation mix in Turkey<sup>12</sup>**

Figure 3 above shows the current practice of electricity generation in Turkey; the weight of fossil fuels in electricity generation has been around 70-75% for the last five years and is not expected to change much in the future as highlighted in Figure 4.



**Figure 4. Electricity Generation Forecasts<sup>13</sup>**

<sup>12</sup> Based on TEİAŞ data, <http://www.teias.gov.tr/istatistik2005/39.xls>, [http://www.teias.gov.tr/ist2006/36\(06\).xls](http://www.teias.gov.tr/ist2006/36(06).xls).

The official forecasts as displayed in Figure 4 suggest that in the future power generation in Turkey will be dominated by fossil fuel sources covering more than 70% of the overall electricity supply. In this framework, the continuation of the current situation (Alternative B) would mean carrying on this fossil fuel dominated trend.

The same forecasts show that wind energy is expected to cover around 1% of Turkey's electricity demand during 2007-2016. Thus, wind farm projects most likely will *not* become business as usual in the near future.

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

Both alternatives as well as the project activity are subject to the following laws;

Relevant Laws	Number / Enactment Date
Electricity Market Law	Nr. 4628 / 03.03.2001
Energy Efficiency Law	Nr. 5627 / 02.05.2007
Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy	Nr. 5346 / 18.05.2005
Environmental Law	Nr. 2827 / 11.08.1983

There are various regulations in connection with these laws as well. The Project activity is in compliance with the current laws and regulations. Turkey did not ratify the Kyoto Protocol and has no national legal binding emission reduction targets. Hence, both alternatives, A and B, are consistent with the applicable legislation.

**Outcome of Step 1b:** As mentioned above, if the project activity is not feasible and will not be realized, the project participant does not have an alternative investment plan that would generate electricity with a comparable quality and similar amount. Alternative A cannot be considered as a plausible scenario because of financial, investment, technological and prevailing practice barriers that would prevent the project activity from being implemented, which will be further elaborated below. Therefore, the only plausible baseline scenario to the Project is Alternative B: the continuation of the current situation without realization of the proposed Project Activity.

For the demonstration of additionality, a barrier analysis or an investment analysis, or both can be conducted. Barrier analysis is applied.

**STEP 2. Investment Analysis**

The Investment Analysis is not applied.

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<sup>13</sup> TEİAŞ capacity projection 2007-2016, p.30. (<http://www.teias.gov.tr/projeksiyon/projeksiyon%20Temmuz2007.pdf>)

### STEP 3. Barrier Analysis

This analysis determines whether the proposed project activity faces barriers that:

- (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

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

Investment -, technical -, prevailing practice - and other barriers are explained below for the scenario identified as Alternative A, which assumes that the project activity being implemented without consideration of revenues from VER credits;

- (a) Investment barriers
  - Lack of Infrastructure: Legally TEİAŞ is required to construct the 154 kV HV transmission line to connect the Project site to the national grid, since the Project is located in a relatively remote location. Thus, project participants are required to pre-finance the 28 km-long transmission line in advance, putting further difficulties in finding funding for the already high initial investment budget. Although associated costs are later “compensated” by TEİAŞ, the official internal price tariffs are structured such that this compensation is not based on actual up to date costs, resulting in a significant loss on behalf of the project participant.
  - As of PDD development date, no similar and comparable wind energy project has been taken into operation without VER credits in Turkey.
  - Access to finance: Although being one of the leading and credited wind energy companies in Turkey, the project participant experiences difficulties in securing finance for the Project because of the following reasons;
    - Transmission Fee: The transmission line system usage fee depends on the project location and can differ significantly. It constitutes a significant operating cost item for the Project, since this fee is the second highest<sup>14</sup> among 23 distribution regions in Turkey, reducing the feasibility of this Project in particular. Furthermore, the expected privatization process of these distribution networks contains the risk of distribution fee increases.
    - Equipment Selection: Enercon wind turbines, which are chosen for the Project, have higher prices than comparable turbines. This choice is justified by their high quality, reliability, extensive technical support, grid friendliness, low maintenance requirements and low noise. However, it amplifies the investment volume, thus posing another barrier.
    - After the recent credit crunch and the related global financial crisis, the international and the local financial sector is having a wide range of challenges. With several banks gone bankrupt or taken over by governments/competitors, the financial world has shifted its focus more to internal difficulties rather than financing projects. Nowadays, several banks have stopped new loans and even started calling their loans back before maturity. Project developers in Turkey are also facing the same difficulties, adding very significant barriers to the feasibility of the Projects. The Project proponents are not sure anymore whether financial institutions will be able to supply loans for the Projects with comparable conditions as before.

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<sup>14</sup> The project is located in distribution zone Nr. 1. (<http://www.emra.org.tr/tarife/elektrik/iletim/1407/1407.html>)

The Turkish financial market is experiencing such high difficulties that some commercial Turkish banks are even exercising their “call back” option for their loans, which means that banks take extreme measures to ensure their survival. This, on the other hand, leaves companies in very difficult positions. Turkish banks have lately been criticized by the government for acting too much on their behalf without paying attention on their customers, and these arguments have been accepted even by the Turkish Banks’ Association. In this environment, companies have very serious financial problems and new projects are having various challenges for finding finance. These developments leave no doubts about the financial additionality of the Projects under validation.

As a result of these changes, the ongoing loan discussions with the bank have been halted abruptly by the bank until February 2009. Further discussions revealed that the bank’s loan conditions are not attractive for the Project Owner and the talks have been stopped in December 2009. The Project Owner has initiated talks with another commercial bank in January 2010 and has signed the loan agreement as of February 2010. The delay in securing finance clearly demonstrates the financial barriers faced.

(b) Other Barriers

- Institutional Capacity: A significant portion of the required technology and know how must be imported. The former wind farm projects of the same Project proponents have resulted in the formation of a joint venture for wind turbine blade manufacturing, demonstrating the know how transfer caused by similar projects. As of today, this JV is selling blades to internal and external buyers. Moreover, the selected Enercon wind turbines for the Project activity are grid friendly units, allowing further expansion capacity of wind power plants in the grid, which is an additional benefit of the Project. However, TEIAS prefers to limit the wind power capacity at each transformer station without differentiating between different wind turbine specifications. Therefore, the Project had to apply for a generation license with a lower installed capacity.
- Legal and bureaucratic difficulties: Apart from the rigorous permit process, the history of the licensing process is summarized below:

Date	Action
29.12.2003	EMRA <sup>15</sup> is applied for the electricity generation license
05.01.2004	EMRA requested additional information
09.01.2004	Requested information is submitted to EMRA
13.01.2004	EMRA requested construction planning
21.01.2004	Requested documentation is submitted to EMRA
04.03.2004	EMRA requested the payment of the license fee in order to start with assessment
12.03.2004	License fee is paid and EMRA is informed
31.05.2006	EMRA requested for additional documents (after 2 years)
14.09.2006	Requested documentation is gathered and submitted
22.08.2007	EMRA forwards Alize Enerji TEİAŞ’s request to connect to Soma transformer station
24.08.2007	The request is accepted
12.09.2007	EMRA takes board decision to grant the license
15.10.2007	The currently valid license is obtained by Alize Enerji.

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<sup>15</sup> Energy Market Regulatory Authority of Turkey

- As seen from above, the license could only be obtained after nearly 4 years following the first application. Beside time issues, the costs associated with the whole process have been at significant levels. Moreover, there have been several challenges during the permit process as well, which are not included in the list. This clearly shows legal and bureaucratic barriers which have been gone through.

**Outcome of Step 3a:**

The identified barriers are sufficient grounds for demonstration of additionality since they prevent potential project proponents from carrying out the proposed project activity undertaken without being registered as a VER project activity. The barriers mentioned above prevent the realization of Alternative A (the proposed Project Activity undertaken without VER credits).

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

Identified barriers explained in Sub-step 3a would not prevent the implementation of the Alternative B, which is mainly the continuation of fossil fuel and hydro power plant construction because of the following reasons:

- Investment Barriers: Investment barriers partly affect ongoing power plant investments; however as the current practice of financial institutions also shows, fossil fuel powered power plant investments often face considerably lower investment barriers as a result of:
  - Smaller initial investment volumes compared to similar-capacity renewable energy projects: The Project's technology has a higher investment volume per MW<sup>16</sup> compared to fossil fuel fired power plants. The Project had a very hard time accessing finance and loan discussions have taken a long time. Therefore Project's alternatives (i.e. mostly fossil-fuel fire power plants) are not affected by the same financial and institutional barriers.
  - Familiarity of financiers, investors and authorities: The Project had to apply for a lower capacity (as MW) because of the insufficient institutional capacity of relevant public bodies (please refer to "institutional capacity" barrier for details). Fossil fuel fired power plants are very well known by public authorities and financial institutions as they dominate electricity generation of Turkey. Only licensing, apart from other permits, took about 4 years. Therefore the barriers do not apply to the alternatives.
- Technological Barriers: Large hydro- and fossil fuel fired thermal power plants, which constitute a large portion in the installed capacity forecasts, utilize conventional technologies, which are well known and mature. In Turkey there are technically competent equipment suppliers, technical planners, contractors, maintenance staff etc. regarding such investments. Therefore the continuation of the current situation does not involve any identifiable technological barriers.
- Prevailing Practice: This alternative already involves the current practice and is therefore not applicable.
- Other Barriers: In general, there is an oversupply of imported natural gas in Turkey because of Turkey's international take-or-pay purchase contracts. Therefore, the national energy policy supports the expansion of natural gas networks stimulating the demand. Furthermore, the Turkish energy policy is based on a strategy acting as an energy bridge between the Eastern and the Western oil and gas markets, thereby securing its own fossil fuel supply and gaining strategic position in global energy markets. This strategy

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<sup>16</sup> <http://www.epdk.gov.tr/lisans/elektrik/kaynakbazinda/kaynakbazinda.htm>

prioritizes fossil fuels at political levels, whereby renewable resources and their strategic importance are seen as secondary. In terms of licensing procedure, renewable energy investors are faced with additional permit bureaucracy (e.g. wind farm license applications are not being accepted by EMRA as of the date of GS application, HEPP applications are thoroughly reviewed by DSI (State Hydraulic Works) in terms of their technical design and feasibility, projects on overlapping areas need to pay additional fees or settle with other project applicants etc.), which thermal power plant projects are not faced with, since such conventional projects do not require to be set up on natural resources).

These reasons stated above prevent Alternative B being affected by the barriers, whereas these barriers seriously affect the Alternative A.

#### **STEP 4. Common Practice Analysis**

Common Practice Analysis checks whether the proposed project type has already diffused in the relevant sector and region.

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

As far as similar activities to the Project are concerned, wind power plants under IPP<sup>17</sup> model with comparable installed capacities can be identified.

**Table 6. Wind Power Plant Licenses**

<b>State of Wind Farm Licenses<sup>18</sup>, as of June 25<sup>th</sup>, 2008</b>	<b>Number</b>	<b>Capacity [MW]</b>
License Applications	3	39.60
Applications Under Review	44	2,479.65
Applications Approved	19	1,022.25
License Granted	81	2,951.90
Licenses Cancelled	15	596.56
Licenses Terminated	9	209.30

Out of the 81 licenses available, 15 are in operation (total capacity 333.35 MW) and 2 of them are under construction (total capacity 142.80 MW). The progress of the remaining wind farm projects is unknown, and several licenses and license applications have been cancelled due to various reasons in the past by EMRA. This illustrates that there is a low correlation between wind power project license ownership and project implementation and that implementation of wind power projects in Turkey is rather difficult.

EMRA has prohibited wind power license applications for an unknown period of time for an unknown reason. On November 1, 2007, the prohibition on wind farm license applications has been lifted by EMRA only for one day, and a big volume in applications has been observed. However, there have been several multiple overlapping applications for the same locations. As fees and technical requirements for the license applications are minimal, this intensive interest of applicants can be associated with:

- Obtaining licenses by companies aiming to sell their license to third parties
- Creation of a project portfolio for a potential future use
- Precaution against future uncertainty by applying for non- or semi-developed projects
- Prevention of competitors reserving attractive wind farm locations

<sup>17</sup> Independent Power Producer

<sup>18</sup> EMRA Website, <http://www.epdk.gov.tr/lisans/elektrik/yek/yeklisansgeneltable.xls>

In the past, a significant percentage of applications and granted licenses have either been terminated or cancelled later, therefore the available licenses have a low realization implication. This has also been described above in legal and bureaucratic difficulties. In Turkey, generation license is the equivalent of a pre-permit, which allows the project owner to apply for necessary permits and is therefore to understand only as intent to build a generation facility rather than an investment decision. Based on these arguments and recent experience, these recent license applications have not been considered to be significant.

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

As discussed above, wind farms are not common practice in Turkey, as their share in overall electricity generation is and will be under 1% according to official projections. Although wind farm projects in Turkey face various barriers besides economic ones, their realization chance can be improved by the sales of VERs, which would offset some of their difficulties by means of better feasibility figures.

