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

(GS-VER-PDD)

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Grid-connected electricity generation from renewable sources:

Çatalca 60 MW Wind Power Project, Turkey

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

A.1 Title of the project activity

Grid-connected electricity generation from renewable sources:
Çatalca 60 MW Wind Power Project, Turkey
(in the following: Çatalca WPP)

Document version: 03
Date of completion: 13 August 2008

Replaces Version 02 from 13 March 2008 with some changes in the SD matrix according to the comments/requests raised from the 6-weeks registration review by the Gold Standard.

Version 02 replaces Version 01 from 9 November 2007 with minor changes in sections D.3 and D.4 according to the DOE's requests for clarifications regarding the monitoring plan. In addition, a brief description of the main stakeholder consultation procedure was added in section G.

A.2. Description of the project activity

ERTÜRK Elektrik Üretim A.Ş. (in the following: Ertürk) plans to install a wind power plant near the villages of Elbasan and Çatalca in the region of Istanbul in Turkey. The purpose of the project is to generate electricity and to feed it into the public grid. Çatalca WPP shall be registered as a Gold Standard Voluntary Emission Reduction (GS-VER) project in order to enable the project implementation by means of financial inflows coming from the credits sale. Because of its significant contribution to climate protection and to sustainable development in the region, this project is expected to fulfil the requirements of the Gold Standard.

In comparison to the existing wind farms in Turkey, Çatalca WPP is one of the larger ones. It consists of 20 Vestas V90 wind turbines with a rated output of 3.0 MW, hub height 80 meters and rotor diameter of 90 meters. The entire net electricity production is expected to be some 211 GWh per year.

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

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

The project contributes to sustainable development in Turkey in the following ways:

- Wind energy presents various environmental benefits compared to other primary energy sources: wind energy does not result in emissions of pollutants into the atmosphere nor does it emit residuals that can have a negative impact on soil, water etc. As a renewable energy source wind energy can be used without putting the supply of primary energy sources into danger for future generations. The proposed project will also contribute to a reduction in other emissions than GHG related to conventional electricity generation, like emissions of sulphur dioxide, nitrogen oxides and particulates.
- Çatalca WPP will result in extra employment – the realisation of the project will result in increased jobs in the local area, especially during the construction phase. Construction materials for the foundations, cables and access roads will preferentially be sourced locally.

Ertürk, as the project developer, from the very beginning was convinced of the positive influence of the project on the environment as well as on social and economical aspects. Based on the information collected during the stakeholder meeting (for details see section G) and the Environmental Impact Assessment (EIA) which was carried out in order to apply for the license, the Sustainable Development Matrix was prepared. The results from the in-depth assessment of environmental and social impacts confirm the positive influence of the project on all the discussed domains.

Components • **Indicators**	**Score** **(-2 to 2)**	**Rationale**
Local / regional / global environment		
• * Water quality and quantity	0	As compared to the baseline, no significant changes with regard to both ground and surface waters are expected. The project does not have any positive or negative impacts. According to the EIA, there is no aqua product production and reproduction area close to the plant and the ground water level is about 100 m below the surface[1]. As a result of discussion of this issue in the stakeholder meeting[2] • construction as well as operating or decommissioning of the plant will not affect water quality and quantity; • the project activity does not have any risks of contamination of water, groundwater, coastal wasters or the sea. The handling of the accruing waste water during the construction phase is under the responsibility of a subcontractor who assures that any negative environmental effects are avoided. This will be documented in form of the service contract (cf. monitoring, section D.2.1.2)
• Air quality (emissions other than GHGs)	+2	Electricity generated from the wind farm partially substitutes electricity generation from thermal power plants that represent a large share of the Turkish grid generation mix (especially gas and lignite, cf. Figure 3 on page 11).Thus,

[1] Çatalca WPP Environmental Impact Assessment Report (page 35)

[2] Appendix 8.A to the protocol of the stakeholder meeting: The protocol and checklist (English)

		besides greenhouse gases, all other air pollutants (e.g. SO_x, NO_x), particle and VOC emissions are avoided by the project activity. Dust emergence connected to the project activity appears only for a short time during the construction phase and will be caused by digging foundations, land arrangement works and installation of the towers. Regulatory limits will not be exceeded, which is confirmed by the Pre-EIA that was carried out in connection with license application.[3] The stakeholders consider the clean electricity production as a positive effect of the wind power plant (no impacts are expected, cf. question 3 of the stakeholder consultation checklist).
• Other pollutants (including, where relevant, toxicity, radioactivity, POPs, stratospheric ozone layer depleting gases	0	During operation of the wind farm there are no positive nor negative impacts expected. There will be noise pollution caused by the machinery used during the construction operations, which however will remain within the threshold values. During the wind park operation, the generated sound pressure level by the turbines will be far below the allowed noise values. This aspect is analysed in the EIA as well as mentioned and discussed in the stakeholder meeting with no negative results: The noise caused by the wind turbines will not affect the villages in the area[4].
• * Soil condition (quality and quantity)	0	As compared to the baseline, no significant changes are expected. The area of land needed for the turbine installation is small, therefore the land will be used for the same purposes (grass and maquis land with stony and rocky composition, some trees) as before project implementation. (Please also refer to what is described for the indicator “Biodiversity” below and to the Environmental Impact Study, pages 6 and 44.) Some trees have to be cut. They will be replanted at a suitable spot by the Forestry Directorate, financed by Ertürk. This will be monitored as described in section D.2.1.2 and presented at the verification. The negligible impact on soil condition is also confirmed by the stakeholders (cf. question 1 of the stakeholder consultation checklist).
• * Biodiversity (species and habitat conservation)	0	According to the environmental impact analysis which was carried out for license application, the project area does not have the characteristics of a wildlife habitat. The vegetal soil on the stony and rocky land is thin. The dominant vegetation consists of grass and maquis.[5] While the 20 turbines shall be built on an area that amounts to some 175 hectares, the

[3] Çatalca WPP Environmental Impact Assessment Report, section 1.c.3., p. 13

[4] Çatalca WPP Environmental Impact Assessment Report (page 27,28), Appendix 8.A to the protocol of the stakeholder meeting: The protocol and checklist (English)

[5] Çatalca WPP Environmental Impact Assessment Report, p. 44

		actual ground covered by the turbines, road and installations is only 13 ha[6]. The remaining land can be used as before, for example for wildlife passing the area. The project area is not located on a bird migration route or in the vicinity of any nesting places[7]. The stakeholders confirmed that the project will not have any impacts on biodiversity or habitats (cf. questions 1 and 8 of the stakeholder consultation checklist). The project does not pose any dangers for sustainable environment and sustainable development as defined by Article 2 of Environmental Law No. 2872.[8] Any unavoidable tree cuttings are reduced to a minimum by appropriate turbine placement. For turbine placement and tree cuttings issue, the Forestry Operations Directorate is involved. For every tree that has to be cut, Ertürk has to finance new tree plantings which will be carried out by the authority. This shall be documented for verification by presenting the official correspondence between Ertürk and the competent forestry authority (cf. section D.2.1.2.)
Sub total	***+2***	
Social sustainability and development		
• * Employment (including job quality, fulfilment of labour standards)	+2	Installation of the wind farm will provide employment to local people, who will assist during the building phase as well as during the maintenance of the wind farm. • During construction 10 persons will be employed • During the operating stage some 5 to 15 persons will be employed[9] The exact number of employees has yet to be planned. The positions at the wind farm require skilled workers, which will be achieved by adequate training. In addition to the employees above there will be employed some 15 security staff in both stages. Because of the introduced new technology, the regional tourist interest in the region will increase, which is expected to influence the regional development and with it the employment situation. The project owner intends to employ local people in order to avoid moving or long travels for the employees. Within this project the stakeholder processes give fulfilment of labour standards a public site. Public consultations like this are not common in Turkey and therefore this case enhances thoughtfulness including job quality and fulfilment of labour standards.

6 Çatalca WPP Environmental Impact Assessment Report, p. 6

7 Çatalca WPP Environmental Impact Assessment Report, p.27

8 Çatalca WPP Environmental Impact Assessment Report, p. 35

9 Çatalca WPP Environmental Impact Assessment Report (page 6)

		Employment is part of the monitoring of the project (Employment and Training, cf. section D.2.1.2) and will thus be documented and reported for the periodic verification.
• * Livelihood of the poor (including poverty alleviation, distributional equity, and access to essential services)	+1	Generating electricity from resources that were not used before creates an additional income to the local community, influencing the poverty alleviation, particularly in the rural areas, and accelerates the regional economic development. As a measurable effect, the impact on the local economy shall be monitored and reported in form of contracts with and invoices from local subcontractors and businesses (cf. section D.2.1.2)
• Access to energy services	0	As a local energy source, wind power helps to mitigate Turkey's high import dependency and thus improves the access to energy services, especially in the scenarios of import stops or energy price hikes. The International Energy Agency criticises dependency on oil and gas imports and demands for expansion of renewable energy in Turkey(cf. IEA: Energy Policies, Turkey 2005 review, 2005, pages 85, 100 and 129). However, as the improved access to energy services does not effect the local public (as the electricity is delivered to the grid) and cannot be assigned to specific consumers and therefore not be monitored, a conservative score of zero is applied.
• * Human and institutional capacity (including empowerment, education, involvement, gender)	+1	Project development will promote the use of renewable energies in the region. It will require widespread education and skills improvement, as the local people will be incorporated in the development and maintenance of the project. The local public is intensively involved in the development and decision-making regarding the wind farm within the stakeholder consultation process, representing a new kind of institution as part of the development of a Turkish energy project. One measurable effect on human capacity is the improved skills of plant staff. Education and trainings are part of the monitoring as described in section D.2.1.2.
Sub total	***+4***	
Economic and technological development		
• * Employment (numbers)	+2	Within the installation of the project, there will be created employment opportunities for workers (civil services and turbine installations). 10 new working places during the plant installation will be created. During the operation of the wind farm likely 5 to 15 persons will be employed. According to current plans one plant manager, one electrical engineer and seven technical workers are anticipated for operation of the wind farm. They will, as far as possible, be hired from the region. Employment during construction and operation phase is part of the monitoring, where employment contracts shall serve as evidence for this indicator (cf. section D.2.1.2).

• Balance of payments (sustainability)	+1	The project and its role in strengthening the sustainable sector of electricity generation in Turkey tend to contribute to mitigation of import dependency. With 70 percent of total primary energy supply in the last years[10] and a growing tend this is an important issue for Turkish energy policy. Electricity generation from wind sources is completely independent from any imports and thus does not have any negative effects on the balance of payments.
• Technological self reliance (including project replicability, hard currency liability, skills development, institutional capacity, technology transfer)	+1	As the project developer is a Turkish company using the returns from the GS VER project to enable the realization of the wind farm, the Turkish capabilities, competencies and self-reliance regarding the introduction of innovative technologies are strengthened. The fact that the project activity is not common practice in Turkey is comprehensively derived in section B.3. of the PDD. The project developer considers the investment into and the operation of a new technology in Turkey as a contribution to technological self reliance due to the gathered experience with the proposed project..
Sub total	***+4***	
TOTAL	**+10**	

*Table 1: Sustainable development assessment matrix (*the asterisk denotes indicators that are covered by the monitoring of the project)*

A.3. Project participants:

Name of Party involved	Private and/or public entity(ies) project participants	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	ERTÜRK Elektrik Üretim A.Ş.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

The **Republic of Turkey** is the host country. Turkey has not ratified the Kyoto Protocol yet.

According to the UNFCCC website, the Ministry of Environment and Forestry is in charge of administration of the climate project issues[11]. The Turkish Country Office of the REC initiative has taken over certain functions of a National Focal Point for UNFCCC Article 6[12].

[10] See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, p. 28.

[11] See UNFCCC website, List of National Focal Points http://maindb.unfccc.int/public/nfp.pl?mode=wim (accessed on October 2007)

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

İstanbul region, Çatalca city, close to the villages of Çatalca, Çakıl, Elbasan, İnceğiz

A.4.1.3. City/Town/Community etc:

The site is located approximately 2 km from Çatalca and at around 350 meters above the sea level, on a ridge.

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

The project region is bordered in the north by the Black Sea and in the south by the Marmara Sea. It is situated in the Istanbul region, west from Istanbul and east from Tekirağ (Figure 1). The geographical coordinates of the project activity are presented in the table below. A schematic view of the turbines distribution is demonstrated in Figure 2.

Turbine name	East	North	Turbine name	East	North
T01	621948.000	4554709.000	**T11**	619449.000	4557041.000
T02	621709.000	4554688.000	**T12**	619120.000	4556486.000
T03	621588.000	4555137.000	**T13**	620248.000	4556341.000
T04	621363.000	4555160.000	**T14**	620993.000	4556637.000
T05	621162.000	4555257.000	**T15**	619050.000	4557562.000
T06	620851.000	4555268.000	**T16**	620649.000	4556828.000
T07	620521.000	4555268.000	**T17**	619203.000	4557237.000
T08	620196.000	4555728.000	**T18**	619547.000	4556491.000
T09	622108.000	4555104.000	**T19**	618995.000	4558014.000
T10	619796.000	4556350.000	**T20**	618747.000	4558575.000

Table 2: Coordinates of the turbines

[12] See REC Turkey website, http://www.rec.org.tr/sayfa_en.asp?id=31 (accessed on October 2007)

Figure 1: Çatalca WPP in north-west of Turkey

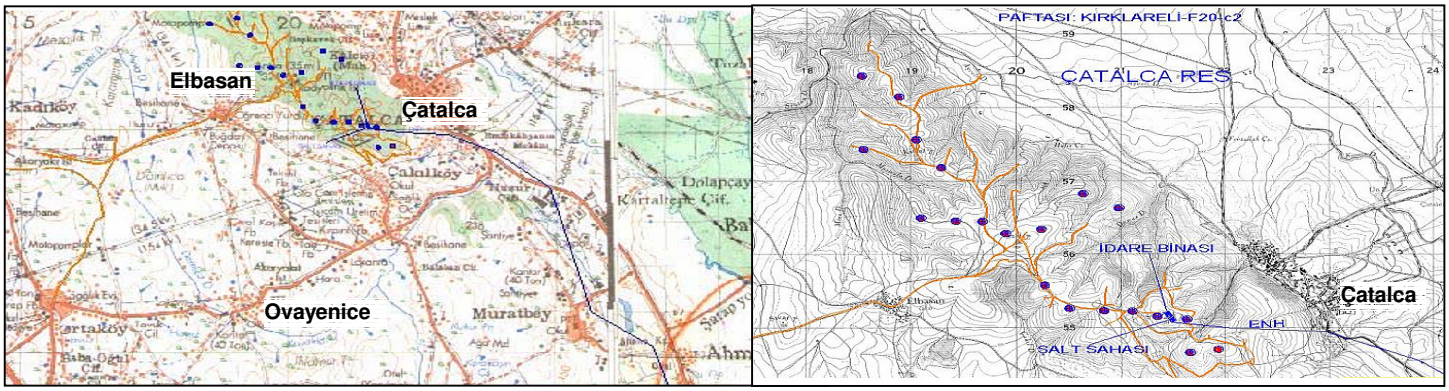

Figure 2: Distribution of the wind turbines

A.4.2. Size of the project:

With an installed capacity of 60 MW Çatalca WPP is classified as a large-scale project.

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

Çatalca WPP falls in the category A.1., Renewable Energy, according to the Gold Standard VER Project Developer's Manual.

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:

Emission reductions will be calculated based on the calculated Combined Margin (for details see B.2.). With the assumed yearly net electricity generation of approx. **211 GWh**, over the period of 7 years the project activity will generate approx. **149,510 tCO_2** emission reductions per year. The emission reductions will be generated by substituting the energy produced from conventional sources, namely from fossil fuels. The following figures show the shares of the different fuels to the overall Turkish installed electric capacity and generation in the year 2006:

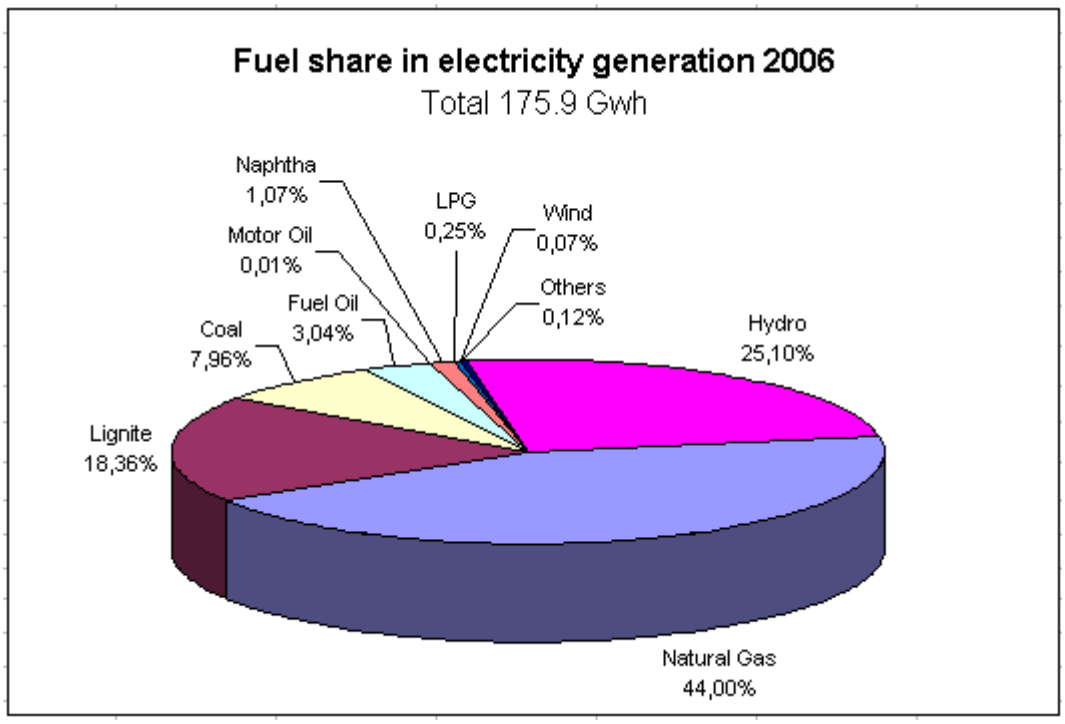

Figure 3: Fuel share in electricity generation 2006[13]

[13] TÜIK http://www.tuik.gov.tr/PreHaberBultenleri.do?id=464&tb_id=3 (accessed on October 2007)