As of October 6<sup>th</sup>, 2008, the list of wind parks in operation and under construction is given below;

**Table 7. Wind farms in operation<sup>19</sup>**

Location	Company	Operational Start	Installed Capacity [MW]	Business Model <sup>20</sup>
İzmir-Çeşme	Alize A.Ş.	1998	1.5	IPP*
İzmir-Çeşme	Güçbirliği A.Ş.	1998	7.2	BOT
Çanakkale-Bozcaada	Bores A.Ş.	2000	10.2	BOT
İstanbul-Hadımköy	Sunjüt A.Ş.	2003	1.2	Autoproducer
Balıkesir-Bandırma	Bares A.Ş.	I/2006	30	IPP-VER
İstanbul-Silivri	Ertürk A.Ş.	II/2006	0.85	IPP
İzmir-Çeşme	Mare A.Ş.	I/2007	39.2	IPP <sup>21</sup> -VER
Manisa-Akhisar	Deniz A.Ş.	I/2007	10.8	IPP-VER
Çanakkale-İntepe	Anemon A.Ş.	I/2007	30.6	IPP-VER
Çanakkale-Gelibolu	Doğal A.Ş.	II/2007	14.9	IPP-VER
Hatay- Samandag	Deniz A.Ş.	I/2008	30	IPP-VER
Manisa- Sayalar	Doğal A.Ş.	I/2008	30.6	IPP-VER
İzmir- Aliaga	Innores A.Ş.	I/2008	42.5	IPP-VER
İstanbul-Gaziosmanpaşa	Lodos A.Ş.	II/2008	24	IPP-VER <sup>22</sup>
İstanbul-Çatalca	Ertürk A.Ş.	II/2008	60	IPP-VER
<b>Total</b>			<b>333.35</b>	

\*former autoproducer

**Table 8. Wind farms under construction<sup>19</sup>**

Location	Company	Operational Start	Installed Capacity [MW]	Business Model <sup>20</sup>
Balıkesir-Şamlı	Baki A.Ş.	II/2008	114	IPP-VER
Muğla-Datça	Dares A.Ş.	II/2008	28.8	IPP-VER
<b>Total</b>			<b>142.80</b>	

<sup>19</sup> Source: EMRA Website, <http://www.emra.gov.tr/lisans/elektrik/yek/ruzgarprojeleriningelisimi.xls>. Date: October 6<sup>th</sup>, 2008

<sup>20</sup> Source: [www.iklim.cevreorman.gov.tr/belgeler/03.pdf](http://www.iklim.cevreorman.gov.tr/belgeler/03.pdf) (Ministry of Environment and Forestry Report, December 2008, p.39, Table 17)

<sup>21</sup> Independent Power Producer.

<sup>22</sup> Source: [www.lodoselektrik.com.tr/PDF/GS\\_Paydas\\_Kons%C3%BCltasyonu\\_2cisi.pdf](http://www.lodoselektrik.com.tr/PDF/GS_Paydas_Kons%C3%BCltasyonu_2cisi.pdf)

The first wind farms in operation have been realized under “BOT<sup>23</sup>” or “autoproducer” models. Autoproducers generate electricity primarily for their own electricity consumption, and they are allowed to feed a limited portion of their generation to the grid. The BOT model is not applicable in Turkey anymore, as the existent BOT projects have special contracts with the government and will be handed over to the government after a certain period of time. Since BOT projects are realized based upon governmental purchase guarantee containing project-specific conditions, they are not comparable to IPP projects, where liberal market conditions apply.

The so called Autoproducers are companies which invest in electricity generation technologies to cover their own demand. Therefore they are not regular electricity suppliers to the grid and cannot be considered as similar players as other electricity generation companies.

BOT projects are established for the sole purpose of generating and supplying electricity to the grid. Based on the Law Nr.3096 (04.12.1984), BOT projects were allowed to have negotiated special contracts with the government. Since BOT projects are realized by securing long-term electricity sales agreements with guaranteed pricing mechanisms, they have been able to raise funding for the project. As a result of the market liberalization with the Electricity Market Law (Nr. 4628 / 03.03.2001), the legislative framework has been altered such that the BOT model is not applicable anymore. Existing BOT projects are allowed to run in accordance with their special contracts, but new investments are subject to the current legislation. As BOT and autoproducer wind farms are not completely liberal electricity market players and are limited in terms of number and installed capacity, they are not considered as common practice or similar projects.

After the “liberalization” of the electricity market, which is still in a transformation period, investors have been allowed to build and operate their own power plants for electricity production and sales to the national grid as IPPs. As of now, two IPP wind farms (1.5 MW İzmir Çeşme and 0.85 MW İstanbul Silivri) are either operated or under construction without the consideration of VERs. The 1.5 MW İzmir Çeşme wind farm has been built under the Autoproducer scheme and cannot be considered as being realized as an IPP. The only remaining IPP wind farm is the 0.85 MW İstanbul Silivri wind farm, which can be seen as an outlier in terms of number and scale. All the other IPP model wind farms have undergone a VER procedure for facilitating additional revenues enabling the realization of projects. This shows that no other similar activity to the Project (i.e. IPP wind farm) has been realized without the consideration of carbon credits, clearly demonstrating that the Project activity is not common practice.

Since wind energy constitutes a very limited portion of the Turkish electricity market, the Project Activity goes beyond of a “business as usual” scenario and cannot be considered as a common practice. As a result, the Project is considered to be additional.

### **Gold Standard Additionality Screen**

#### *Previously announced projects screen*

##### *GS Manual for VER Project Developers: Section 3.3.1*

There has been no public announcement of the Project going ahead without the VER, prior to any payment being made for the implementation of the project.

Prior to the implementation of the Project activity, the Project Developer has concluded a decision about VER development on 23.07.2007, indicating early consideration. The Project Developer has also sent a letter to the Turkish National Focal Point stating its intention to register the project activity under GS VER in order to inform the Turkish National Focal Point about the Project.

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<sup>23</sup> Build-Operate-Transfer

*ODA Additionality Screen*

*GS Manual for VER Project Developers: Section 3.3.3*

Project financing for this Project activity will not use any public funding nor Official Development Assistance (ODA) Funds as defined in the Gold Standard Manual for Project Developers. There are no loans or grants being provided by International Finance Institutions, which include ODA.

*Conservative Approach*

*GS Manual for VER Project Developers: Section 3.3.3*

The baseline scenario selection and the calculation of green house gas emission reductions have been carried out in a conservative manner:

- Project proponents have used approved methodologies by the CDM Executive Board (ACM0002, Version 07 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” and the “Tool to calculate the emission factor for an electricity system” v.01.1) in order to determine the baseline scenario and calculate emission reductions.
- When no appropriate data is available, the assumptions are made as conservatively as possible by making choices which lead to the lowest emission reductions for the sake of conservatism.
- All calculations are based on official and publicly available data. Data sources have all been referenced in the PDD. Calculations have been done in a transparent manner providing full documentation and references to data sources to the DOE.

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

The greenhouse gases and emission sources included in or excluded from the Project boundary are:

**Table 9. Emission sources included or excluded from the Project boundary.**

Source	Gas	Included?	Justification / Explanation
Baseline CO <sub>2</sub> emissions that are displaced due to the Project Activity from electricity generation in fossil fuel fired power plants connected to national grid	CO <sub>2</sub>	Yes	Main emission source. The dominant emissions from power plants are in the form of CO <sub>2</sub> , therefore CO <sub>2</sub> emissions from fossil fuel fired power plants connected to the grid will be accounted for in baseline calculations.
	CH <sub>4</sub>	No	Minor emission sources.
	N <sub>2</sub> O	No	
Project Activity Emissions as a result of Project Activity	CO <sub>2</sub>	No	Minor emission sources. As suggested by the baseline methodology, project emissions (PE <sub>y</sub> ) are assumed to be 0 and will not be considered.
	CH <sub>4</sub>	No	
	N <sub>2</sub> O	No	

According to ACM002, the geographic and system boundaries for the relevant electricity grid must be clearly identified. According to TEIAS, the Turkish transmission system is interconnected. There is no independent regional electricity system or any significant transmission constraints. Therefore, in this Project activity the project boundaries include the project site and all power plants attached to the Turkish National Grid.

**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:**

This monitoring methodology and baseline study application was completed on 24.11.2008. Mavi Consultants is the carbon consultant for the project activity.

Contact Information of the project participants is given in Annex 1.

Consultant: MAVI Sürdürülebilir Kalkınma Proje ve Danışmanlık Hizmetleri Ltd. Şti.  
Address: Baba Efendi S. 5/2 Akaretler 34357 İstanbul / Turkey  
Telephone: +90 212 3270922  
Fax: +90 212 3270925  
E-Mail: [info@maviconsultants.com](mailto:info@maviconsultants.com)  
Web: [www.maviconsultants.com](http://www.maviconsultants.com)

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**SECTION C. Duration of the project activity / Crediting period**

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**C.1 Duration of the project activity:**

**C.1.1. Starting date of the project activity:**

The Project Activity is expected to start operation on 01/07/2010. The investment decision is met by ordering the wind turbines on 30.09.2008, which is the starting date of the Project activity.

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

The project is expected to run for 25 years, in agreement with the UNFCCC "Tool to determine the remaining lifetime of equipment" v.01 default values.

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

**C.2.1. Renewable crediting period**

The project will use a crediting period of 7 years.

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

The first crediting period starts on 01/07/2010.

**C.2.1.2. Length of the first crediting period:**

7 years.

**C.2.2. Fixed crediting period:**

**C.2.2.1. Starting date:**

N/A

**C.2.2.2. Length:**

N/A

## SECTION D. Application of a monitoring methodology and plan

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

The latest version of the CDM large-scale approved consolidated baseline and monitoring methodology ACM0002, Version 07 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (dated December 14<sup>th</sup>, 2007) is applied as the monitoring methodology for the project.

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

The ACM0002 baseline and monitoring methodology has been chosen because of the following reasons:

- The project activity consists of the installation of wind turbines, which will export electricity to the national grid system;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;
- The Project supplies electricity to the national grid and thereby displaces electricity from fossil fuel based power plants connected to the grid.

#### **D.2.1. OPTION 1: Monitoring of the emissions in the project scenario and the baseline scenario**

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

The total Project emissions are stemming from the combustion of diesel oil on site by the auxiliary diesel generator unit to cover the electricity need of the office building only. The generator unit will be operated each week for a couple of minutes for maintenance purposes, and also in case of electricity blackouts in the grid, which are rare and short. The turbines will not be fed with the auxiliary diesel generator unit. In compliance with the ACM0002, the corresponding GHG emissions are negligible. For the sake of conservativeness, this will be monitored.

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

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
ID 4	<i>Diesel Oil consumption</i>	<i>Project Owner</i>	<i>litres</i>	<i>m</i>	<i>continuously</i>	<i>all</i>	<i>Paper (invoices of diesel oil purchases)</i>	<i>The diesel oil consumption will be negligibly small. To demonstrate this, the diesel oil invoices during the monitoring period will be checked.</i>

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

N/A

**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 :**

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.)**

N/A

**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 1	<b>EG<sub>y</sub></b> Annual net electricity amount fed to the grid by the project activity	Project owner and TEİAŞ	MWh	m	Continuousl y	100%	Electronic and paper	<p>There are two metering instruments (a primary and a backup) at the main switchgear station. These devices measure the net electricity supply to the national grid by the project activity, all losses before this point are on account of the project participant. Both metering instruments, which continuously monitor and measure the net electricity delivered by the project activity, are sealed and only accessible by TEİAŞ personnel. Official TEİAŞ data from the PMUM web site will be used for calculating EG<sub>y</sub>.</p> <p>The annual emissions reductions will be updated by multiplying the ex-ante calculated baseline emission factor by the metering instrument readings. The metering device does not measure the net electricity generation but the gross generation and self consumption separately. Their difference gives the net electricity generation, which is going to be listed on a monthly basis for monitoring purposes.</p>

As required by the Gold Standard, sustainable development indicators are also monitored and verified. The project aims to create local employment opportunities in the project region in a sustainable way. The project participants prefer to prioritize personnel from the project region, which will be defined as an Gold Standard indicator to be verified each year as shown in the below table:

ID number (Please use numbers to ease cross-referencing to table D.3)	Sustainable development indicator	Data Source	Data variable	Data unit	Measured (m), calculated (c), estimated (e)	Comment
ID 2	Local Employment Number	Project Owner	N/A	N/A	Counted	Number of new jobs which the Project Activity has created in the region.
ID 3	Air Quality	Project owner and TEİAŞ	SO <sub>2</sub> and NO <sub>x</sub> emissions		Calculated	Reduction of baseline SO <sub>2</sub> and NO <sub>x</sub> emissions: The Project, by replacing electricity from fossil fuel combustion and the related fuel consumption, the baseline SO <sub>2</sub> and NO <sub>x</sub> emissions from electricity generation are: SO <sub>2</sub> emissions: Total host county emissions are 936.51 <sup>24</sup> tonnes in 2007. Net electricity generation in 2007 is 183,340 <sup>25</sup> GWh, corresponding to 5.1 kg/MWh SO <sub>2</sub> intensity. NO <sub>x</sub> emissions: Total host county emissions are 202.09 <sup>24</sup> tonnes in 2007. Net electricity generation n 2007 is 183,340 <sup>25</sup> GWh, corresponding to 1.1 kg/MWh NO <sub>x</sub> intensity. The reductions of SO <sub>2</sub> and NO <sub>x</sub> emissions will be calculated by multiplying net electricity generation of the Project activity with the SO <sub>2</sub> and NO <sub>x</sub> intensities referred above.
ID 5	Noise Emission	Local people	N/A	N/A	Estimated	The Project is not expected to create any noise above the national thresholds at the closest settlements, as discussed in the sustainable development matrix. To ensure this, random interviews with local people will be carried out during verification site visit.

#### D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.):

EG<sub>y</sub> : Annual net electricity amount fed to the grid by the project activity

GEG<sub>y</sub> : Gross Electricity Generation

<sup>24</sup> Source: National GHG inventory of Turkey, [http://unfccc.int/files/national\\_reports/annex\\_i\\_ghg\\_inventories/national\\_inventories\\_submissions/application/zip/tur\\_2009\\_crf\\_13apr.zip](http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur_2009_crf_13apr.zip), Worksheet:Table1s1

<sup>25</sup> Source: TEİAS, [http://www.teias.gov.tr/istatistik2008/30\(84-08\).xls](http://www.teias.gov.tr/istatistik2008/30(84-08).xls)

$SEC_y$  : Project activity's Self Electricity Consumption

$$EG_y = GEG_y - SEC_y$$

PMUM website publishes monthly  $GEG_y$  and  $SEC_y$  data in detail (with a breakdown into three daily time periods), however it does not show  $EG_y$  separately. Therefore, for each month  $GEG_y$  and  $SEC_y$  data need to be recorded and their difference has to be calculated on a monthly basis. The annual total net electricity generation is then found by summing up monthly  $EG_y$  values. Detailed information regarding each formulae and parameters are provided in Annex 2.

**D.2.3. Treatment of leakage in the monitoring plan**

The methodology suggest to neglect leakage for wind energy projects, therefore leakage will not be monitored.

**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**

N/A.

**D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO<sub>2</sub> equ.)**

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 CO<sub>2</sub> equ.)**

Please See Section B.2.

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

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.
ID 1	Low	Please see Annex 3.
ID 2	Low	Please see Annex 3.
ID 3	Low	The SO <sub>2</sub> and NO <sub>x</sub> emissions data are reported in the national GHG inventory report and are sufficiently reliable. Net electricity generation of the Project is also reliable, as it is measured real time by calibrated devices. Multiplying the SO <sub>2</sub> and NO <sub>x</sub> intensities with net electricity therefore provides a fairly reliable approximation for avoided SO <sub>2</sub> and NO <sub>x</sub> emissions.
ID 4	Low	Diesel oil consumption will be checked using invoices as evidence.
ID 5	Low	Noise emissions will be checked by randomly interviewing local people in the vicinity of the Project.

**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**

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

**SD Indicator Monitoring Plan:** A project manager on site is not appointed yet, therefore for the time being his or her name is not available. Project Owner is responsible for collecting data for the monitoring of the SD indicators.**Net Electricity Generation Monitoring Plan:** On behalf of the project participants, Demirer Enerji will access the PMUM web site with own ID and password and print the monthly reports for the whole verification period prior to verification process. These reports will be used to fill in the summary table, which is the final document for calculating total emission reductions, basis for GS VERs. Both the scans of monthly PMUM reports and the summary table will be prepared by the relevant personnel of the Project owner prior to verification and submitted to the verifying DOE.

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

Mavi Consultants

Phone : +90 212 327 09 22

Fax : +90 212 327 09 25

e-mail : [info@maviconsultants.com](mailto:info@maviconsultants.com)

Mavi Consultants are the consultants for this project activity and they are also listed in Annex 1 of this document.

## **SECTION E. Estimation of GHG emissions by sources**

### **E.1. Estimate of GHG emissions by sources:**

The relevant GHG emission source is CO<sub>2</sub>, which will be reduced by the Project.

### **E.2. Estimated leakage:**

No leakage is identified.

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

The total Project activity emissions are stemming from the combustion of diesel oil on site by the auxiliary diesel generator unit. This generator will be used only occasionally in case of electricity blackouts in the grid, which is rare, to cover the electricity need of the office building only. The turbines will not be fed with the auxiliary diesel generator unit. This unit will be operated each week for a couple of minutes for maintenance purposes. Grid electricity blackouts in the Project region are rare and last very short. The Project owner has experience from its other wind farms about the total diesel oil consumption, which is a couple of hundreds of litres every year. The corresponding GHG emissions are extremely limited. This emission is negligible and will be assumed as zero. This is in compliance with the ACM0002.

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

The baseline emissions are estimated as 71,578 tCO<sub>2</sub>-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. Since project emissions and leakage are taken as zero, emission reductions of the Project are simply found by monitoring net electricity generation by the Project and multiplying it with the combined margin emission factor.

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

<b>Year</b>	<b>Estimation of project activity emission reductions (tonnes CO<sub>2</sub> e)</b>	<b>Estimation of baseline emission reduction (tonnes CO<sub>2</sub> e)</b>	<b>Estimation of leakage (tonnes CO<sub>2</sub> e)</b>	<b>Estimation of emission reductions (tonnes CO<sub>2</sub> e)</b>
2010	0	36,279	0	36,279
2011	0	71,578	0	71,578
2012	0	71,578	0	71,578
2013	0	71,578	0	71,578
2014	0	71,578	0	71,578
2015	0	71,578	0	71,578
2016	0	71,578	0	71,578
2017	0	35,299	0	35,299
<b>Total</b>	<b>0</b>	<b>501,047</b>	<b>0</b>	<b>501,047</b>

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**SECTION F. Environmental impacts**

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

As one of the cleanest and most sustainable renewable energy generation technologies, wind energy projects generally pose no significant environmental impacts. No Environmental Impact Assessment (EIA) has been performed for the following reasons:

- For wind farms in Turkey, an Environmental Impact Assessment report is officially not required. The copy of the document showing that EIA is legally not needed for the Project Activity is given in Annex 4.
- Environmental impacts of the project activity are not considered to be significant by the project participant, local stakeholders or the host country. No relevant comment suggesting potential negative environmental or social impacts has been expressed in the initial stakeholder consultation either.

Therefore, no EIA is necessary and no relevant negative environmental or social impact is considered.

*EIA requirements*

GS Manual for CDM Project Developers: **Section 3.4.2** - EIA Gold Standard Requirements according to section 3.4.2 in the Gold Standard Manual apply to the project activity as follows:

1. Host country EIA requirements

It is not mandatory in Turkey to conduct an EIA for this type of project activity. The project site is in a remote location and a transmission line (TL) construction will be necessary. TEIAS is responsible for the construction and operation of the transmission lines in Turkey. Although the wind farm itself is not subject to EIA, in Turkey transmission lines equal or above 154 kV are subject to a TL EIA report. In theory, it is TEIAS's responsibility to prepare the EIA reports, however in practice the project participants have to finance this report. Authorized EIA consulting companies prepare and submit this TL EIA reports in the name of TEIAS. If any critical issue regarding TL environmental impacts is seen by the Ministry, then a revision is requested. After the TL EIA report is authorized, the TL can be built. The rights of the TL EIA belong to TEIAS and project participants have only the role to provide the finance for it. This project involves a TL voltage of 34.5 kV and is not subject to the above stated TL EIA requirements.

2. Gold Standard Initial Stakeholder Consultation

The Gold Standard Initial Stakeholder Consultation was held in Kırkağaç Belediye Salonu, Manisa, Turkey on May 22<sup>nd</sup>, 2008. The results of the Gold Standard Initial Stakeholders Consultation did not show any significant environmental and/or social impact (see Initial Stakeholder Consultation report below).

3. None of the indicators in the Sustainable Development Assessment Matrix scores -1.

By reducing fossil fuel consumption indirectly, the Project Activity will help in decreasing pollutants, which are being generated by thermal power plants, resulting in improved air quality.

**Summary:** The Project is exempt from a national Environmental Impact Assessment report or approval. For this reason, a project description study is prepared evaluating the potential environmental impacts of the Project. The Project has complied with all relevant environmental regulations that apply in the host country. This study does not highlight any problems. The study does not report any bat population in the area, therefore an impact on bat populations is not expected. The species which are listed in the study that are living in the area are *not* vulnerable or *not* under threat according to IUCN<sup>26</sup>. The Project is not located on or close to any bird migration route; therefore the

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<sup>26</sup> International Union for Conservation of Nature

Project is not expected to affect migrating bird populations. The Project results in limited number of tree logging, which is mitigated by paying a significant amount of afforestation fee to be used for planting new trees by public institutions. Local people do *not* express any environmental concern which should be taken into account. Shadow flickering is deemed irrelevant as it is more of an issue in regions such as northern Europe, where the sun shines at an oblique angle for more hours of the day and more days of the year, which is not the case for Turkey. Noise emissions will be under national thresholds of 50 dBA<sup>27</sup>, which will be monitored by public authorities. The chosen Enercon wind turbines use a special gearless drive technology, which reduces noise and waste oil. The Project does *not* lie on a sensitive area, where surface or underground water would be endangered. Local people and animals will be able to access Project site without limitation, except the vicinity of the turbines for safety reasons, thus enabling them to carry on their former life styles as it is. Therefore, no significant negative impact is foreseen in terms of water quality and quantity, biodiversity, soil condition, air quality or other pollutants.

**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:**

N/A

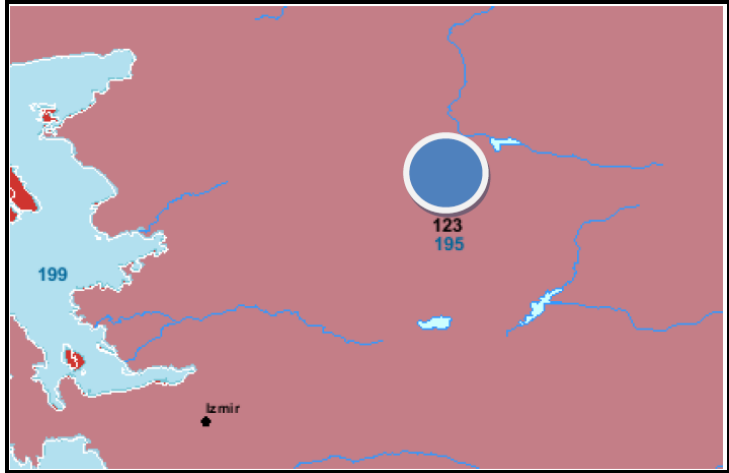
### Sustainable Development Matrix

Component Indicators	Score (-2 to +2)	Explanation
<b>Local / Regional / Global Environment</b>		
<ul style="list-style-type: none"> <li>Water quality and quantity</li> </ul>	0	<p>There is no running surface water at the Project site and the foundations of the turbines are highly unlikely to disturb any ground water, as the Project area is not an aquifer*.</p> <p>The waste water on site will be generated by the personnel, and not from processes. This domestic waste water will be stored in closed underground tanks and disposed of properly.</p> <p>Compared to the baseline, risks of groundwater contamination due to the acid rains as well as process wastewater leakages into the groundwater will slightly be reduced. The amount of discharging of cooling water into the surface waters, as well as water consumption of cooling towers in the baseline will also be decreased. "In Turkey, 2.72 billion m<sup>3</sup> of water was used by thermal power plants in 2006. The amount of wastewater discharged in 2006 was 2.66 billion m<sup>3</sup>**.</p> <p>Source*: EIA project description report, p.68</p> <p>Source**: Turkish Statistical Institute (<a href="http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=1927">www.turkstat.gov.tr/PreHaberBultenleri.do?id=1927</a>)</p>

<sup>27</sup> National upper noise limit for housing areas in the night.

<ul style="list-style-type: none"> <li>Air quality (emissions other than GHG)*</li> </ul>	<p>+1</p>	<p>Dust emissions created during construction phase (land excavation and transport) will be minimized by paying utmost care not to scatter excavated material, by operating lorries at low speeds and by keeping roads wet. No dust emissions are expected during operation.</p> <p>Air quality will be improved compared to the emission levels of fly ash, odour, SO<sub>x</sub> and NO<sub>x</sub> related to the thermal energy generation, since energy generation constitutes the largest GHG emission source in Turkey*.</p> <p>Marmara and Aegean Regions are responsible for half of the CO<sub>2</sub> emission of Turkey**. The Project is located in the Aegean region; therefore the Project is expected to have a positive impact on air quality in the area.</p> <p>Source*: Turkish Statistical Institute (<a href="http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=4078">http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=4078</a>)</p> <p>Source**: "Estimation of CO<sub>2</sub> Concentration Over Turkey by Using Dispersion Model", p.3 (<a href="http://www.ukidek.org/bildiriler/Cozumler_2.doc">www.ukidek.org/bildiriler/Cozumler_2.doc</a>)</p>
<ul style="list-style-type: none"> <li>Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases)*</li> </ul>	<p>0</p>	<p>Wind farms do not generate radioactive pollution. In terms of electromagnetic interference, the Project is only allowed by public authorities if it is deemed that the Project will not cause interference to television, radio, aviation communications or navigation aids or other networks. In this respect, no adverse impact is expected.</p> <p>Apart from water, soil and air pollutants mentioned in this matrix, disposal of metal compounds as Co, Cd, Zn, Pb and Cu in the flue gas and in the waste ash will slightly be diminished.</p> <p>Noise will be generated during operation, but owing to the distance from local residential areas the level of noise will be below national thresholds. Noise level of the Project will be measured at the initial acceptance process and also in cases where a complaint is received. In breach of these thresholds, the Project will be banned from operation by public authorities. Measurement of noise will be carried out by public authorities, ensuring quality control and assurance. In settlement areas, the maximum allowed noise level from industrial activities is 60 dBA for day and 50 dBA for night*. The noise emission will be monitored, as this is a concern of local stakeholders.</p> <p>Shadow Flickering: When the sun passes behind the rotor of a wind turbine and casts a shadow, the shadow can appear to flick on and off within buildings where the shadow appears through a narrow window under certain combinations (e.g. no cloud, clear weather, window of the house directed to the wind turbine, no trees or other buildings between the receptor and the blades, close distance, the receptor being on the same line with the blades and the sun, windy weather, etc.). Dwellings within 130 degrees either side of north relative to and within 10 rotor diameters of the wind turbine can experience shadow flickering**.</p>