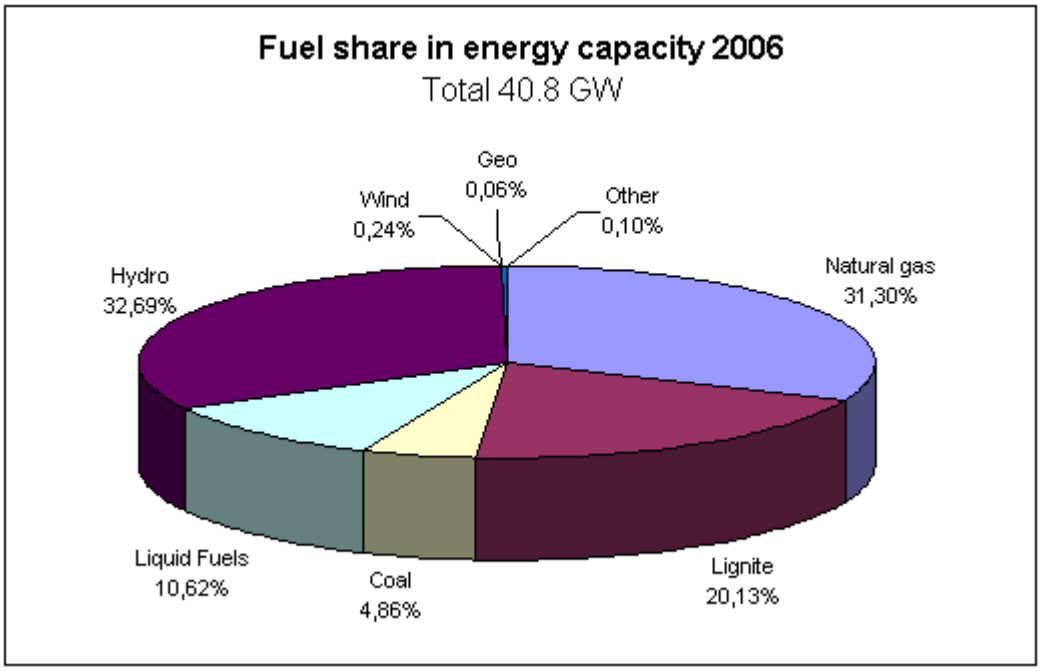

Figure 4: Fuel share in energy capacity 2006[14]

Hydropower is the only relevant zero-emissions primary energy source at the moment in Turkey. The share of non-hydro renewables (geothermal, solar, wind, biomass) with its 162 MW capacity makes some 0.14 percent of total generation. Also noteworthy is the trend in the renewables share: today's 25 percent share of renewables compares to 40 percent in 1990.[15]

But more important for the justification of effective emission reductions by the proposed project activity is a glance at the future trend. While the share of coal (principally lignite) in electricity generation is forecasted by the government to rise from 23 % in 2003 to 33.3 % in 2020, the share of non-hydro renewables is expected to increase only to 1.8 % in 2020 from the current 0.14 %.[16]

These numbers and figures show the contribution of a wind power project like Çatalca to the development of environmental friendly electricity generation. At the moment 9 wind power plants with 131.4 MW installed capacity are in operation. Against the background of expected future growth rates for power consumption of 7 to 10% p.a., the alternative to the wind power plant is a capacity addition representing the above described Turkish mix of hydroelectric and fossil fuelled power plants. They are better known, less risky and financially more attractive from an investor's point of view.

One element forming the general conditions for wind power projects in Turkey is the energy efficiency law from April 2007[17], which contains an amendment to the 2005 renewable energy law regarding feed-in tariffs. The new law stipulates a purchase obligation of 10 years for a purchase price between 5

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14 TEIAS http://www.teias.gov.tr/yukdagitim/kuruluguc.xls (accessed on October 2007)

15 See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, p. 117

16 See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, p. 135

17 Law No. 5627, published in the official gazette on 2 May 2007, see http://www.eie.gov.tr (accessed on October 2007)

and 5.5 €cent/kWh. This tariff is much below the average remuneration in the leading wind markets and does not constitute much of an incentive for investments in little experienced wind power projects in Turkey. These regulations are considered in the investment planning of the project and do not lead to returns that let the project be profitable or attractive for capital investors and lenders.

In comparison with emissions arising from electricity generation representing the Turkish generation mix, 1,046,572 tCO_2 are avoided by the wind power plant over the first seven year crediting period from 03/2008 to 02/2015. The emission reductions would not occur in the absence of the proposed project activity because of various real and perceived risks that impede the provision of financing.

Çatalca WPP, as a large wind power plant, serves as a perfect project to demonstrate long-term potential of wind energy as a means to efficiently reducing greenhouse gas emissions as well as to diversifying and increasing security of the local energy supply and contributing to a sustainable development. The Gold Standard certification shall help to realise this seminal technology by providing an adequate compensation for the lacking financial incentives in the Turkish renewable energies market.

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

The crediting period starts with the commissioning of the plant, exactly with the first day of documented electricity supply to the grid. The expected yearly net electricity generation is listed in the table below. As the project activity is to start in March 2008, the estimated emission reductions from the first and last year of the crediting period sum up to the amount of the estimated yearly reductions.

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2008 (from March)	124,592
2009	149,510
2010	149,510
2011	149,510
2012	149,510
2013	149,510
2014	149,510
2015 (until February)	24,918
Total emission reductions (tonnes of CO_2e)	**1,046,572**[18]
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	149,510

[18] Emission reductions are calculated in Excel spreadsheet, where values are considered with 9 decimal places. In the PDD at hand the presented values are rounded up, therefore the total number of emission reductions does not equal the sum of the yearly emission reductions.

SECTION B. Application of a baseline methodology

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

For the determination of the baseline, the official methodology ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"[19], approved by the CDM Executive Board, is applied, using conservative options and data as presented in the following section.

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

The choice of methodology ACM0002, Version 6, is justified as the proposed project activity meets its applicability criteria:

- Çatalca Wind Power Project is a grid-connected renewable power generation project that adds electricity capacity from wind sources;
- The project does not involve switching from fossil fuels to renewable energy at the site of the project activity;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid are available.

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

The Baseline Methodology specifies how the baseline is described and calculated. It particularly refers to the consolidated tool for the demonstration and assessment of additionality, provided by the CDM Executive Board. In the context of the baseline determination, the project boundary and the Operating and Build Margin have to be established following certain specifications set by ACM0002. In the following the derivation of the emission factor is described.

The baseline scenario is formulated in ACM0002 as follows:

> *"Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the Combined Margin (CM) calculations described below."*

This formulation exactly corresponds to the proposed project activity, also against the background of the in the following described trends in the Turkish electricity generation mix and supported by the additionality demonstration in chapter B.3, where the different scenarios that come into question in this case are discussed.

In the following, the step-wise approach provided in ACM0002 to calculate the combined margin emission factor for Turkey is described.

[19] Revised version 6 from May 19th 2006, see http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763, (accessed on October 2007)

Calculation of the combined margin emission factor

STEP 1: Calculation of the Operating Margin emission factor:

ACM0002 provides four options for calculating the Operating Margin, and guidance for how to choose which option to use for a given project. For the project at hand, method "a" with the calculation of the Simple Operating Margin (Simple OM) shall be applied for the following reasons:

- ACM0002 relies on dispatch data analysis (method c) as its preferred option. However, this approach cannot be applied in this case due to a lack of hourly dispatch data available for the Turkish power grid. As a simpler approach than preferred by the methodology is chosen, great importance is attached to the conservative manner of the derivation of the Operating Margin emission factor in the project design.
- The Simple OM approach can be used where low cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years. The following table shows that this condition is fulfilled:

Share of hydroelectric production 2002 - 2006					
	2002	**2003**	**2004**	**2005**	**2006**
Gross production [GWh]	129,399.5	140,580.5	150,698.3	161,956.2	175,893.3
Hydro [GWh]	33,683.7	35,329.5	46,083.7	39,560.5	44,157.7
Share of hydro	26.03%	25.13%	30.58%	24.43%	25.10%

Table 3: Share of hydroelectric production in Turkey, 2002 - 2006[20]

The Simple Operating Margin (OM) emission factor ($EF_{OM,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low operating cost and must run power plants. According to the Baseline Methodology, the typical low operating cost and must run resources include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. However the only relevant one in Turkey is hydro power. The share of the non-hydro renewables (geothermal, solar, wind, biomass) is only 0.14 percent (average 2002-2006) of total electricity generation and therefore assumed as negligible for this calculation. Nuclear energy is not generated in Turkey. There is also no indication that coal is used as must-run.

Therefore the only low cost and must run plant not included in the calculation are hydropower plants.

The following formula shall be applied:

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} * COEF_{i,j}}{\sum_{j} GEN_{j,y}}$$

Formula 1

[20] TEIAS, Development of Electricity Generation, Internet: http://www.teias.gov.tr/istatistik2005/35.xls and http://www.tuik.gov.tr/PreHaberBultenleri.do?id=464&tb_id=3 (both accessed on October 2007)

Where

$F_{i,j,y}$	is the amount of fuel *i* consumed by relevant power source *j* in year *y*;
j	refers to the power sources delivering electricity to the grid with the above described conditions;
$COEF_{i,j,y}$	is the CO_2 emission coefficient of fuel *i*;
$GEN_{j,y}$	is the electricity delivered to the grid by source *j*.

For the calculation of the OM the consumption data of the fuels used is taken from the TEIAS data base, which holds data on annual fuel consumption by fuel type as well as on electricity generation by sources and electricity imports. The data for the year 2006 are not fully available, therefore the calculation of the OM data from years 2003-2005 is used. All the data needed for the calculation, including the emission factors and net calorific values (NCVs), both taken from IPCC, are provided in Annex 2 (Table 15 and Table 16).

At first the overall emissions from electricity production are calculated:

CO_2-emissions from electricity production 2003-2005			
	2003	**2004**	**2005**
CO_2-emissions [$ktCO_2$]	**75,489**	**76,291**	**95,468**

Table 4: CO_2-emissions by electricity production 2003-2005[21]

Table 5 presents the gross electricity production data by all the relevant energy sources. Low-cost/must-run resources like hydro, wind, geothermic and biomass do not emit fossil CO_2 and thus are not considered.

Gross electricity production by energy source 2003-2005 [GWh]			
	2003	**2004**	**2005**
Natural gas	63,536.0	62,241.8	73,444.9
Lignite	23,589.9	22,449.5	29,946.3
Coal	8,663.0	11,998.1	13,246.2
Fuel oil	8,152.7	6,689.9	5,120.7
Motor oil	4.4	7.3	2.5
Naphtha	1,036.2	939.7	326.5
LPG	2.9	33.4	33.7
Gross electricity production from fossil fuels	**104,985.1**	**104,359.7**	**122,120.8**

Table 5: Gross electricity production by energy source 2003-2005[22]

[21] Calculation based on the annual consumption of fossil fuels and accordant net calorific values, for details see Annex 2

[22] TEIAS, see http://www.teias.gov.tr/istatistik2005/35.xls (accessed on October 2007)

As Table 5 shows gross data, but $GEN_{j,y}$ in the above described formula means electricity delivered to the grid, i.e. net generation, the following table shall help to derive net data by calculating the net/gross proportion on the basis of overall gross and net production numbers.