		<p>Shadow flickering is more of an issue for regions such as northern Europe, where the sun shines at an oblique angle for more hours of the day and more days of the year; this is not the case for Turkey.</p> <p>Source*: Regulation on Assessment and Management of Environmental Noise (Official Gazette Date: 07.03.2008, 2002/49/EC), Annex VIII, Table 4.</p> <p>Source**: "Onshore Wind Energy Planning Conditions Guidance Note", British Department for Business, Innovation and Skills (Link: <a href="http://www.berr.gov.uk/files/file35240.pdf">http://www.berr.gov.uk/files/file35240.pdf</a>)</p>
<ul style="list-style-type: none"> <li>• Soil condition (quality and quantity)</li> </ul>	0	<p>Solid Waste: "The amount of waste generated by thermal power plants in Turkey was 16.01 million tonnes in 2006. On average, out of the waste generated during the 2003-2006 period, 10% was recovered outside the plants and 90% was disposed. 79% of the disposed waste was dumped onto ash disposal area/ash dam, on average. The major component of the waste generated by thermal power plants was observed to be mineral wastes (ash, slug, fly ash, and gypsum)".</p> <p>The solid waste on site will be generated by the personnel, and not from processes. This domestic solid waste will be stored in closed containers on site and disposed of properly. Compared to the baseline, which causes high amounts of solid waste during mining, fuel processing and combustion processes for thermal power plants, the Project positively contributes to soil quality.</p> <p>The Project is not expected to have a significant impact on soil erosion. In order to minimize erosion, the minimum length of roads will be built that will follow natural terrain contours. As compared to baseline, the Project will have a slightly positive impact on soil erosion by decreasing fossil fuel mining and extraction activities.</p> <p>Regarding the waste oil used as lubricant in the turbines, national legal disposal requirements will be applied. Licensed private companies will collect the waste oil on site and dispose it properly. The selected Enercon turbines have minimal moving components and can operate for years without oil change. The turbines are also equipped with oil absorption systems which prevent any leaks, thereby minimizing the risk of spillage and soil contamination. It is expected that Enercon E-82 type turbines will require ca. 10 liters grease each year and ca. 100 liters gearbox oil every 4 years**. Considering that there will be 14 turbine units which are even smaller than E-82, the average oil consumption will be around 500 liters per year, which is a low value.</p> <p>Regarding land area use, wind turbine basements cover a relatively small area as compared to other power plants having similar electrical production capacity.</p> <p>Source*: Turkish Statistical Institute</p>

		<p><a href="http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=1927">www.turkstat.gov.tr/PreHaberBultenleri.do?id=1927</a></p> <p>Source**: Enercon Servis Ltd. (maintenance company of the Project)</p>
<ul style="list-style-type: none"> <li>Biodiversity (species and habitat conservation)</li> </ul>	<p>0</p>	<p>In terms of WWF “Global 200: Priority Areas”*, the Project region falls into two general “Critical/Endangered” habitats: (195) Anatolian Freshwater and (123) Mediterranean Forests, Woodlands and Scrub.;</p>  <p>Threats in these regions are listed as: “Habitat loss, excessive water diversions, pollution from industry, agriculture, and domestic sources, overfishing, draining of wetlands for malarial control, dams, and introduced species (particularly Zander - <i>Stizostedion lucioperca</i>) are the principle threats to this ecoregion.” (195); and “Most natural communities have been degraded or permanently altered throughout the Mediterranean basin. The ecoregion is threatened by continuing conversion to agriculture, pasture, and urban areas. Frequent fires, logging of remaining native woodlands, exotic species, and intensive grazing are also threats.” (123).</p> <p>According to the National Geographic “Terrestrial Ecoregions of the World**” classification, the Project region is located on (PA1201) “Aegean and Western Turkey sclerophyllous and mixed forests”, where “Agriculture threatens most habitats of this ecoregion. The use of agricultural chemicals pollutes waters, lands, and other resources. Recreation, tourism, and road building increase hunting and fragmentation of forest habitats. Lowland forests are threatened by fire.”</p> <p>Taking the current practice in the region and the foreseen impacts of the Project into account, the Project can be expected to have neutral or slightly positive contribution against these threats in these critical ecoregions.</p> <p>In general, “Bat species appear to be at risk during key movement periods. Almost nothing is known about current populations of these species and the impact on bat numbers as a result of mortality at windpower locations.***”</p> <p>The Project is expected to result in the removal of a certain amount of trees. The Project area is not densely populated with large trees and road</p>

		<p>construction will be planned such that the harm to trees is minimized. These trees will be logged by public authorities for the Project. The Project proponents have paid a considerable amount of reforestation fee to the relevant public authority. These fees will be used to plant new trees by public authorities, which will mitigate the impact of the Project regarding tree logging.</p> <p>The Project is <i>not</i> located on bird migration routes and it will not have any adverse impact on bird migration****. For local avian in the Manisa region, 38 species in the Project area are listed. According to the IUCN Red List (<a href="http://www.iucnredlist.org">www.iucnredlist.org</a>), 36 of them are categorized as Least Concern. According to IUCN<sup>28</sup>, 2 of the listed species listed in the EIA report can be highlighted:</p> <ul style="list-style-type: none"> <li>• Neophron percnopterus (Egyption Vulture): Endangered</li> <li>• Emberiza cineracea (Cinereous Bunting): Near threatened</li> </ul> <p>Both species are listed in the EIA report as category B (“A” being the least and “F” the most critical), indicating the “need of evaluation whether this species should be protected”. Therefore, the Project is not expected to have significant impact on local birds either.</p> <p>Compared to the baseline, the Project will also have a slight positive impact by reducing the temperature increase of cooling water resources of thermal power plants, thereby protecting marine habitats.</p> <p>Source*: WWF (<a href="http://www.panda.org">www.panda.org</a>), National Geographic (<a href="http://www.nationalgeographic.com/wildworld/global.html">www.nationalgeographic.com/wildworld/global.html</a>)</p> <p>Source**: National Geographic (<a href="http://www.nationalgeographic.com/wildworld/terrestrial.html">www.nationalgeographic.com/wildworld/terrestrial.html</a>, <a href="http://www.nationalgeographic.com/wildworld/profiles/terrestrial/pa/pa1202.html">www.nationalgeographic.com/wildworld/profiles/terrestrial/pa/pa1202.html</a>)</p> <p>Source***: Wikipedia (<a href="http://en.wikipedia.org/wiki/Environmental_effects_of_wind_power">http://en.wikipedia.org/wiki/Environmental_effects_of_wind_power</a>)</p> <p>Source****: The EIA Project description report (p56)</p>
<i>Sub Total</i>	<b>+1</b>	
<b>Social Sustainability and Development</b>		
<ul style="list-style-type: none"> <li>• Employment (including job quality, fulfilment of labour standards)</li> </ul>	<b>+1</b>	<p>Local economy dominantly relies on agricultural activities and most families in the region are either unemployed or work at their own farmland. There is no or minimal industrial activity in the vicinity, therefore the Project will improve the overall job quality in the region.</p> <p>Health and Safety trainings will be given to employees to ensure safe</p>

<sup>28</sup> <http://www.iucnredlist.org/apps/redlist/details/144347/0>; <http://www.iucnredlist.org/apps/redlist/details/149648/0>

		<p>operation of the Project. The employment of the skilled staff will have an impact on job quality and promote education in the rural context of the Project. The jobs do not include tasks related to hazardous materials or dangerous works.</p> <p>The Project will employ people, local if possible and will fulfil relevant safety and labour standards, ensuring social security, health and safety of the Project staff.</p>
<ul style="list-style-type: none"> <li>Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)</li> </ul>	0	<p>The Project will have a positive impact on the livelihood of local people by contributing to the local economy. This will be achieved with the income of local employees that will be spending locally.</p> <p>As a result of heavy trucks, some parts of the existing roads might be harmed during construction. During operation, no impact on roads is foreseen. The Project proponents will not only build new roads at the Project site, they will also improve the roads before and after the construction to allow shipping of equipment to the site and to repair any damage due to equipment transport. This will also improve local infrastructure and increase land values which did not have roads before, positively contributing to the livelihood of local population.</p> <p>The Project will not be located on agricultural land, therefore will have no impact on agricultural production. The Project might initiate entrepreneurial opportunities associated with the wind farm (e.g. tourism attractions, market etc.)</p> <p>Apart from this, the Project proponents also plan some Corporate Social Responsibility activities in the Project region.</p>
<ul style="list-style-type: none"> <li>Access to energy services</li> </ul>	0	<p>The generated electricity can legally and technically not be supplied to the nearby communities. These communities are already connected to the national grid, therefore no significant change is expected as compared to the baseline.</p>
<ul style="list-style-type: none"> <li>Human and institutional capacity (including empowerment, education, involvement, gender)</li> </ul>	0	<p>Employing high voltage switchgear operators is required by relevant legislation. Such operators obtain an “operator license” from TEIAS or TEDAS, after completing a special training course. This also ensures that these employees are trained properly.</p> <p>During hiring, the Project proponents do not discriminate potential employees based on sex, race, ethnicity or any other similar personal information, and will promote the employment of women for the Project if there are any potential appropriate applicants available.</p>
<i>Sub Total</i>	<b>+1</b>	
<b>Economic and Technological</b>		

Development		
<ul style="list-style-type: none"> <li>• Employment (numbers)*</li> </ul>	+1	<p>Several temporary jobs will be generated directly and indirectly (by subcontractors) during the construction of the project activity.</p> <p>1 wind farm engineer, 1 service technician, 4 security personnel and 4 high voltage switchgear operators are expected to be employed for the Project for operation and maintenance of the wind power plant. Local people will be preferred as much as possible for these positions.</p> <p>Source: Project proponents</p>
<ul style="list-style-type: none"> <li>• Balance of payments (sustainability)</li> </ul>	0	<p>Electricity generation from renewable energy sources substitutes the electricity generated from fossil fuels and thus decreases fossil fuel consumption overall, thereby having a slightly positive effect on balance of payments in the medium/long term.</p>
<ul style="list-style-type: none"> <li>• Technological self reliance (including project replicability, hard currency liability, institutional capacity, technology transfer)</li> </ul>	0	<p>Improvement of technical adequacy of companies working in the wind energy sector and creation of high quality technical labour force. The blades and towers of the wind turbines for the Project will be produced in Turkey.</p> <p>Justification: First wind farms imported most of the wind turbine components (generator, blades, tower etc.) from international suppliers. Starting with the first wind investments in Turkey, new domestic investments in this field have been initiated (e.g. blade factory, wind farm service companies, wind turbine tower production facility etc.). These indirect outcomes also improve the technological self reliance of local industries and companies.</p>
<i>Sub Total</i>	<b>+1</b>	
<i>Total</i>	<b>+3</b>	

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**SECTION G. Stakeholders' comments**

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**G.1. Brief description how comments by local stakeholders have been invited and compiled:*****Initial Stakeholder Consultation***

The initial stakeholder consultation was held in Kırkağaç Belediye Salonu, Manisa, Turkey on May 22<sup>nd</sup>, 2008. The meeting was attended by representatives from the local authorities and local residents of the project activity. In addition to the local meeting, Gold Standard supporting NGOs in Turkey have been invited by email to send their comments on the project activity.

***Main Stakeholder Consultation***

The Gold Standard Main Stakeholder Consultation is based on a set of additional criteria in addition to UNFCCC requirements. Full documentation of the project activity is made publicly available for 60 days prior to conclusion of validation at [www.maviconsultants.com](http://www.maviconsultants.com), including:

- The original and complete PDD
- A non-technical summary of the project design document (in appropriate local language)
- Relevant supporting information

During the consultation period, stakeholders are invited to submit their comments and questions related to the project activity. The report on the Main Stakeholder Consultation process is sent to the DOE for validation.

**G.2. Summary of the comments received:**

The overall response to the project, from all invited stakeholders, was encouraging and positive. It is evident from the stakeholder consultation process, that the project is perceived as a good example for the energy generation in Turkey and that it contributes to sustainable development of the country. No major environmental concerns were raised during the entire initial stakeholder consultation process. No adverse reaction, comments or clarifications related to socio-economic aspects have been received during the Initial Stakeholder Consultation process.

No comments have been declared by any stakeholder during the Main Stakeholder Consultation period.

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

The comments did not require any change in the Project design.

Annex 1

**CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

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Annex 2

**BASELINE INFORMATION**

**Table 10. Definitions and Explanations regarding Equations (1), (2), (3)**

Parameter	Definition	Explanation
ER <sub>y</sub>	Emission reductions in year y (tCO <sub>2</sub> /yr)	Calculated using Equation (1)
BE <sub>y</sub>	Baseline emissions in year y (tCO <sub>2</sub> /yr)	Calculated using Equation (2)
PE <sub>y</sub>	Project emissions in year y (tCO <sub>2</sub> /yr)  Project emissions involve direct emissions (such as fossil fuel consumption of construction equipment or vehicles for on-going operations and maintenance).	0 tCO <sub>2</sub> /yr  This is suggested by the baseline methodology, and the quantity of fossil fuels used for the Project Activity is negligibly small.
LE <sub>y</sub>	Leakage emissions in year y (tCO <sub>2</sub> /yr)  Leakage is emissions arising due to activities such as power plant construction, fuel handling and land inundation.	0 tCO <sub>2</sub> /yr  The baseline methodology suggests not considering these emission sources as leakage.
EG <sub>y</sub>	Electricity supplied by the project activity to the grid (MWh)	Net electricity generation estimation of Project developer is supplied in the PDD. The monitoring methodology involves actualization of this figure annually.
EG <sub>baseline</sub>	Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh)	0 MWh  No modification or retrofitting.
EF <sub>grid,CM,y</sub>	Combined Margin CO <sub>2</sub> emission factor (tCO <sub>2</sub> /MWh) for grid connected power generation in year y	Calculated using Equation (3)
EF <sub>grid,OM,y</sub>	Operation Margin CO <sub>2</sub> emission factor (tCO <sub>2</sub> /MWh) for grid connected power generation in year y	Calculated based on the "Tool to calculate the emission factor for an electricity system" v.01.1 (EB 35)
EF <sub>grid,BM,y</sub>	Build Margin CO <sub>2</sub> emission factor (tCO <sub>2</sub> /MWh) for grid connected power generation in year y	Calculated based on the "Tool to calculate the emission factor for an electricity system" v.01.1 (EB 35)
W <sub>OM</sub>	Weighting of operation margin emissions factor (%)	75% (default value), as "Tool to calculate the emission factor for an electricity system" v.01.1 suggests
W <sub>BM</sub>	Weighting of build margin emissions factor (%)	25% (default value), as "Tool to calculate the emission factor for an electricity system" v.01.1 suggests