Relation net/gross electricity production 2003-2005			
	2003	**2004**	**2005**
Gross production [GWh]	140,580.5	150,698.3	161,956.2
Net production [GWh]	135,248.3	145,065.7	155,469.1
Relation	**96.21%**	**96.26%**	**95.99%**

Table 6: Net/gross electricity production 2003-2005[23]

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

The following table shows the resulting net data for fossil fuel generation and adds electricity imports.

Net el. production by fossil fuels and import 2003-2005 [GWh]			
	2003	**2004**	**2005**
Net electricity production from fossil fuels	101,003.0	100,459.1	117,229.3
Electricity import[24]	1,158.0	463.5	635.9
Electricity supplied to grid by relevant sources	**102,161.0**	**100,922.6**	**117,865.2**

Table 7: Electricity supplied to the grid, relevant for OM

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

The last step is to calculate the ratio of emissions and generation:

OM emission factor 2003-2005 [tCO_2/MWh]			
	2003	**2004**	**2005**
OM emission factor	**0.7389**	**0.7559**	**0.8100**

Table 8: OM emission factor for 2003-2005

[23] TEIAS, see http://www.teias.gov.tr/istatistik2005/34.xls (accessed on October 2007)

[24] TEIAS, see http://www.teias.gov.tr/istatistik2005/34.xls (accessed on October 2007)

The Baseline Methodology allows two data vintages for the calculation of the OM emission factor:

- *Ex ante*: A 3-year average, based on the most recent statistics available at the time of PDD submission
- *Ex post*: The year in which project generation occurs, if the OM emission factor is updated based on ex post monitoring

As the necessary data to show a 3-year average OM emission factor is available, the ex ante approach is chosen for the project at hand. This again is assumed to be a conservative approach, as the share of fossil fuels in the Turkish generation mix tends to rise in the future, as shown in chapter A.4.4.

The mean value of the 2003-2005 figures as shown in Table 8 shall be applied. Therefore the OM emission factor is **0.7683 tCO_2/MWh**.

STEP 2: Calculation of Build Margin emission factor:

According to the Baseline Methodology the Build Margin emission factor EF_{BM} is calculated as the generation-weighted average emission factor of a sample of power plants *m* for a specific year, as follows:

$$EF_{BM}\,[tCO_2 / MWh] = \frac{\sum_{i,m} F_{i,m} * COEF_{i,m}}{\sum GEN_m} \qquad \textbf{Formula 2}$$

Where

$F_{i,m}$	is the amount of fuel *i* consumed by relevant power sources *m;*
$COEF_{i,m}$	is the CO_2 emission coefficient of fuel *i*, taking into account the carbon content of the fuels used by relevant power sources *m;*
GEN_m	is the electricity (MWh) delivered to the grid by source *m*.

Calculation of the Build Margin is based on the sample of plants, which consists of either:

- the five power plants that have been built most recently, or
- the most recently built power plants capacity additions to the electricity system that comprise 20% of the system generation (in MWh).

From these two options the sample group that comprises the larger annual generation shall be used.

For the project at hand, a list of recently built power plants was made available by the state-owned Turkish Electricity Transmission Company (TEIAŞ), naming their capacity, type of utility (e.g. IPP, autoproducer, BOT), fuel type and date of commissioning. The list does not contain data about the annual electricity generation or even fuel consumption, which would be necessary to calculate the Build Margin emission factor according to the above stated model. It was not possible to obtain more detailed data from official sources.

Furthermore, the characteristics of recent capacity additions pose some challenges:

- The five most recently built power plants add up to a capacity of 105.6 MW and represent approximately 0.25 percent of the overall Turkish annual generation, which in 2006 amounted to (gross production) 175.9 TWh[25], and thus by far do not reach the 20% threshold.
- Alternatively the Build Margin can be calculated by using the latest capacity additions comprising 20% of the system generation. Due to the lacking generation data for each plant in the list, this is only possible by use of an approximation. 20% of 175.9 TWh amount to 35.2 TWh. Assuming for all the plants on the list an average amount of full load hours for each fuel type based on the generation and capacity data between 2004 and 2006, the latest 161 plants would add up to 24%. The oldest plant in the list adds more then 4% to the sample group's generation and thus is fully included in the calculation.

For calculating the most recent 24% of the generating units built, the data from TEİAŞ[26] is used. The derivation of the values presented in Table 9 is contained in a separate excel file which is available for validation.

Energy type	Average full load hours 2004-2006 [h]	03/2003 - 08/2007		BM emission factor [tCO_2/MWh]
		Capacity additions [MW]	Equivalent generation [MWh]	
Natural Gas	6,295	4,192.6	26,391,781	0.4390
Lignite	3,869	530.7	2,052,985	1.1018
Coal	6,724	1,506.0	10,125,831	0.8230
Liquid Fuels (Fuel Oil, Motor Oil, LPG, Naphtha)	1,358	306.3	415,833	0.6669
Hydro	3,338	824.5	2,752,221	0
Wind	2,435	3.6	8,645	0
Geo	5,952	8.0	47,321	0
Other	3,151	197.9	623,641	0
Total	**4,188**	**7,569.5**	**42,418,309**	**0.5295**

Table 9: Build Margin calculation

The wind farms Bares, Anemon, Karakurt and Mare are not included in the Build Margin calculation, as they are registered as VER projects.

In order to generate a weighted Build Margin emission factor, at first the emission factors for each energy source have to be calculated:

Fuel specific emission factors: Fuel specific emission factors are taken from the "2006 IPCC Guidelines for National Greenhouse Gas Inventories"[27].

[25] Turkish Statistic Institute, http://www.tuik.gov.tr/PreHaberBultenleri.do?id=464&tb_id=3 (accessed on October 2007)

[26] TEIAS http://www.tuik.gov.tr/PreHaberBultenleri.do?id=464&tb_id=3, http://www.teias.gov.tr/yukdagitim/kuruluguc.xls and http://www.teias.gov.tr/istatistik2005/35.xls (accessed on October, 2007)

Electrical efficiency rates: There are no power plant specific efficiency data available. Therefore average efficiency rates from Turkish fuel consumption and electricity generation statistics were calculated and rounded up in order to be conservative. These rates were checked for plausibility by comparing them with values from the European Commission's "Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for Large Combustion Plants" (July 2006). The derivation of the data is presented in a separate Excel file, which is available for validation.

The following table shows the plant specific emission factors calculated from the carbon dioxide emission factor of the fuel and the technology specific average efficiency.

Energy source	Emission Factor [tCO_2/MWh]	Efficiency	BM emission factor [tCO_2/MWh]
Natural Gas	0.2020	46%	0.4390
Lignite	0.3636	33%	1.1018
Coal/ Anthracite	0.3539	43%	0.8230
Fuel/Motor Oil	0.2668	40%	0.6669

Table 10: Fuel specific CO_2 emission factors

Equivalent electricity generation

The equivalent electricity generation $EquivGEN_{BM,j}$ for each fuel type *j* of the most recent 24% of the generating units built is calculated as follows:

$$EquivGEN_{BM,j}\,[MWh] = CAP_{add,03'03-08'07,j}\,[MW] * FLH_{av\,2004-06,j}\,[h] \qquad \textbf{Formula 3}$$

Where:

$CAP_{add,03'03\text{-}08'07}$ are the capacity additions between March 03 and August 07

$FLH_{av\,2004\text{-}06,j}$ are the average full load hours per fuel type *j* of the years 2004-2006

For calculations see Table 9 above.

The applied data result in a weighted Build Margin emission factor of **0.5295 tCO_2/MWh**.

STEP 3: Baseline emission factor

The baseline emission factor is the weighted average of the Operating Margin emission factor and the Build Margin emission factor. According to ACM0002 the default weight values for the wind power projects are 75% for OM and 25% for BM, which leads to following formula:

$$EF = 0.75 * EF_{OM} + 0.25 * EF_{BM} \qquad \textbf{Formula 4}$$

The resulting baseline emission factor is **0.7086 tCO_2/MWh**.

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27 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2: Energy, Table 1.4

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:

For the explanation of how and why the project activity leads to emission reductions that are additional to what would have occurred in the absence of the project activity and therefore is not part of the baseline scenario, the Baseline Methodology refers to the latest version of the "Tool for the demonstration and assessment of additionality"[28], that defines a step-wise approach to be applied to the proposed project.