**Table 11. Definitions and Explanations regarding Equation (4)**

Parameter	Definition	Explanation
$EF_{grid,OMsimple,y}$	Simple operating margin CO <sub>2</sub> emission factor in year y (tCO <sub>2</sub> /MWh)	Calculated using Equation (4) Data in Table 16
$FC_{i,y}$	Amount of fossil fuel type <i>i</i> consumed in the project electricity system in year y (ton or 000m <sup>3</sup> )	
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type <i>i</i> in year y (TJ/kt or TJ/mil m <sup>3</sup> )	Data in Table 14
$EF_{CO2,i,y}$	CO <sub>2</sub> emission factor of fossil fuel type <i>i</i> in year y (tCO <sub>2</sub> /TJ)	Data in Table 14
$GEN_y$	Net electricity generated and delivered to the grid by all power sources serving the system, not including lc-mr power plants/units, in year y (GWh)	Data in Table 13
<i>i</i>	All fossil fuel types combusted in power sources in the project electricity system in year y	

**Table 12. Definitions and Explanations regarding Equations (5) and (6)**

Parameter	Definition	Explanation
$EF_{grid,BM,y}$	Build margin CO <sub>2</sub> emission factor in year y [tCO <sub>2</sub> /MWh]	Calculated using Equation (5) Data in Table 4
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit <i>m</i> in year y [MWh]	Data in Table 17
$EF_{EL,m,y}$	CO <sub>2</sub> emission factor of power unit <i>m</i> in year y [tCO <sub>2</sub> /MWh]	
$EF_{CO2,m,i,y}$	CO <sub>2</sub> emission factor of fuel type <i>i</i> used in power unit <i>m</i> in year y (tCO <sub>2</sub> /TJ)	Data in Table 14
$\eta_{m,y}$	Average net energy conversion efficiency of power unit <i>m</i> in year y (%)	Data in Table 4
<i>m</i>	Power units included in the build margin	
<i>y</i>	Most recent historical year for which power generation data is available	

**Table 13. Electricity Supply to Grid**

	2002	2003	2004	2005	2006
<b>Net Generation, GWh</b>	123,727	135,248	145,066	155,469	169,543
<b>Net Delivery Ratio</b>	95.6%	96.2%	96.3%	96.0%	96.2%
<b>Imports, GWh</b>	3,588	1,158.0	463.5	635.9	573.2
<b>Net Delivered to Grid, exc. lc-mr</b>	94,796	102,161	100,923	117,864	127,208

**Table 14. NCVs and Emission Factors of Fuels**

<b>NCV [TJ/kt or TJ/mil m<sup>3</sup>]</b>	2002	2003	2004	2005	2006	<b>Emission Factors [tCO<sub>2</sub>/TJ]</b>
Hard Coal	15.1	14.4	15.1	13.6	14.9	92.8
Imported Coal	25.1	25.7	25.5	24.7	24.7	89.5
Lignite	7.5	7.5	7.6	5.9	6.9	90.9
Fuel Oil	40.1	40.1	39.9	40.2	40.2	75.5
Diesel Oil	42.8	43.3	42.4	42.8	42.7	72.6
Lpg	46.1	44.1	45.9	46.0	0.0	61.6
Naphta	44.9	40.0	44.0	44.3	43.9	69.3
Natural Gas	36.5	37.2	36.9	37.3	37.0	54.3

**Table 15. CO<sub>2</sub> Emissions Breakdown by Fuel Type**

<b>CO<sub>2</sub> Emissions, ktCO<sub>2</sub></b>	2002	2003	2004	2005	2006
Hard Coal	2,161	2,057	1,860	2,155	2,162
Imported Coal	1,145	4,986	7,388	7,858	8,963
Lignite	28,875	24,191	23,207	26,057	31,921
Fuel Oil	9,635	8,669	7,242	6,085	5,297
Diesel Oil	306	44	90	88	190
Lpg	27	2	36	37	0
Naphta	682	733	637	260	41
Natural Gas	22,882	25,455	26,687	31,886	34,212
<b>Total Calculated</b>	65,713	66,138	67,145	<b>74,426</b>	<b>82,787</b>
<b>UNFCCC Data</b>	74,056	74,196	<b>76,185</b>		

**Table 16. Operation Margin EF Calculations**

<b>Operating Margin EF</b>	2004	2005	2006
CO <sub>2</sub> Emissions, ktCO <sub>2</sub>	76,185	74,426	82,787
Net electricity supplied to grid, GWh	100,923	117,864	127,208
OM Emission Factor, [ktCO <sub>2</sub> /GWh]	0.755	0.631	0.651
<b>EF<sub>OM</sub> average 2004-2006, ktCO<sub>2</sub>/GWh</b>	<b>0.679</b>		

**Table 17. Recent Capacity Additions 2003-2006**

<u>Year</u>	<u>Plant</u>	<u>Installed capacity (MW)</u>	<u>Average Generation (GWh)</u>	<u>Fuel Type</u>	<u>Commissionary date</u>
2003	ENERJİ-SA(Mersin) GR GT	41.65	312	N.GAS+NAPHTA	05/10/2003
2004	TÜPRAŞ BATMAN GR V	1.5	4.1	D.OIL	2003
2004	ECZACIBAŞI BAXTER HAS.ÜRÜN.	1.0	5.8	N.GAS	13/01/2001
2004	ÇIRAĞAN SARAYI İŞL.	1.4	11.0	N.GAS	01/11/2002
2004	ANKARA D.G.(BAYMİNA) GR-I-II-III	798.0	6,500.0	N.GAS	08/01/2004
2004	ENTEK GR-IV	31.1	255.7	N.GAS+NAPHTA	12/02/2004
2004	ATATEKS 2 GM	5.6	45.0	N.GAS	20/02/2004
2004	TANRIVERDİ 4 GM	4.7	38.7	N.GAS	24/03/2004
2004	<del>VAN SANT (Dismantled)</del>	<del>(-26)</del>	<del>(-195.0)</del>	<del>FUEL OIL</del>	<del>06/04/2004</del>
2004	ÇOLAKOĞLU(KAPASİTE ARTIRIMI)	45	337.5	IMPORTED COAL	05/05/2004
2004	TEKBOY TEXTILE 1 GM	2.2	16.0	N.GAS	18/05/2004
2004	GÜL ENERJİ GR-II	12.5	96.5	FUEL-OIL	03/06/2004
2004	KOMBASSAN KAĞIT GIDA VE TEKS	5.5	38.1	N.GAS	09/06/2004
2004	AYEN OSTİM ENERJİ ÜRETİM	31.1	264.1	N.GAS	11/06/2004
2004	BİS ENERJİ 2 GT	73.0	602.7	N.GAS	16/06/2004
2004	ENERJİ-SA ADANA 1 BT	49.8	322.9	NAPHTA	23/06/2004
2004	ŞAHİNLER ENERJİ 1 GM	3.2	22.2	N.GAS	29/06/2004
2004	BESLER GR-2, BT (5,2+7,5)	12.7	97.7	N.GAS	07/07/2004
2004	<del>KAREGE (Revision)</del>	<del>(-7.7)</del>	<del>(-57.9)</del>	<del>N.GAS</del>	<del>08/07/2004</del>
2004	ÇELİK ENERJİ ÜR.ŞTİ. 2 GM	2.4	18.6	N.GAS	09/07/2004
2004	<del>ÇINKUR (Dismantled)</del>	<del>(-30.0)</del>	<del>(-150)</del>	<del>FUEL OIL</del>	<del>20/07/2004</del>
2004	<del>OTOPRODUKTÖR (Revision)</del>	<del>6.4</del>	<del>43.2</del>		<del>20/07/2004</del>
2004	KOMBASSAN KAĞ. MATBAA GIDA	5.5	35.7	N.GAS	24/09/2004
2004	AYEN OSTİM ENERJİ ÜRETİM(BT)	9.9	84.0	N.GAS	01/10/2004
2004	HABAŞ ALIĞA GRUP I-II	89.2	713.9	N.GAS	08/10/2004
2004	STANDART PROFİL 3 GM	6.7	49.2	N.GAS	22/10/2004
2004	KARKEY-II 3+3 DGM	54.3	369.7	FUEL-OIL	12/11/2004
2004	<del>HAKKARI-1</del>	<del>(-15.3)</del>	<del>(-114.8)</del>	<del>MOBILE</del>	<del>30/11/2004</del>
2004	<del>EÜAŞ Revision (ADALAR)</del>	<del>(-8.2)</del>	<del>0</del>	<del>D.OIL</del>	<del>09/12/2004</del>
2004	ALTINMARKA GIDA GR I-II-III	3.6	28.8	N.GAS	17/12/2004
2004	ERE(BİR KAPILI HES) GRUP-I	48.5	170.6	RUN OF RIVER	11/03/2004
2004	ELTA ELK(DODURGA) GR-I-II-III-IV	4.1	12.3	RUN OF RIVER	26/04/2004
2004	İSKUR TEKSTİL(SÜLEYMANLI) GR I- II	4.6	17.86	RUN OF RIVER	28/04/2004
2004	BEREKET EN.(Feslek Hes) Gr-1-2	9.5	41	RUN OF RIVER	05/08/2004
2005	ÇAN GR I	160.0	1,040.0	LIGNITE	15/02/2005
2005	ÇAN GR II	160.0	1,040.0	LIGNITE	15/03/2005
2005	ELBİSTAN-B GR I	360.0	2,340.0	LIGNITE	15/02/2005
2005	<del>AKBAŞLAR GR II (Isolated)</del>	<del>8.8</del>	<del>73</del>	<del>N.GAS</del>	<del>24.06.2005</del>
2005	AKÇA ENERJİ GR-III	8.7	65.4	N.GAS+NAPHTHA	14/12/2005
2005	AYKA TEKSTİL GR-I	5.5	40.0	N.GAS	24/09/2005
2005	BAYDEMİRLER GR IV-V-VI	6.2	51.4	N.GAS	04/02/2005

2005	BOSEN GR-III	50.0	350.0	N.GAS	30/12/2005
2005	BOSEN (Revision)	(-6.5)	(-45.5)	N.GAS	30/12/2005
2005	ÇUMRA ŞEKER	16.0	40.0	N.GAS+LIGNITE	01/01/2005
2005	ETİ MAD.(BAN.ASİT) Dismantled	(-3.8)	(-28.5)	RENEW.+WASTES	15/07/2005
2005	ETİ MAD.(BAN.ASİT)GR-I	11.5	85.0	RENEW.+WASTES	15/07/2005
2005	EVYAP GR I-II	5.1	30.0	N.GAS	27/08/2005
2005	GRANİSER GRANİT GR-I	5.5	42.0	N.GAS	14/11/2005
2005	HABAŞ ALIĞA GR III	47.7	381.6	N.GAS	02/06/2005
2005	HABAŞ ALIĞA GR IV	47.7	381.6	N.GAS	21/09/2005
2005	HABAŞ ALIĞA GR-V	24.6	196.8	N.GAS	24/11/2005
2005	HABAŞ ALIĞA (Revision)	6.2	49.3	N.GAS	24/11/2005
2005	HAYAT KAĞIT GR-I	7.5	56.0	N.GAS	27/05/2005
2005	İÇDAŞ ÇELİK GR-I	135.0	1,080.0	IMPORTED COAL	30/11/2005
2005	KAHRAMANMARAŞ KAĞIT GR-I	6.0	45.0	IMPORTED COAL	08/12/2005
2005	KORUMA KLOR GR I-II-III	9.6	77.0	N.GAS	03/12/2005
2005	KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	8.0	64.0	N.GAS	27/11/2005
2005	MERCEDES BENZ TURK GR I-II-III-IV	8.3	68.0	N.GAS	04/02/2005
2005	MODERN ENERJİ GR-III	8.4	62.9	N.GAS	14/06/2005
2005	MODERN ENERJİ (Revision)	(-10.0)	(-75)	N.GAS	14/06/2005
2005	MODERN ENERJİ GR-II	6.7	50.4	N.GAS+LPG	14/06/2005
2005	MOSB GR I II III (Dismantled)	(-54.3)	(-407.3)	F.OIL	01/05/2005
2005	MOSB GR I-II-III-IV-V-VI-VII	84.8	434.0	N.GAS	01/03 - 01/08/2005
2005	ORS RULMAN	12.4	99.4	N.GAS	25/08/2005
2005	PAK GIDA(Kemalpaşa) GR-I	5.7	45.0	N.GAS	07/12/2005
2005	TEZCAN GALVANİZ GR I-II	3.7	29.0	N.GAS	27/05/2005
2005	YONGAPAN(KAST.ENTG) GR-II	5.2	32.7	N.GAS	25/05/2005
2005	ZEYNEP GİYİM SAN. GR-I	1.2	9.0	N.GAS	07/07/2005
2005	OTOP Revision	0.0	0.0	RENEW.+WASTES	
2005	OTOP Revision	(-0.2)	0.0	N.GAS	
2005	OTOP Revision	(-7.2)	(-55.2)	N.GAS+LIQUID	
2005	OTOP Revision	(-1.0)	(-6.0)	F.OIL	
2005	OTOP Revision	2.1	5.2	SOLID+LIQUID	
2005	OTOP Revision	0.1	0.0	LIGNITE	
2005	OTOP Revision	(-0.3)	0.0	NAPHTHA	
2005	OTOP Revision	0.6	1.8	D.OIL	
2005	AK ENERJİ(K.paşa) GR- III	40.0	256.9	N.GAS	09/11/2005
2005	AK ENERJİ(K.paşa) GR I-II	87.2	560.1	N.GAS	30/04/2005
2005	ALTEK ALARKO GR I-II	60.1	420.0	N.GAS	14/10/2005
2005	BİS ENERJİ GR VII	43.7	360.8	N.GAS	18/03/2005
2005	CAN ENERJİ GR-I	3.9	28.0	N.GAS	25/08/2005
2005	ÇEBİ ENERJİ BT	21.0	164.9	N.GAS	27/08/2005
2005	ÇEBİ ENERJİ GT	43.4	340.1	N.GAS	23/08/2005
2005	ENTEK ELK.A.Ş.KOÇ ÜNİ.GR I-II	2.3	19.0	N.GAS	07/02/2005
2005	KAREGE GR IV-V	18.1	141.9	N.GAS	07/04/2005
2005	KARKEY(SİLOPI-4) GR-IV	6.2	47.2	F.OIL	30/06/2005
2005	KARKEY(SİLOPI-4) GR-V	6.8	51.9	F.OIL	23/12/2005