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

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

In the absence of the project activity, the accordant amount of electricity would be delivered through the grid, which to a large extent is fed by fossil sources, leading to carbon dioxide emissions. Demand for electricity in Turkey is growing quickly, therefore additional capacities are necessary. The following figure and related data show the future trend of electricity generation, whereas generation from non-hydro renewables and especially from wind is not part of the business as usual scenario:

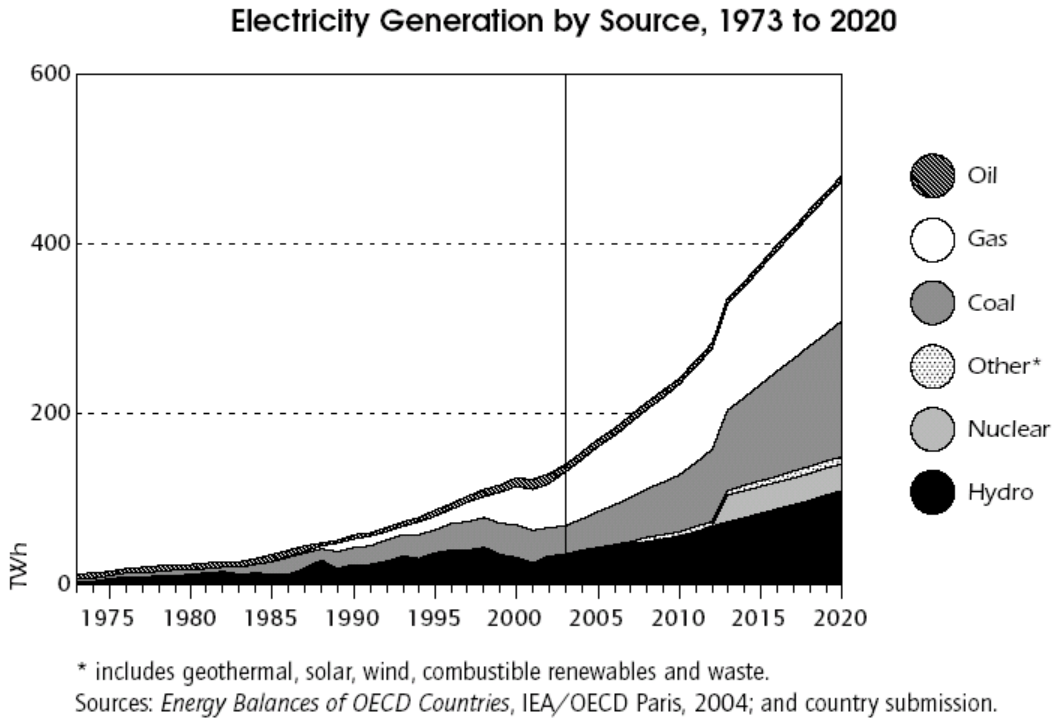

Figure 5: Electricity generation by source, 1973 to 2020[29]

[28] Version 03 from Feb. 15th-16th 2006, taken from http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf, (accessed in October 2007)

[29] See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, p. 134

The graph is accompanied by the following estimations regarding the development of the share of sources for electricity generation:

	2003	2010	2020
Electricity generation [TWh gross]	140.58	242.02	481.38
Output shares (%)			
Coal	23.0	27.3	33.3
Oil	6.5	2.9	1.3
Gas	45.2	44.1	34.3
Comb. renew. & waste	-	-	-
Nuclear	-	-	6.6
Hydro	25.1	23.6	22.8
Geothermal	0.1	0.2	0.1
Solar/Wind/Other	0.0	2.0	1.7

Table 11: Development of electricity generation and sources[30]

These data are confirmed by current plans for new lignite power plants – a part of the Turkish strategy to decrease import dependency.

Besides rehabilitation and replacement of existing power plants and reduction of transmission and distribution losses, new capacities have to be added to satisfy demand in the medium and long term. These capacity additions will be carried out amongst others by private investors, as publicly-owned generators have not been allowed to make investments in new power plants since 2001, the time of economic depression. Private investors again face some difficulties in deciding large investments in the current situation of state-defined low prices especially in the baseload segment, as they have to compete with fully depreciated state-owned power plants.[31]

Regarding the baseline scenario, which is characterised by the above described status and development of the Turkish generation mix, it is not in the hands of ERTÜRK as project participant to influence the future mix. ERTÜRK can only chose between investing or not investing into the proposed project and thus has no further alternatives.

Therefore the realistic and credible alternatives available to the project participants or similar project developers that provide new electricity generation capacity are:

1. **the proposed project not undertaken as a Gold Standard VER project activity**
2. **the same service of power supply is provided from the grid (Çatalca WPP is not built)**

With analysing these two alternative scenarios within the additionality test, consistency with the baseline definition of ACM0002 is assured. ACM0002 defines the baseline scenario as the amount of electricity that would be delivered to the grid by the project activity, generated by the operation of existing grid-connected power plants and by the addition of new generation sources, as reflected by

[30] See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, Annex A, p. 171

[31] See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, p. 135

the combined margin. In the following it will be shown that this baseline scenario (scenario 2) is the most plausible scenario in this case and that the implementation of the proposed project is additional to what would occur in the absence of the proposed project.

Sub-step 1b: Enforcement of applicable laws and regulations

The above discussed scenarios are in compliance with applicable legal and regulatory requirements.

Step 2: Investment Analysis

Investment Analysis is not applied.

Step 3: Barrier Analysis

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

The main barriers for renewable energy investments in Turkey are the lacking financial incentives, uncertainty about the future national policy, currency risks, lacking experience and disadvantages compared to conventional technologies with view to the regulatory framework. The carbon market turns out to be an innovative and effective element of an "enabling environment" for new renewable sources for electricity generation in Turkey. While the national policy can concentrate on the manifold aspects how to support the rapidly developing economy, funds from international credit buyers help the simultaneously fast growing electricity market to pursue a sustainable path by alleviating barriers which project developers face. The following barriers partly apply in general to all wind power projects and partly are project specific.

System usage fee

Wind projects do especially suffer from the regulation concerning fees for the public grid system usage. The system usage fee, that has to be paid to TEIAS, is calculated on the basis of the installed capacity of a power plant. For conventional power plants, which use their installed capacity to some 80 to 85 percent to generate electricity, this means a much lower relative burden than for wind power plants, which use their capacity only to some 40%. Demands for calculation of system usage fee on the basis of actual output are rejected by TEIAS.[32] This shows the barrier for scenario 1, the investment into a wind farm, that scenario 2 does not face. Quite the contrary, the system usage fee's design privileges conventional power sources, as they generally use their installed capacities to a relevantly higher degree than wind and other renewable sources.

Moreover, the height of the system usage fee is unevenly regionally distributed over Turkey. Wind farms again suffer from the fact that the system usage fee in the Turkish western, where most of the wind sites are located due to the good wind conditions, is among the highest in Turkey. This leads again to financial advantage of conventional power plants that are less dependent on site specific characteristics.

[32] See speech by Mr. Tolga Bilgin, chairman of Ressiad (Wind Power and Hydro Power Plants Businessmen's Association) on March 9th, 2007 in Istanbul. Internet: http://www.ressiad.org.tr/makaleler.php?ID=62 (accessed on October, 2007)

Situation with respect to market liberalisation

Wind power can hardly profit from electricity market liberalisation. Though they have the possibility to close contracts with private electricity buyers, who would pay higher prices than the state owned electricity distributor TEIAS, but then face the risk that they have to supply electricity also in times where the wind farm does not produce. This means they have to buy the contractual amounts on the market, most probably for a higher price than they sell it to their customer, thus producing financial losses with every kilowatt hour that has to be delivered without the wind farm producing. As this risk is hardly calculable, wind power producers rely to the very low, but guaranteed prices TEIAS pays. Operators of conventional power plants can benefit from liberalisation, as they can more flexibly adapt generation to actual demand.

Price cap for renewable electricity

Concerning the guaranteed feed-in tariff for renewable electricity, the Energy Efficiency Law defines a minimum price of 5 Eurocent per kWh for 10 years for plants put in operation before the year of 2012. However there is also a maximum price of 5.5 Eurocent per kWh which has to be paid to the producer. This regulation does not exist in other incentive schemes for renewable electricity in Europe and thus does not leave much of a real incentive to this law. In addition, since some 50 percent of electricity generation in Turkey is by the state, any competition above the 5 Cent threshold is anyway limited, as the state can regulate the electricity supply and with this influence the prices.

Privatisation of electricity distribution

While the ongoing privatisation activities do not bring any chances for wind power producers, they rather contain the risk of rising distribution fees. All these uncertainties have to be considered within the financial and investment planning of the project and complicate access to equity and loans for wind power investments.

Availability of dept financing

The barriers described above contribute to the main barrier being the low attractiveness of the project to investors and therefore the difficulties in obtaining debt funding. This was the major problem in project development due to the low IRR combined with the high risks involved with implementation of a still new project type in Turkey. Generally investment in Turkey is associated with relatively high risks – especially after the economic crisis in 2001 – which makes access to international capital markets difficult. Beside the generally high perceived country risks in Turkey, the disadvantages and risks associated with the inexperienced wind market and technology in Turkey lead to difficulties in finding a reasonable offer for debt financing. This kind of investment barrier is also getting obvious by analysing the Turkish wind power development. Despite good wind conditions, some 40 wind licenses are waiting for implementation into a project since years, most of them untouched, some of them offered for sale, some soon running out, all because of lacking financing for wind power projects.

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

As the above presented barriers are largely specific to wind power projects, they do not – or only to a very small extent – affect the alternatives that are included in the baseline scenario of ACM0002, namely the electricity generation by existing grid-connected power plants and the addition of new generation sources.

Alleviation of the identified barriers by GS-VER income

The major problem in project development being the low economical attractiveness of the project activity from the investor's perspective, the identified barriers and economic and financial hurdles described above will be overcome by additional revenues from generation and sale of GS-VERs.

As for corporate decisions, financial ratios are a relevant basis, the effect of GS-VER registration is analysed by assessing the influence on the payback period. For electricity sales, the numbers from the internal calculations of ERTÜRK, taken from a conservative approach of the feasibility assessment and micrositing, are used and carbon credit revenues from one and two crediting periods assumed. This approach is still conservative, as the project proponent assumes to re-validate and continue the project for two more periods, thus for the maximum period of 21 years.

Assumptions:

- Electricity generation: 211,000 MWh p.a.
- Emission reductions: 149,510 tCO_2e p.a.
- GS-VER price according to an available contract (value confidential)
- One or two crediting periods

The impact of integrating GS-VER sales into the project calculations is already getting evident by only considering the first 7 year crediting period, reducing the payback period by almost two years. It is getting even more obvious when also the second crediting period is taken into account, assuming the same values for electricity generation and emission reductions as in the first period (reduction of payback period by some 2.3 years). For a potential investor or lender, not only the reduced paypack period is an important argument for investing into the project but also the fact that the project developer considered all possible sources of income, thus showing a responsible and careful handling of investment projects. For SANKO, the shareholding company of Ertürk, the consideration of carbon financing played a decisive role in the investment decision, which is documented in accordant board resolutions. The board resolutions and financial calculations are available for validation.