2005	METEM ENERJİ(Hacışiramat) GR I-II	7.8	58.0	N.GAS	29/01/2005
2005	METEM ENERJİ(Peliklik) GR I-II-III	11.7	89.0	N.GAS	29/01/2005
2005	NOREN ENERJİ GR-I	8.7	70.0	N.GAS	24/08/2005
2005	NUH ENERJİ-2 GR I	47.0	319.7	N.GAS	24/05/2005
2005	ZORLU ENERJİ KAYSERİ GR-I-II-III	149.9	1,144.1	N.GAS	22/07/2005
2005	ZORLU ENERJİ KAYSERİ GR-IV	38.6	294.9	N.GAS	26/10/2005
2005	ZORLU ENERJİ YALOVA GR I-II	15.9	122.0	N.GAS	26/11/2005
2005	TEKTUĞ(Kargılık) GR I-II	23.9	83.0	RUN OF RIVER	25/04/2005
2005	İÇTAŞ ENERJİ(Yukarı Mercan) GR I-II	14.2	44.0	RUN OF RIVER	22/05/2005
2005	MURATLI GR I-II	115.0	444.0	DAM	03/06/2005
2005	BEREKET EN.(DALAMAN) GR XIII-XIV-XV	7.5	35.8	RUN OF RIVER	16/07/2005
2005	YAMULA GRUP I-II	100.0	422.0	DAM	31/07/2005
2005	SUNJÜT(RES) GR I-II	1.2	2.4	WIND	23/04/2005
2006	EKOTEN TEKSTİL GR-I	1.9	14	N.GAS	16/02/2006
2006	ERAK GİYİM GR-I	1.4	10	N.GAS	22/02/2006
2006	ALARKO ALTEK GR-III	21.9	158	N.GAS	23/02/2006
2006	AYDIN ÖRME GR-I	7.5	60	N.GAS	25/02/2006
2006	NUH ENERJİ-2 GR II	26.1	180	N.GAS	02/03/2006
2006	MARMARA ELEKTRİK (Çorlu) GR I	8.7	63	N.GAS	13/04/2006
2006	MARMARA PAMUK (Çorlu) GR I	8.7	63	N.GAS	13/04/2006
2006	ENTEK (Köseköy) GR IV	47.6	378	N.GAS	14/04/2006
2006	ELSE TEKSTİL (Çorlu) GR I - II	3.2	25	N.GAS	15/04/2006
2006	BARES IX. GRUP	13.5	43	WIND	20/04/2006
2006	SÖNMEZ ELEKTRİK (Çorlu) GR I – II	17.5	126	N.GAS	03/05/2006
2006	DENİZLİ ÇİMENTO (Revision)	0.4		N.GAS	04/05/2006
2006	MENDERES ELEKTRİK GR I	8.0	56	GEO THERMAL	10/05/2006
2006	KASTAMONU ENTEGRE (Balıkesir) GR I	7.5	54	N.GAS	24/05/2006
2006	ÇIRAĞAN SARAYI (Deleted by the Ministry)	(-1.4)		N.GAS	24/05/2006
2006	BARES X. ve XX GRUPLAR	16.5	52	WIND	26/05/2006
2006	BOZ ENERJİ GR I	8.7	70	N.GAS	09/06/2006
2006	ADANA WASTEWATER TREATMENT PLANT	0.8	6	BIOGAS	09/06/2006
2006	AMYLUM NIŞASTA (ADANA)	(-6.2)		F.OIL	09/06/2006
2006	AMYLUM NIŞASTA (ADANA)	14.3	34	N.GAS	09/06/2006
2006	ŞİK MAKAS (Çorlu) GR I	1.6	13	N.GAS	22/06/2006
2006	ELBİSTAN B GR III	360.0	2,340	LIGNITE	23/06/2006
2006	ANTALYA ENERJİ GR I - II - III - IV	34.9	245	N.GAS	29/06/2006
2006	HAYAT TEM. VE SAĞLIK GR I - II	15.0	108	N.GAS	30/06/2006
2006	EKOLOJİK EN. (Kemerburgaz) GR I	1.0	6	LANDFILL GAS	31/07/2006
2006	EROĞLU GİYİM (Çorlu) GR I	1.2	9	N.GAS	01/08/2006
2006	CAM İŞ ELEKTRİK (Mersin) GR I	126.1	1,008	N.GAS	13/09/2006
2006	ELBİSTAN B GR II	360.0	2,340	LIGNITE	17/09/2006
2006	YILDIZ ENT. AĞAÇ (Kocaeli) GR I	6.2	40	N.GAS	21/09/2006
2006	ÇERKEZKÖY ENERJİ GR I	49.2	390	N.GAS	06/10/2006

2006	ENTEK (Köseköy) GR V	37.0	294	N.GAS	03/11/2006
2006	ITC-KA EN. MAMAK TOP.M. GR I-II-III	4.2	30	LANDFILL GAS	03/11/2006
2006	ELBİSTAN B GR IV	360.0	2,340	LIGNITE	13/11/2006
2006	MARE MANASTIR RÜZGAR (X GRUP)	8.0	12	WIND	08/12/2006
2006	ÇIRAĞAN SARAYI GR I	1.3	11	N.GAS	01/12/2006
2006	ERTÜRK ELEKTRİK Tepe RES GR I	0.9	2	WIND	22/12/2006
2006	AKMAYA (Lüleburgaz) GR I	6.9	50	N.GAS	23/12/2006
2006	BURGAZ (Lüleburgaz) GR I	6.9	54	N.GAS	23/12/2006
2006	VAŃ-2	(-24.7)	0	F.OIL	
2006	KARACAÖREN-II	(-0.8)		HYDRO	20/02/2006
2006	SEYHAN I-II	0.3	1.7	HYDRO	20/02/2006
2006	ŞANLIURFA GR I-II	51.8	124	HYDRO	01/03/2006
2006	BEREKET ENERJİ GÖKYAR HES 3 Grup	11.6	43.3	HYDRO	05/05/2006
2006	MOLU EN. Zamantı Bahçelik GR I - II	4.2	16.7	HYDRO	31/05/2006
2006	SU ENERJİ (Balıkesir) GR I - II	4.6	20.7	HYDRO	27/06/2006
2006	BEREKET EN.(Mentaş Reg) GR I - II	26.6	108.7	HYDRO	31/07/2006
2006	EKİN (Başaran Hes) (Nazilli)	0.6	4.5	HYDRO	11/08/2006
2006	ERE(Sugözü rg. Kızıldüz hes) GR I - II	15.4	31.6	HYDRO	08/09/2006
2006	ERE(AKSU REG.ve ŞAHMALLAR HES) GR I-II	14.0	26.7	HYDRO	16/11/2006
2006	TEKTUĞ(Kalealtı) GR I - II	15.0	52	HYDRO	30/11/2006
2006	BEREKET EN.(Mentaş Reg) GR III	13.3	54.4	HYDRO	13/12/2006
<b>Total</b>		<b>5,017</b>	<b>35,436</b>		

**Table 18. Electricity Generation of Selected Recent Capacity Additions by Fuel Type**

Capacity Additions by Fuel Type	Average Generation, GWh				Total
	2003	2004	2005	2006	
Coal	0	337.5	1,125.0	0.0	1,462.5
Lignite	0	0.0	4,420.0	7,020.0	11,440.0
Fuel Oil	0	466.2	99.1	0.0	565.3
Diesel oil	0	4.1	0.0	0.0	4.1
LPG	0	0.0	0.0	0.0	0.0
Naphtha & Aphaltite	0	322.9	0.0	0.0	322.9
Natural Gas	312.0	8,827.2	6,995.4	3,457.4	19,592.0
Renewables and wastes	0	0.0	85.0	42.0	127.0
Hydro	0	241.8	1,028.8	484.3	1,754.9
Geothermal & Wind	0	0.0	2.4	165.0	167.4
<b>Total</b>	<b>312</b>	<b>10,120</b>	<b>13,756</b>	<b>11,169</b>	<b>35,436</b>

Annex 3  
**MONITORING PLAN**

12 wind turbines with a rated output of 2,000 kW each and 2 turbines with 800 kW output will be connected to the measurement instruments through a transformer. The switchgear station, where the measurement instruments are read periodically by TEİAŞ, is only accessible to trained TEİAŞ staff. On the first days of each succeeding month, the TEİAŞ staff performs the reading, upon which the invoicing will be based.

There will be two measurement instruments monitoring the generated electricity continuously. Furthermore, a SCADA system will monitor and store various data including the electricity generation of each wind turbine separately. The project participant is able to monitor the electricity generation data read by the SCADA system as well as the two measurement instruments from distance, however it has no control over or access to the measurement devices and cannot perform any type of maintenance or calibration.

Energy generation and consumption of the Project Activity is measured and recorded with a single primary metering device and another secondary metering device for high data quality. A TEİAŞ personnel comes each month to the Project site and connects to the primary and secondary metering devices using his own equipment, without any interference from the project participants. This personnel takes readings from both devices and compares them. If the difference of both devices is higher than 0.002, then technical precautions described below in the *"Detailed description of the monitoring plan"* are taken by TEİAS to ensure data quality. Under normal conditions, the digital readings are uploaded by the TEİAS personnel to TEİAS on site and a print-out of the preceding month's generation and consumption summary is signed by both the site engineer and the TEİAS personnel.

The net electricity generated and delivered to the grid can be monitored from TEİAŞ invoices, from the PMUM - Market Financial Settlement Centre- (MFSC) website<sup>29</sup> or the SCADA system. To ensure high quality data, PMUM web site data will be used to calculate the net electricity generation.

Apart from the electricity generation, number of local employees will be monitored as well. The total number of new jobs created by the Project Activity will be checked whether it is positive.

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<sup>29</sup> <http://www.teias.gov.tr/mali/maliuz.htm>.

### **Detailed Description of the Monitoring Plan**

The monitoring plan involves;

1. The determination of the baseline emissions occurring within the project boundary during the crediting period. As the project boundary is defined as the national grid of Turkey, the baseline emissions from electricity generation activities in Turkey are calculated and monitored based on national official data.
2. The determination of the local employment as an SD indicator. The project aims to create local employment opportunities in the project region in a sustainable way. The project participants prefer to prioritize personnel from the project region, which will be defined as an Gold Standard indicator to be verified each year.
3. The final locations of the wind turbines will be identified during the first monitoring.

### **Indicator 1: Net electricity generation**

The leakage during crediting period will be negligibly small and will not be monitored, as fossil fuel consumption during construction and operation of the project activity is minimal.

Hence, the monitoring plan involves the net electricity generation by the project activity;

- The two measurement instruments, which are located at the high voltage side of the main switchgear station, are not accessible by the project participant or any other party except TEİAŞ. This prevents any intervention and assures the accuracy and quality of the measurements.
- The measurement instruments give two types of data, beside others; the total gross electricity generated and the total electricity consumed by the wind farm. The difference of these two data is the net electricity generated. Furthermore, TEİAŞ cuts a certain percentage of the generation to account for transmission losses. The net electricity generation, which is to be monitored and to be used for baseline emissions, is the net electricity generation, which is the difference of gross electricity generation and self electricity consumption.
- At the end of each monitoring period, the data from the monthly meter readings will be added up to obtain the total monitoring period net electricity generation. This figure will be multiplied with the combined margin emission factor, which has been calculated ex-ante.

### **Self consumption of the Project activity:**

The project activity itself consumes some amount of energy for operation. This self consumption is also measured with a primary and a secondary metering device. Similar to energy generation, energy consumption is also recorded and accounted for the invoicing.

Self electricity consumption of the project activity is also measured and recorded by a primary and a secondary metering devices. The TEİAS personnel comes on the first days of each succeeding month and takes the readings of the previous month in terms of gross electricity generation and self electricity consumption (beside others), with a breakdown into 3 time periods (T1 for 06:00-17:00, T2 for 17:00-22:00, T3 for 22:00-06:00) for invoicing. Following this reading, the results are transmitted on site to the TEİAS network by the TEİAS personnel electronically without any intervention. Based on this reading, a protocol form is printed out, which lists in detail the energy generation and consumption values in a similar way the PMUM web site lists them, and is then signed by the site manager and the TEİAS personnel. Therefore, self consumption values are recorded, read and treated similar to the generation values. Project participants have no access to the metering devices and the self electricity consumption data is of high quality.

**Data Source:**

At the first day of each month, a TEIAS personnel comes to the sites and makes a reading regarding the last period from the beginning to the end of the previous month. After making the reading from the metering device, a standard protocol showing the generation and consumption data is signed by the site manager and the TEIAS personnel. Under normal conditions, these figures are used for invoicing purposes.

Based on these monthly protocols, a detailed breakdown of generation and consumption figures is also supplied by the TEIAS Market Financial Clearing Center (PMUM) website. The project participant can access its own consumption and generation data through the web site of PMUM (<http://pmum.teias.gov.tr>) by using a secured ID and password. After accessing this web site, the project participant is able to call actual and historical data. These data are used by TEIAS for invoicing, and the same data source will be used for the determination of emission reductions.