In case Turkey ratifies the Kyoto Protocol and becomes a JI or CDM host country, the project developer intends to upgrade the Çatalca GS-VER project to be registered as a JI or CDM project activity. Appropriate provisions will be made in any Emission Reduction Purchase Agreements closed by the project developer.

Step 4: Common Practice Analysis

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

At the moment, 56 licenses for wind power plants are issued by EPDK, the "Electricity Market Regulation Agency".[33] As there is no official information available about the status of the projects, own observations have to give an impression of the proceedings on the Turkish wind market.

[33] See http://www.epdk.org.tr/lisans/elektrik/lisansdatabase/verilenuretimsorgula.asp, (accessed on October 2007)

According to the IEA country report, four wind power plants were installed before 2006, adding up to 20.1 MW[34]. This is confirmed by information from Ressiad[35] and TEIAS[36], providing further details about the projects. From 2006 on, wind market activities can be observed by the increasing informal activities between the different players on conferences and fairs as well as the growing networks. Known realised projects since 2006 are Bares and Karakurt, Mare and Anemon. With this, the following wind parks are known to exist so far:

Nr.	Plant	Operator	Model	Capacity [MW]	Region	Operation
1	Delta Plastik	Demirer Holding	Autoproducer	1.50	İzmir	Aug 1998
2	ARES	Güçbirliği Holding	BOT	7.20	İzmir	Dec 1998
3	BORES	Demirer Holding	BOT	10.20	Çanakkale	Jun 2000
4	Sunjüt	Demirer Holding	Autoproducer	1.20	İstanbul	April 2005
5	Bares	Bares Elektrik	IPP	30.00	Balıkesir	May 2006
6	Tepe	Ertürk	IPP	0.85	İstanbul	Sep 2006
7	Anemon	Anemon Elektrik	IPP	30.40	Çanakkale	Feb 2007
8	Karakurt	Deniz Elektrik	IPP	10.8	Manisa	Apr 2007
9	Mare	Enercon-Demirer	IPP	39.2	Çeşme, İzmir	Apr 2007

Table 12: Wind Power Plants in Operation

Concerning the first three plants, they were built before 2001, the year of economic crisis. Two of them are realised as BOT (Build Own Transfer) plants, that means stately owned and with guaranteed income. The other one is very small and serves to feed industry plants with electricity, thus based on a different business model than IPP (Independent Power Producer) wind power plants with the purpose of selling electricity to the grid. This description applies also to Nr. 4.

Nr. 5, 7,8 and 9 are the first real private investments into large wind power with the purpose of earning money from electricity sale (IPP – Independent Power Producer). All four are realised with the help of carbon credits, with Bares and Karakurt being validated VER projects and Anemon and Mare as Gold Standard VER projects in the validation stage.

It is more difficult to get an impression of the ongoing developments regarding wind power plants that shall soon be built. From what is known to the project developer, three more VER and GS-VER wind power projects are underway to be built and completed until early 2008, one of them being the already validated VER project 30 MW Sebenoba wind farm, built and operated by Deniz Elektrik.

[34] See IEA (International Energy Agency): Energy Policies, Turkey 2005 Review, 2005, p. 123

[35] Ressiad: Wind Power and Hydropower Plants Businessmen's Association, www.ressiad.org.tr

[36] Turkish Electricity Distribution Company, www.teias.gov.tr

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

As shown above, the observed activities in the Turkish wind market can either not be considered similar, as they were realised under a different environment, or do not have to be included in this analysis since they are realised as VER or GS-VER projects. For only one project (Nr. 6 from Table 12) with 0.85 MW installed capacity there is no further information on the circumstances for their implementation. Nevertheless, their size alone gives a reason for not including them into the common practice analysis, as the investment risks are far away from those for Çatalca. Thus, no similar options occur, showing that wind power is far from being common practice in Turkey.

Summarizing the above one can state that the commercial risks are high for this project. Without GS-VERs income, the proposed project does not represent an economically attractive investment opportunity. Taking into consideration the significant technological and investment barriers and barriers due to prevailing practice in conjunction with renewable energies and specifically with wind energy in Turkey, investors are unlikely to invest into the project in the absence of carbon finance.

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

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

The project consists of the 20 wind turbines that are connected to the grid via a 1 km transmission line.

	Source	Gas	Included?	Justification/Explanation
Baseline	Generation mix of Turkish electricity grid	CO_2	Yes	ACM0002 assumption: Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.
Project Activity	Construction and operation of WPP	CO_2	No	Project emissions are negligible during construction and non-existent during operation, as a net electricity generation approach is chosen.

For the purpose of determining the build margin (BM) and operating margin (OM) emission factor, the project electricity system is defined as the overall Turkish electricity network. According to TEIAS, the Turkish transmission system is interconnected. There is no independent Istanbul regional electricity system or any significant transmission constraints.

For electricity imports from neighbour countries, the emission factor of 0 tons CO_2 per MWh is applied.

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

Date of completion: 8 November 2007

Name of entity determining the baseline:
FutureCamp GmbH, Germany (project consultant)
Tel: +49 (89) 68 008-330
Fax: +49 (89) 68 008-333
Email: climate@future-camp.de

Contributor: ERTÜRK Elektrik Üretim A.Ş.

FutureCamp is not a project participant.

SECTION C. Duration of the project activity / Crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

Turbine installation shall begin in the end of November 2007. With this, the project activity begins in November 2007.

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

The expected lifetime of the Çatalca WPP project is 49 years.

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

A renewable crediting period has been selected for the project.

C.2.1. Renewable crediting period

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

The first crediting period starts with commissioning of the wind power plant expected to be in March 2008.

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Application of a monitoring methodology and plan

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

Approved Monitoring Methodology ACM0002 (Version 06), which is the consolidated monitoring methodology for grid-connected electricity generation from renewable sources, is applied.

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

Application of the ACM0002 monitoring methodology to Çatalca WPP is justified because:

- the approved methodology ACM0002 for baseline determination is used,
- the project activity is connected to the grid and information on its characteristics is available,
- electricity generation from the wind energy sources,
- this is not a fuel-switch project.

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

As the necessary baseline emission factors are all defined ex ante (Operating and Built Margin, see baseline description), the only information to be monitored is the amount of electricity fed into the grid by Çatalca WPP. This value will be monitored continuously by redundant metering devices, one of them being the main electricity meter to provide the data for the monthly invoicing to TEIAS.

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

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

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

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

Left blank on purpose, as the proposed project activity is a zero-emission generating activity.

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

As there are no particularly sensitive nor critical sustainable development indicators identified, it is not required to include accordant indicators into the monitoring plan in order to comply with the Gold Standard rules. However, in order to follow the idea of the Gold Standard, adequate indicators are chosen for the monitoring and shown in the table below.

Sustainable Development Indicator	Data type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)
Employment during construction phase		Number of employees		m
Employment for plant operation		Number of employees		m
Training for the employees		Employees with type of training		m
Impact on the local economy		Number and type of contracts		m
Waste management during construction phase (waste water and solid waste)		Content of the sub-contract		m
Tree planting		Correspondence with the ministry of forestry		m

How to measure, calculate or estimate the above listed indicators is described below:

- **Employment during construction phase:** This indicator is chosen as a quantifiable way to demonstrate the project activity's impact on the local and regional employment and thus its positive social impact. Both the project developer and his sub-contractors commit themselves to source as many staff as possible locally. This is even their interest, as this reduces moving costs or temporary living costs. To measure this impact the employment contracts and contracts with sub-contractors will be used. At the first verification, a short evaluation of local employment will be presented.
- **Employment during plant operation:** New jobs will be created by the wind power plant. For the operation of the plant, 7 people have to be hired: The plant will be manned 24 hours by two persons, divided into three shifts, with one more person as reserve. The employment contracts serve as evidence for the verification.
- **Training for the employees:** A dedicated training raises the professional skills of the local people. Two people will be send to Italy to a Vestas course in order to educate and train them for the work at the wind power plant. Back in Turkey they will lead the training for the rest of the staff. The employees record, containing work contract and training certificates, serves as evidence for training measures. A list of the employees and respective training will be prepared and provided for verification. All the data will be documented in the monitoring report.
- **Positive impact on the local economy:** As another positive social impact, the local business that is generated due to the project activity shall be documented. Business will mainly be generated throughout the construction phase, which will be documented by contracts with and invoices to local partners.
- **Waste management during construction phase:** In order to keep environmental impacts from accruing solid and liquid wastes during construction works for the wind farm minimal, a dedicated company is assigned by Ertürk for transport and treatment of the waste. This is chosen as an indicator to prove that negative environmental effects are avoided. The respective contract, which includes the necessary measures, will be available for the first verification audit.
- **Tree planting:** One unavoidable measure associated with the wind farm construction is the cutting of trees. The tree population on this site is not old, and tree cuttings are reduced to a minimum by an adequate choice of turbine and crane sites. The local forestry authority was involved in the site determination and agreed to the final layout. Environmental law requires that every tree which is cut shall be replaced by planting two trees at another site. The determination and plantation of trees is implemented by the forestry authority, the project developer has to pay for the measures. As the activities of the forestry authority are documented in form of official correspondence with the project developer, this shall serve as documentation for the verification of this indicator.

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

Project emissions are zero.

D.2.1.4. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived :

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment
1. GEN_y	Net electricity delivered to the grid	Electricity Meter	*MWh*	*m*	Continuously	*100%*	Electronic and paper	The data will be taken from the monthly meter readings, documented in the "meter reading record". The latter serves as basis for the settlement notification by TEIAS and the following invoicing by Ertürk.