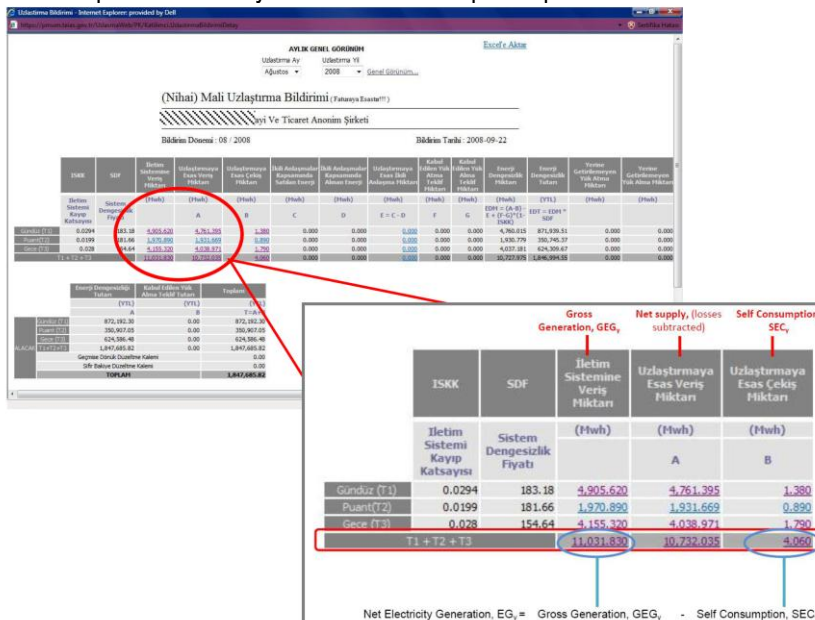
TEIAS invoices according to the net electricity supply, which takes transmission line losses into account. This means that the invoiced amount of electricity is the difference of gross generation, self consumption and transmission line losses, which is determined by TEIAS every month as a certain percentage.

For emission reductions calculations, however, transmission line losses shall not be subtracted, therefore the invoiced amount of energy cannot be used. Instead, **EG<sub>y</sub>** (Annual net electricity amount fed to the grid by the project activity) will be used, which is the monitoring parameter, is the difference between the Gross Electricity Generation (GEG<sub>y</sub>) and project activity's Self Electricity Consumption (SEC<sub>y</sub>):

$$EG_y = GEG_y - SEC_y$$

PMUM website publishes monthly GEG<sub>y</sub> and SEC<sub>y</sub> data in detail (with a breakdown into three daily time periods), however it does not show EG<sub>y</sub> separately. Therefore, for each month GEG<sub>y</sub> and SEC<sub>y</sub> data need to be recorded and their difference has to be calculated on a monthly basis. The annual total net electricity generation is then found by summing up monthly EG<sub>y</sub> values.

An example of a monthly PMUM web site report is provided below<sup>30</sup>:



**Figure 5. Official PMUM Report used for Invoicing and Monitoring (figures not relevant)**

<sup>30</sup> This report belong to another GS project of the project participant.

These monthly figures will be used to fill in the Net Electricity Generation Monitoring Plan spreadsheet. This table is provided to the DOE as a separate file. The monthly and annual emission reductions are calculated with this table. The scans of monthly report print-outs will be also be supplied as proof to the DOE.

#### Data Quality, Storage and Accuracy:

Concerning metering system accuracy, project participants have to comply with relevant national legislation. The project must ensure that the metering devices are in line with the technical requirements which are set out by the “Elektrik Piyasasında Kullanılacak Sayaçlar Hakkında Tebliğ” (Communiqué for Metering Devices to be used in the Electricity Market). Metering devices are technically checked by independent companies for their accuracy and certified. Afterwards, TEIAS also tests each metering device in order to ensure that the devices satisfy all requirements.

The table in the Section II, Article 11 of this communiqué describes the minimum accuracy requirement the metering devices have to fulfil, which are categorized according to the installed capacity. As the rated output of the project activity is between 10 MW and 100 MW, the metering device has to have an accuracy equal to or better than 0.5%:

*Sayacın bağlı olduğu devrenin gücü	100 MVA'dan büyük	100 MVA ile 10 MVA arasında (100 MVA ve 10 MVA dahil)	10 MVA'dan küçük
Aktif enerji sayaçları	IEC-EN 60687 0.2S sınıfı	IEC-EN 60687 0.5S sınıfı	IEC-EN 60687 0.5 sınıfı
Reaktif enerji sayaçları	**IEC-EN 61268 2 sınıfı	**IEC-EN 61268 2 sınıfı	**IEC-EN 61268 2 sınıfı

**Figure 6. The table in the Section II, Article 11 of this communiqué**

This requirement of 0.5% is stricter than 1% and thus fulfils the requirement. The original and valid version of the communiqué (in Turkish language) is also submitted to the DOE.

The collected data will be kept by Demirer Enerji during the credit period and stored at least two years after the issuance of VER credits for the all wind power project activity in the concerning crediting period. Furthermore, the data will be accessible through the PMUM database as well.

According to the “Communiqué for Metering Devices to be used in the Electricity Market”, Article 9, paragraph b, the periodic calibration shall be made every 10 years<sup>31</sup>. The calibration will be carried out by TEIAS. The devices are sealed during first operation of the plant. In case there is a significant inconsistency (assessed by TEIAS) between two devices, the meters will be calibrated by TEIAS before the 10 years period. In such a case, a template<sup>32</sup> will be used. The Project owner can also request calibration of the meter(s). The calibration stations are inspected by the central organization of the same Ministry<sup>33</sup>.

#### Failure of the metering device:

In case of unforeseen problems or failures of the meters or if any difference occurs between primary and secondary device TEIAŞ has to be informed for necessary maintenance and calibration. An agreement between the project participant and TEIAŞ will ensure that in case of problems or failures of the meters TEIAŞ reacts as fast as possible

<sup>31</sup> “Communiqué for Metering Devices to be used in the Electricity Market”, Article 9, paragraph b. (Document already submitted to the DOE.)

<sup>32</sup> [http://www.teias.gov.tr/mali/GDUY/PRO\\_FORM/OLCUM/DAG02.xlsa](http://www.teias.gov.tr/mali/GDUY/PRO_FORM/OLCUM/DAG02.xlsa)

<sup>33</sup> Source: “Communiqué for Metering Devices to be used in the Electricity Market”, Article 10

to solve the problem, TEIAŞ performs the necessary maintenance and calibration. Since the electricity generation data is used for the billing and accounting between TEIAŞ and Demirer Enerji the data is of high quality. The plant manager is responsible for the plant as well as the monitoring issues on behalf of Demirer Enerji on sight.

If it is determined by TEIAS that the seal of the primary metering device is torn apart or any intervention is made; correct power amounts are determined over the secondary meter, beginning from the latest measurement when the recorded values of the primary and the secondary metering devices match.

In case of unforeseen problems or failures of the meters or if any difference occurs between primary and secondary device TEIAŞ has to be informed for necessary maintenance and calibration. TEIAŞ performs the necessary maintenance and calibration. If TEIAS determines that the seal of the primary metering device is torn apart or any intervention is made; correct power amounts are determined over the secondary meter, beginning from the latest measurement when the recorded values of the primary and the secondary metering devices match.

#### **Maintenance Plan (by TEIAS):**

The following maintenance plan will be carried out by TEIAS every 5 year without any interference of the project participants:

FIVE-YEAR PERIODICAL MAINTENANCE FOR METERS (CODE 04.04)		DONE	NOT DONE	REMARKS
04.04.1	Maintenance of the primary metering device shall be made in accordance with related contracts and legislation.			
04.04.2	Periodical maintenance of meters that are not used for the calculation of sales invoice shall be made every 5 years. However, in case totals of index values of total of bar meter and feeder meter do not match, measurement circuits shall be completely tested.			
04.04.3	Seals of meters shall be renewed every 10 years. Values shall be obtained from, if available, the secondary meter. If not available, a meter with the same characteristics shall be assembled temporarily until the meters are sealed.			
04.04.4	Factors of meters shall be checked in accordance with ATO (current transformer ratio) and GTO (voltage transformer ratio) rates to which they are dependent on.			
04.04.5	Metering devices shall be tested in accordance with IEC/TSE standards and/or measurement adjustment regulations by using an etalon meter. In case there are differences, faulty meters shall be checked and adjusted if necessary.			
04.04.6	Voltage, current and angle magnitudes coming to the meter shall be read.			
04.04.7	Time meters of electromechanical d-phase meters shall be checked and if necessary, changed.			
04.04.8	Characteristic values of metering devices shall be compared to book records.			
04.04.9	The following documents shall be drawn by the parties and signed under their titles; 1- Transformer station panel personnel			

	2- Customer representative			
	3- RÖA unit			
	4- Conduction Plan and Management Group Management			
	5- TETAŞ General Management			
	6- TEİAŞ General Management			

## SUSTAINABLE DEVELOPMENT INDICATOR MONITORING

According to the Gold Standard Manual for CDM Project Developers, Gold Standard monitoring requirements in addition to regular CDM monitoring procedures are defined based on the outcomes of the stakeholder consultation meeting and the Sustainable Development Assessment conducted above. The Sustainable Development Assessment Matrix shows that local employment is an indicator, which would be critical for a positive contribution of the project to Sustainable Development.

Local stakeholders have indicated no issues of potentially significant importance related to questions from the Gold Standard Public Consultation Checklist (Appendix E to the Gold Standard Manual for VER Project Developers) during the initial stakeholder consultation. A detailed report of the issues raised and the answer provided by the project owner are provided in the Initial Stakeholder Consultation Report.

Issues -except local employment- of potentially significant importance during the stakeholder consultation cannot be converted into additional monitoring requirements because:

- the monitoring requirements already prescribe monitoring of all relevant parameters, or
- the indicated issues cannot be influenced by the project owner during the operation of the plant (e.g. risk of seismic activities), or
- the indicated issues are considered to be positive (social impact) or neutral (visibility of the project).

Therefore, only the Project's contribution to local employment as an additional Gold Standard specific monitoring criteria has been added to the regular monitoring plan.

### Indicator 2: Employment (Numbers) [ID 2]

The project aims to create employment in the local region. The number of local employees will be monitored yearly to demonstrate that the project activity has contributed to local employment. The reason of selecting employment as a Sustainable Development Indicator is its significance for the local community. During the stakeholder consultation process, local stakeholders have indicated that their most relevant expectation from the project activity is the creation of new jobs for their villages. As the stakeholders have emphasized local employment as the most important social contribution, it is determined as the SD monitoring indicator.

The number of local personnel employed by the Project will be determined during monitoring and verified by the DOE.

### Indicator 3: Air Quality: [ID 3]

As indicator parameter, the avoided SO<sub>2</sub> and NO<sub>x</sub> emissions is selected. The SO<sub>2</sub> and NO<sub>x</sub> emissions in 2007 caused by electricity generation are already reported in Turkey's GHG inventory submitted to UNFCCC in 2009, from which the SO<sub>2</sub> and NO<sub>x</sub> intensities are calculated. Using these intensity figures and the net electricity generation of the Project activity, the SO<sub>2</sub> and NO<sub>x</sub> emission reduction of the Project will be computed.

Annex 4  
RELEVANT DOCUMENTS

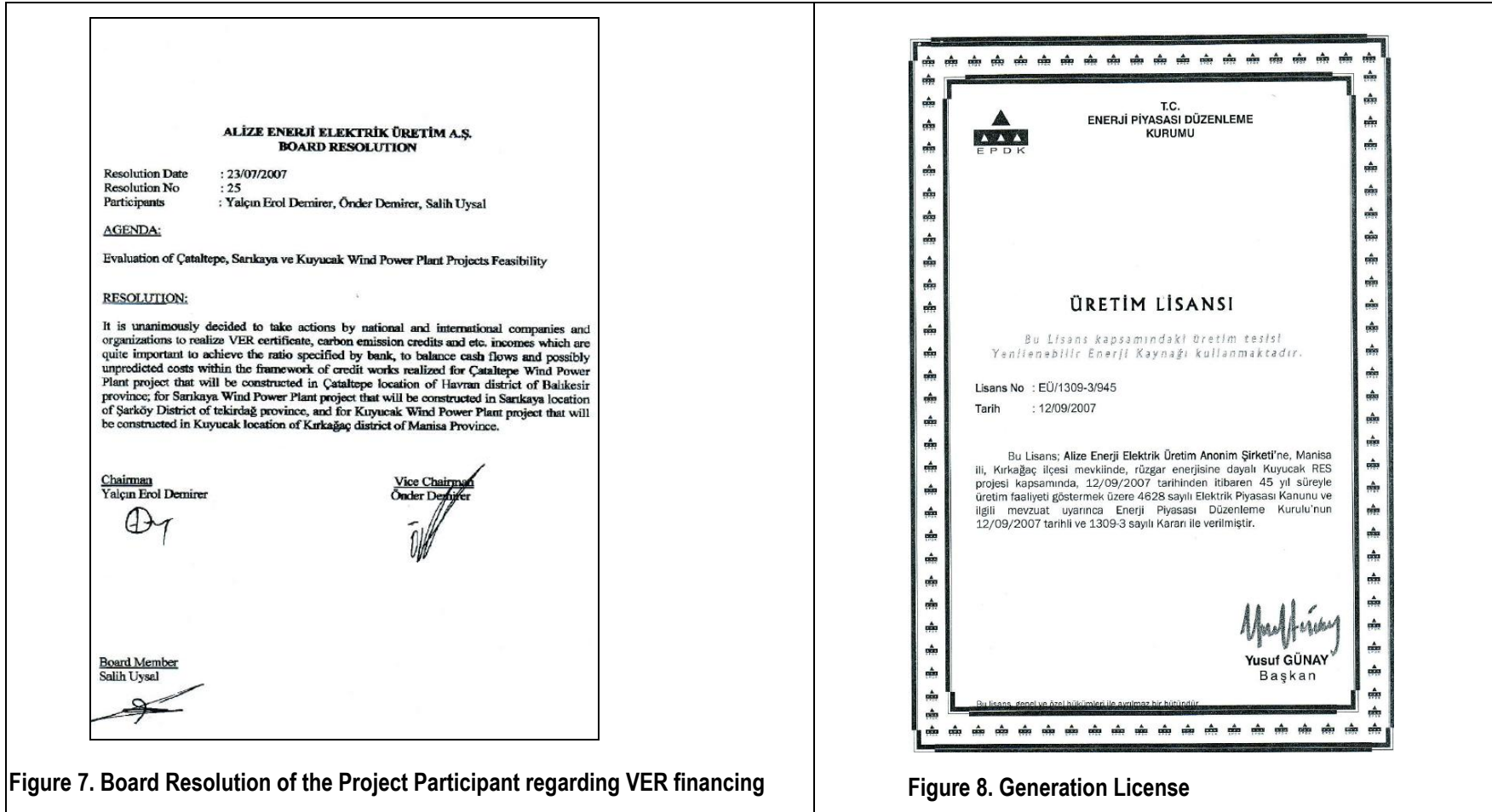



Figure 7. Board Resolution of the Project Participant regarding VER financing

Figure 8. Generation License


 **T.C. MANİSA VALİLİĞİ İL ÇEVRE VE ORMAN MÜDÜRLÜĞÜ (ÇED ve Planlama Şube Müdürlüğü)**

**SAYI : B 18 4 İÇÖ 2 45 00 03/ 228-09 5A3**  
**KONU : Alize Enerji Elektrik Üretim A.Ş.** 13.06.08\*702846

**ALİZE ENERJİ A.Ş.**  
Mazhar Osman Sk. Güneş Apt. No:911 Kadıköy İSTANBUL

İLGİ : 29.04.2008 tarihli "Rüzgâr Enerji Santrali Tesisi" Müracaatı.

Manisa İli, Kırkağaç İlçesi, Demirtaş Köyü, Kuyucak mevki, J.19.B.3 paftada yer alan saha üzerinde Alize Enerji Elektrik Üretim A.Ş. tarafından kurulması planlanan "25,6 MW (12 adet 2 MW ve 2 adet 0,8 MW ) kapasiteli Rüzgâr Enerji Santrali Tesisi " projesine Valiliğimizce "Çevresel Etki Değerlendirmesi Gerekli Değildir Kararı" verilmiştir. Söz konusu faaliyete ilişkin Proje Tanıtım Dosyası ve eklerinde belirtilen hususlar 2872 sayılı Çevre Kanunu ve bu Kanuna istinaden yürürlüğe giren İlgili Yönetmeliklere uyulması, mer'î mevzuat uyarınca ilgili kurum/kuruluşlardan gerekli izinlerin alınması, ÇED Yönetmeliğinin 18. maddesi gereğince alınan izin ve ruhsatlar ile yatırımın başlanması, işletme ve işletme sonrası dönemlerine ilişkin raporların Valiliğimize iletilmesi gerekmektedir. Bilgilerinizi ve gereğini arz/rica ederim.

  
Çiğdem GÜVENÇ  
Vali


**EKLER**  
1-Proje Tanıtım Dosyası (1 Adet)  
2-Proje Tanıtım Dosyası CD'si (2 Adet)  
3-ÇED Gerekli Değildir Belgesi

**DAĞITIM LİSTESİ:**  
- Çevre ve Orman Bakanlığı (ÇED ve Planlama Genel Müdürlüğüne) (Ek-2,3)  
- Çevre Yönetimi Şube Müdürlüğü (Ek - 3)  
- İl Özel İdaresi (Ek-3)  
- Enerji ve Tabii Kaynaklar Bakanlığı (Ek 1,3)  
- Kırkağaç Kaymakamlığına (Ek Konulmadı)  
- Alize Enerji Elektrik Üretim A.Ş. (Ek-1,3)

Hakser Mad. Pet. Ür. Ltd. Şti.  
(Yıldırım Mah. M. Kuvvetler Cd. Başsaran Sok. Serpen Apt. No:72 BALIKESİR)

Tevfikye mah. Doğu cad. Emre sok. No:8 Manisa  
TEL (0.236) 237 10 61 (3 hat)-237 33 83 FAX (0.236) 237 08 03-234 41 51  
www.manisacevreorman.gov.tr

Figure 9. Letter regarding the notice of exemption from EIA



Enerji ihtiyacının büyük bir kısmını ithal fosil yakıtlardan sağlayan Türkiye, bu çerçevede doğal ve kültürel kaynaklarının sürdürülebilirliği tehlikeye atmaktadır. Türkiye'nin halen enerji verimliliği ve yenilenebilir enerji kaynakları ile ilgili resmi bir plan, hedefi ya da takvimi bulunmamaktadır.

Türkiye, sahip olduğu zengin güneş, rüzgâr, su, jeotermal ve biyokütle kaynaklarına dayalı çözümler aracılığıyla, iklimi değiştiren pahalı ve ithal fosil yakıtlara bağımlılığını azaltabilir; enerji güvenliğini artırabilir. Bu bağlamda, özel sektörün temiz teknoloji yatırımları -yatırımları özendirici özel yasal düzenlemeler olmasına rağmen-, etkileri her geçen gün biraz daha hissedilen iklim değişikliğine karşı mevcut durumda atılan en büyük ve etkili adımdır. Bu açıdan bakıldığında, ülkemizdeki rüzgâr enerjisi yatırımlarını desteklemekten mutluluk duyuyoruz.

1995 yılından bu yana rüzgâr enerjisi sektöründe faaliyette bulunan Demirer Holding, hem Türkiye'nin ilk rüzgâr enerjisi santralini kurmuş, hem de pazarın gelişmesine büyük katkıda bulunmuş ve devam eden yatırımları ile de sektörün öncüsü konumuna gelmiştir.

Demirer Holding bünyesindeki Alize Rüzgâr Enerji Santrali San. ve Tic. A.Ş.'nin sahip olduğu Kuyucak Rüzgâr Enerji Santrali Projesi hakkında bilgilendirilmiş bulunmaktayız. Bu projenin Türkiye'nin sürdürülebilir kalkınma hedefleri ile tamamen uyumlu olduğuna düşünülüyor, aynı zamanda bir CO<sub>2</sub> azaltım projesi olarak da tarafımızdan desteklendiğini bildirmek istiyoruz.

**İngilizce Metin:**  
Turkey, covering its energy demand largely by imported fossil fuels, endangers the sustainability of its natural and cultural resources. As of today, Turkey does not have any action plan, targets or agenda concerning energy efficiency and renewable energy issues.

Turkey is able to reduce its dependency on expensive imported oil and improve its energy security by implementing policies for the exploitation of its rich natural resources like wind, solar, geothermal and biomass. In this context, clean technology investments of the private sector -despite the lack of investment incentives and regulations- shall be regarded as significant steps towards combatting climate change which we all experience every day. From this point of view, we are pleased to support wind energy investments in Turkey.

Demirer Holding, being active in the wind energy sector since 1995, greatly contributed to the development of the market by realizing the first ever wind farm in Turkey in the past as well as by carrying out further projects today, and thus deserves to be referred to as the market leader.

We have been informed about the Kuyucak Wind Farm Project, which is owned by Alize Rüzgâr Enerji Santrali San. ve Tic. A.Ş., a member of the Demirer Holding. We believe that this project is in line with sustainable development targets of Turkey, and we support it also as a CO<sub>2</sub> reduction project on our part.

Hilal Atıcı  
Greenpeace Akdeniz  
İklim ve Enerji Kampanyası Sorumlusu


  
GREENPEACE  
MEDITERRANEAN  
Ergenekon Mah. Çiçek Sok. No:109/109, 34 373 Harbiye İstanbul  
tel 00 212 246 26 61 faks 00 212 246 18 59 e-posta ilg@greenpeace.org.tr website www.greenpeace.org.tr

Figure 10. Support Letter from Greenpeace Mediterranean

Annex 5

PRELIMINARY LOCATIONS OF THE WIND TURBINES

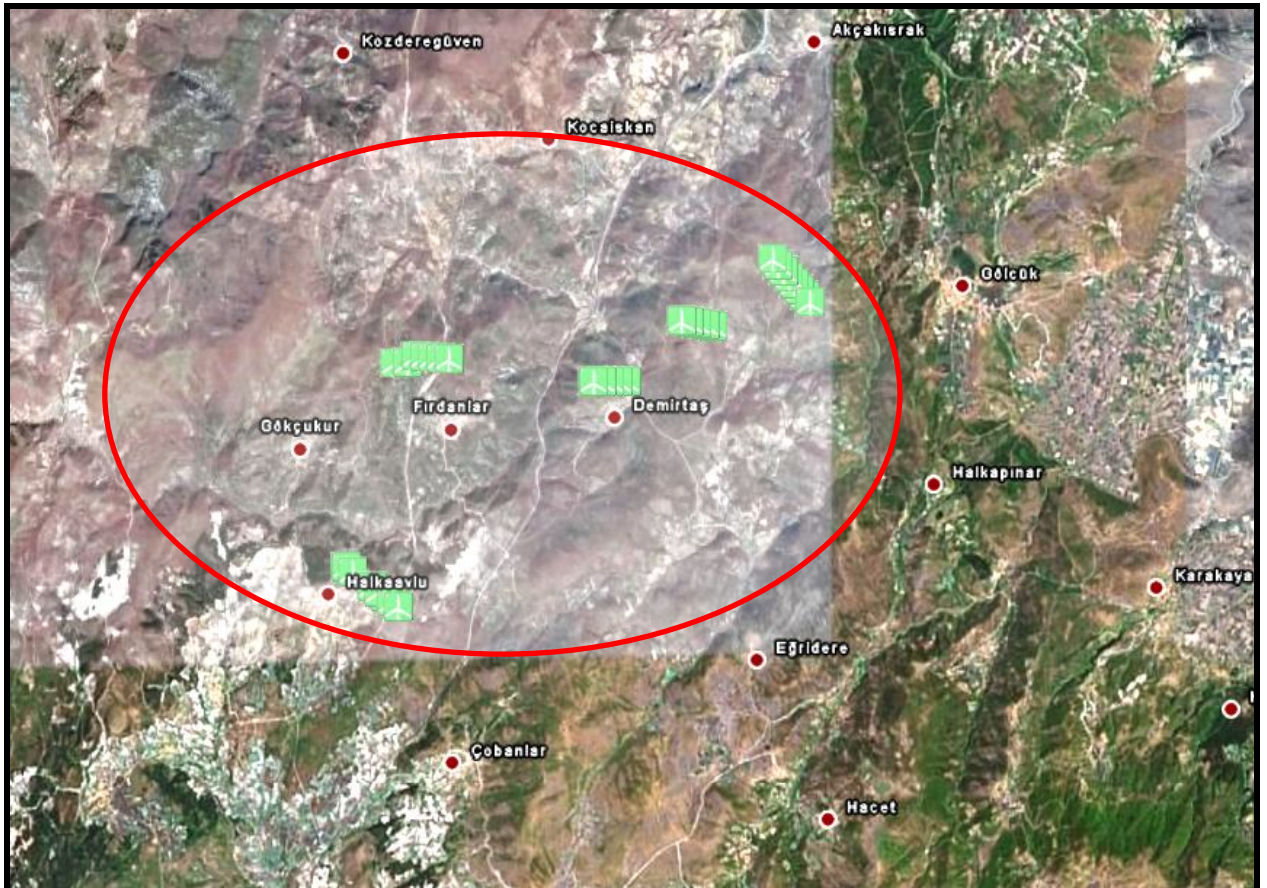


Figure 11. Location of the Project Activity

Locations of the wind turbines are not finalized yet. The final locations will be identified during the first monitoring plan.

## Annex 6

### **GOLD STANDARD INFORMATION**

#### **Introductory Notes**

This document contains the PDD Annex to validate the Project *Kuyucak 25.6 MW Wind Farm* against the Gold Standard.

The project activity comprises the installation of 12 units of 2,000 kW and 2 units of 800 kW wind turbines with a total capacity of 25.6 MW. The project activity implies a series of sustainable development aspects including technology transfer, environmental and social benefits.

In the scope of the project, local roads will be repaired and improved, and an additional transmission line will be built. A significant amount of equipment (tower, blades, cable, transformer etc.) will be procured in Turkey, which will contribute to local development as well. In addition to environmental and social benefits, the project will trigger locally, it will increase the share of renewable and clean energies in the Turkish electricity market, will reduce the dependency on foreign sources and will fuel the development of a wind energy sector in Turkey. The Project, located in a less developed area of Turkey, will also contribute to regional economic development and generate direct jobs during the operation of the plant and temporary jobs during the construction of the plant.

Kuyucak 25.6 MW Wind Farm Project will significantly contribute to the national electricity grid in terms of energy supply and will create considerable amounts of carbon emission reductions, which will help in climate change mitigation. These aspects will help to get more public attention on renewable energies and will create a sounder basis for the wind energy as a serious alternative in terms of reputation, dependability, electricity generation and local sustainable development. Thus, it will be able to open the path to further renewable energy projects in Turkey.

#### **Project Type Eligibility Screen**

*GS Manual for VER Project Developers: Section 3.2*

Wind energy projects fall into the renewable energy categories outlined in the pre-assessment section Box 1 in Chapter 2.2 of the Gold Standard Manual for CDM Project Developers as eligible project types.

Annex 7

**INFORMATION REGARDING PUBLIC FUNDING**

There is no public funding in the project.