The collection and archiving of all relevant data necessary for determining the baseline of anthropogenic emissions by sources of greenhouse gases within the project boundary during the crediting period is provided in an excel file which is available for the verification. In this file the derivation of the Operating Margin, the Build Margin and the Combined Margin is shown in detail.

D.2.1.5. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

Baseline emissions are estimated by using the following formula:

Formula 5

$$BE_y = GEN_y * EF$$

Where:

BE_y	Baseline emissions [tCO_2e]
GEN_y	Annual electricity supplied by the project to the grid [MWh]
EF	Baseline emission factor [tCO_2e/MWh]
y	Refers to a given year

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

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

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

Not applicable

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Not applicable

D.2.3. Treatment of leakage in the monitoring plan

Potential leakage emissions in the context of power sector projects are emissions arising due to activities such as power plant construction, fuel handling and land inundation. However, according to ACM0002, those emission sources do not need to be taken into account.

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

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

Not applicable

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

Not applicable

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_2 equ.)

Emission reductions in year y (ER_y) are equal to the baseline emissions described in D.2.1.5. (BE_y): $ER_y = BE_y$

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.
Quantity of net electricity delivered to the grid (GEN_y)	Low	The Turkish Electricity Market Regulation Agency (EPDK) sets rules on the accuracy of electricity meters that are used by power plants feeding into the grid. The rules are part of the EPDK regulation 25056 from 22 March 2003. The table in Article 11 of the regulation specifies the use of electricity meters of the accuracy class 0.5S for power plants between 10 and 100 MW and refers to compliance with International Electrotechnical Commission's norm EN 60687. TEIAS, who's employees will monthly visit the plant for the meter readings, is in charge of ensuring the adherence to these rules. Calibration and maintenance procedures will follow the requirements. Regarding the electricity meters; two class IEC-60687 0.5S ELSTER A1500 electric meters and grid analyzer, which are in compliance with TSE (Turkish Standards Institute) and IEC standards and which have Type and System Approval Certificates issued by the Ministry of Industry and Trade of the Republic of Turkey, are used at Catalca Wind Power Plant. Furthermore, class IEC-185, IEC-44 0.2S current and voltage transformers are used for connection of the meters. Tests and acceptances of transformers are made by the specialists of TEIAS in accordance with the relevant standards and their compliance are approved. Meters are calibrated under supervision of TEIAS by controlling with Etalon meters. All documents regarding meter quality and approvals/accesptance will be presented at the first verification. The fact that two reliable best practice meters are installed in a redundant manner keeps the uncertainty level of the only parameter for baseline calculation low. High data quality of this parameter is not only in the interest of the emission reduction monitoring, but paramount for the business relation between the plant operator and the electricity buyer.

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

As described above, the only relevant data that has to be monitored is the net electricity generation (GEN_y) per year. These data are subject to the accounting quality systems of both parties to the power purchase agreement, TEIAS and Ertürk. With this, no additional structures or processes have to be implemented to insure the availability of the necessary data for monitoring.

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

For the operating stage the responsibilities and management structure has yet to be defined. Names, jobs and structure will be presented with the first monitoring report.

The overall responsibility for monitoring and reporting issues is with ERTÜRK. This includes:

- monitoring, measurements and reporting
- records handling
- dealing with possible monitoring data adjustments and uncertainties
- review of reported results/data and project performance
- internal audits of GHG project compliance with operational requirements as applicable

Quality assurance for the plant operation in general is a main aspect in the contract with the turbine supplier. The contract with VESTAS includes power curve guarantee as well as complete maintenance and service procedures for the first two years of operation. After two years, the own team of Ertürk is able to perform service and maintenance. The contract with VESTAS includes a dedicated training for two members of the wind farm staff at VESTAS Italy. Under the guidance of those staff and the VESTAS employees who are in charge of maintenance and service during the first two years, a competent team will form ensuring high quality operation of the wind farm.

All of the data needed for the calculation of emission reductions will be kept by ERTÜRK during the crediting period and until two years after the last issuance of GS-VERs for Çatalca WPP project activity.

Quality of data handling and storage is assured by the business processes between Ertürk and TEIAS. The monthly meter reading documents are stored by Ertürk and TEIAS, the settlement notification, which is issued by TEIAS and includes the meter reading data, is stored on a TEIAS file server and accessible by Ertürk via a secured website. The meters themselves can always be read as plausibility check for verification.

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

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

FutureCamp GmbH, Germany (project consultant)
Tel: +49 (89) 68 008-330
Fax: +49 (89) 68 008-333
Email: climate@future-camp.de
Contributor: ERTÜRK Elektrik Üretim A.Ş.

FutureCamp is not a project participant.

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

There are no emissions associated with the production of electricity using wind energy.

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 zero.

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

The estimation of the anthropogenic baseline emissions is based on the expected net electricity generation, which amounts to 211 GWh p.a., and the above calculated baseline emission factor (for formula description see D.2.1.4). The yearly average baseline emissions amount to **149,510 tCO_2 p.a.** and over the period of 7 years in sum to **1,046,572 tCO_2**. For all calculations, the complete baseline emission factor is applied, not the rounded value of 0.7086.

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

As project emissions and leakage emissions equal zero, only baseline emissions are relevant (BE_y). Therefore, amount of the emission reductions equals the amount of the baseline emissions.

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

Year	Estimation of project activity emission reductions (tonnes CO_2e)	Estimation of baseline emission reduction (tonnes CO_2e)	Estimation of leakage (tonnes CO_2e)	Estimation of emission reductions (tonnes CO_2e)
2008 (Mar -)	0	124,592	0	124,592
2009	0	149,510	0	149,510
2010	0	149,510	0	149,510
2011	0	149,510	0	149,510
2012	0	149,510	0	149,510
2013	0	149,510	0	149,510

2014 (- Feb)	0	24,918	0	24,918
Total	**0**	**1,046,572**[37]	**0**	**1,046,572**

SECTION F. Environmental impacts

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

A preliminary environmental impacts study of the Çatalca WPP has been prepared. Preparation of an EIA was not required by Turkish law, which is confirmed by an accordant certificate from the regional environmental authority from 30 January 2007. The environmental sustainability was analyzed in detail with the help of the Sustainable Development Assessment Matrix, where no negative points have been collected. All potential environmental issues were also discussed in detail on the stakeholder consultation, however no objections or critical opinions were received.

According to the environmental impact study prepared with the help of the consulting company ErnerGY consultancy & project, the proposed wind power project Çatalca WPP will comply with all relevant Turkish environmental guidelines during construction and operation. According to the EIA of Çatalca "The facility does not pose dangers in connection with sustainable environment and sustainable development defined by Article 2 of Environmental Law No 2872"[38].

According to the Gold Standard requirements the Sustainable Development Assessment Matrix has to be applied. The indicators as shown in the matrix (cf. section A.2.) – influence of the project on environmental, social and economical issues – were assessed and scored. The sources for this analyze are given by the stakeholder consultation process (see section G) and the conducted environmental impact assessment. No negative indicators were identified. The total score is +10.

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:

There have not been identified any significant environmental impacts of the project, neither by the EIA study carried out, nor within the initial stakeholder process.

A minor environmental impact accrues from the fact that some trees have to be cut at the sites where turbines and cranes shall be erected. The forestry authority was involved into the project development and advised the project developer with respect to the final layout. The forestry authority is in charge of replacing every tree that is cut for the project by planting two at another place. The project developer takes the costs for the planting activities and the trees. In order to verify these activities and demonstrate the mitigation efforts, an accordant indicator "Tree Planting" is included into the monitoring plan – see D.2.1.2.

[37] Emission reductions are calculated in Excel spreadsheet, where values are considered with 9 decimal places. In the PDD at hand the presented values are rounded up, therefore the total number of emission reductions does not equal the sum of the yearly emission reductions.

[38] Çatalca WPP Environmental Impact Assessment Report (page 35)

SECTION G. Stakeholders' comments

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

The local stakeholders' comments invitation and compilation process applied was as follows:

Initial Stakeholder Consultation

The local stakeholder consultation was organized in the Elbasan village on 10:00 o'clock, on Friday, 21st September, 2007.

The stakeholder groups, which included the local participants directly impacted by the project and representatives of various NGOs, policy makers and local authorities, were informed through oral and written announcements about the meeting.

Picture 1: Stakeholder meeting in Elbasan village, Announcement in the local newspaper

It has been arranged a comprehensive meeting which included all possible stakeholders, four different participant groups got invited to the meeting. While choosing the stakeholders, environmental, health and socioeconomic perspectives of the project are taken into account. These participant groups are:

1) Local people from neighbourhood villages,
2) Local and national representatives of national NGOs,
3) University,
4) Local authorities of the related ministries.

Representative of REC Turkey (Yunus Arıkan) and Turkey Focal Point (Mustafa Şahin) were also invited. Finally, a total of 15 stakeholders got invited by letter.

The invitation letter was sent to the stakeholders with a short explanation about Gold Standard and the project activity. Later, all stakeholders got called by phone to confirm the receipt of the invitation.

The 40 villagers who took part in the meeting are people living or working in a close vicinity to the project area. The stakeholder consultation was widely announced by means of written notifications in town hall, so that every interested person could attend the meeting.

Deputy Mayor of Çatalca Municipality and the Mayor of the Elbasan Village were participants from governmental institutions. Other participants were from Elbasan village and from the project developers, Ertürk.

The meeting started with a comprehensive presentation including information about

- project developers,
- the technology and operation of the power plant,
- estimated emission reduction amount this plant realize,
- the importance of revenue from emission reduction certificates (VERs),
- Gold Standard and
- the project characteristics which makes this project different from other wind power projects in Turkey.

Then, environmental and socioeconomic impact analysis of the project has been discussed by using the Gold Standard list. Since many stakeholders didn't want to fill out this document, this impact analysis got discussed together with stakeholders.

Afterwards the mayor of the village and the manager of the project participants signed the protocol of the above mentioned discussion. No negative opinion and negative impact for wind power plant has been declared by the stakeholders.

The entire meeting was conducted in Turkish, therefore all the documents summarizing the meeting as well as the participant list are also prepared in Turkish. Afterwards all comments and a summarizing protocol of the meeting got translated into English.

Main Stakeholder Consultation

For the main stakeholder consultation process, the following documents were made publicly available:

- The original and complete PDD (English language)
- A non-technical summary of the PDD (Turkish language)

The English version of the non-technical summary as well as the report on the initial stakeholder consultation were available on enquiry.

The PDD was made available

- on the Gold Standard website from 20 November 2007 on.
- on the Website of the DOE (SGS) from 20 November 2007 on.

The PDD and the Turkish non-technical summary were made available as hardcopy at the central coffeehouse in Elbasan village from 21 August to 22 October 2007.

Stakeholders comments were actively invited by

- sending letters to the list of "official stakeholders" who have already been identified and invited for the initial stakeholder consultation meeting,
- displaying announcements at the central coffeehouse at Elbasan village and
- announcing the invitation for comments in the newspaper on 26 November 2007,

all referring to the above listed opportunities to read the PDD and the non-technical summary and to give comments over the different channels.

With the last activities initiated on 26 August (announcement of local stakeholder consultation via newspaper), the two month period required by the Gold Standard rules for the main stakeholder consultation ended on 25 January 2008.

G.2. Summary of the comments received:

The overall feedback to the organised consultation, and what follows to the project, was very positive, where numerous participants emphasized the importance of environmental sustainability and the overall benefit for all the participants. There have not been raised any critical comments nor objections for the project implementation.

A total of five questions were asked and answered. The mayor of the village and the project manager signed the protocol in which all questions and answers were collected.

The questions were related to potential impacts caused from the wind park (noise, wind) and what advantages the habitants close to the wind park can take. Due to no negative effects but benefits (e.g. less electrical power outage) for the people, there was no rejection to the proposed wind power project.

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

All the comments were written down during the meeting, where afterwards the participants signed the prepared documents.

As there have not been raised any significant concerns related to the potential impacts of the project, no changes to the project design were necessary.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Please copy and paste table as needed.

Organization:	ERTÜRK Elektrik Üretim A.Ş.
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Represented by:	
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Salutation:	Mr.
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Department:	
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Direct FAX:	
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Annex 2

BASELINE INFORMATION

Data basis needed for calculation of the Combined Margin Emission Factor

Energy type	2006			2005		
	Installed capacity [MW]	Electricity gener. [MWh]	Full load hours [h]	Installed capacity [MW]	Electricity gener. [MWh]	Full load hours [h]
Natural Gas	12,792	77,386,900	6,050	10,976	73,444,900	6,691
Lignite	8,227	32,302,800	3,927	7,131	29,946,300	4,200
Coal	1,986	14,004,200	7,051	2,002	13,246,200	6,616
Liquid Fuels (Fuel Oil, Motor Oil, LPG, Naphtha)	4,343	7,697,700	1,773	5,758	5,482,500	952
Hydro	13,363	44,157,700	3,304	12,906	39,560,500	3,065
Wind	98	129,400	1,318	20	59,000	2,935
Geo	23	123,008	5,348	15	94,400	6,293
Other	41	91,592	2,218	35	122,400	3,467
Total	**40,873**	**175,893,300**	**4,303**	**38,843**	**161,956,200**	**4,169**

2004				03/2003 - 08/2007		
Installed capacity [MW]	Electricity gener. [MWh]	Full load hours [h]	Average full load hours 2004-2006 [h]	Capacity addition [MW]	Equivalent generation of capac. addition [MWh]	**BM emission factor [tCO2/MWh]**
10,131	62,241,800	6,144	6,295	4,192.6	26,391,781	0.439
6,451	2,449,500	3,480	3,869	530,7	2,052,985	1.102
1,845	11,998,100	6,503	6,724	1,506	10,125,831	0.823
5,690	7,670,300	1,348	1,358	306.3	415,883	0.667
12,645	46,083,700	3,644	3,338	824.5	2,752,221	0.000
19	57,700	3,053	2,435	3.6	8,645	0.000
15	93,200	6,213	5,952	8.0	47,321	0.000
28	104,000	3,768	3,151	197.9	623,641	0.000
36,824	**150,698,300**	**4,092**	**4,188**	**7,569.5**	**42,418,309**	**0.5295**

Table 13: Calculation of Build Margin (BM)[39]

[39] Basis for calculation from TEIAS http://www.tuik.gov.tr/PreHaberBultenleri.do?id=464&tb_id=3, http://www.teias.gov.tr/yukdagitim/kuruluguc.xls and http://www.teias.gov.tr/istatistik2005/35.xls (accessed on October 2007)

			2003	2004	2005
EÜAŞ AND AFFILIATED PARTNERSHIPS AND P. Ps. INCLUDED IN THE PRIVATIZATION	Hard Coal		1,420,846	1,209,020	1,589,140
	Lignite		30,106,638	28,703,772	42,763,044
	TOTAL		**31,527,484**	**29,912,792**	**44,352,184**
	Fuel Oil	Main Fuel	213,518	173,591	212,263
		Auxiliary Fuel	104,052	72,933	155,014
		TOTAL	**317,570**	**246,524**	**367,277**
	Diesel Oil	Main Fuel	0	1,035	32
		Auxiliary Fuel	11,909	26,081	27,755
		TOTAL	**11,909**	**27,116**	**27,787**
	TOTAL		**329,479**	**273,640**	**395,064**
	Natural Gas		2,431,825	1,473,102	2,149,958
MOBIL POWER PLANTS	Fuel Oil		516,425	275,222	188,579
	Diesel Oil		0	0	0
	TOTAL		**516,425**	**275,222**	**188,579**
PRODUCTION COMP.	Imported Coal		1,668,036	2,767,660	2,982,782
	Fuel Oil		35,836	116,484	190,208
	Naphta				1,619
	Natural Gas		**6,792,327**	**7,791,886**	**10,548,955**
	Diesel Oil		49	26	155
AUTOPRODUCERS	Hard Coal		120,182	118,583	113,088
	Imported Coal		496,622	469,450	574,048
	Lignite		931,721	927,249	1,110,346
	TOTAL		**1,548,525**	**1,515,282**	**1,797,482**
	Fuel Oil		1,988,351	1,760,408	1,254,894
	Diesel Oil		1,503	1,510	500
	LPG		759	12,673	12,908
	Naphta		264,371	208,749	82,862
	TOTAL		**2,254,984**	**1,983,340**	**1,351,164**
	Natural gas		3,366,795	4,060,733	3,057,851
TOOR	Lignite Main Fuel		4,517,669	4,145,639	4,445,753
	Fuel Oil Auxiliary Fuel		6,210	4,700	4,941
	Diesel Oil Auxiliary Fuel		662	489	
Turkey	Hard Coal		1,541,028	1,327,603	1,702,228
	Imported Coal		2,164,658	3,237,110	3,556,830
	Lignite		35,556,028	33,776,660	48,319,143
	TOTAL		**39,261,714**	**38,341,373**	**53,578,201**
	Fuel Oil		2,864,392	2,403,338	2,005,899
	Diesel Oil		14,123	29,141	28,442
	LPG		759	12,673	12,908
	Naphta		264,371	208,749	84,481
	TOTAL		**3,143,645**	**2,653,901**	**2,131,730**
	Natural Gas		**12,590,947**	**13,325,721**	**15,756,764**

Table 14: Annual fuel consumption in power plants in Turkey (2003-2005)[40]

	2003	2004	2005	OX factor	Emission factor (tC/TJ)	NCV (TJ/kt)[41]
Hard Coal	4,348,209	3,746,003	4,803,056	0.98	26.8	29.30
Imported Coal	5,672,182	8,482,391	9,320,172	0.98	26.8	27.21
Lignite	33.958.314	32,258,902	46,147,917	0.98	27.6	9.63
Total	**43,978,705**	**44,487,296**	**60,271,145**			
Fuel Oil	6,351,856	5,329,458	4,448,128	0.99	15.2	40.19
Diesel Oil	44,872	92,587	90,366	0.99	20.2	43.33
Lpg	2,242	37,434	38,128	0.99	17.2	47.31
Naphta	863,892	682,135	276,061	0.99	20.0	45.01
Total	**7,262,862**	**6,141,614**	**4,852,683**			
Natural Gas Total	**24,247,303**	**25,662,310**	**30,343,947**	0.995	15.3	34.50
TOTAL	**75,488,869**	**76,291,221**	**95,467,775**			

Table 15: Calculated CO_2 emissions (2003-2005)

[40] TEIAS, see http://www.teias.gov.tr/istatistik2005/46.xls (accessed on October 2007)

[41] 2006 Guidelines of IPCC National Inventory http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf (accessed on October 2007)

Name of Power Plant	Capacity in MW	Fuel Type	Date of Operation
Adana Atik Su Aritma Tesisi	0,80	Biogas	09.06.2006
Karen Gr I-II	24,3	Fuel-oil	14.06.2003
Anadolu Efes Bira Gr-I	3,8	Fuel-oil	05.09.2003
Akbaşlar (isolated)	4,0	Fuel-oil	13.09.2003
Gül Enerji Gr-II	12,5	Fuel-oil	03.06.2004
Karkey-II 3+3 DGM	54,3	Fuel-oil	12.11.2004
Karkey (Silopi-4) Gr-IV	6,15	Fuel-oil	30.06.2005
Karkey (Silopi-4) Gr-V	6,75	Fuel-oil	23.12.2005
ORTA DOĞU RULMAN POLATLI SANTRALI	7,36	Fuel-oil	21.08.2006
SAMUR HALILARI SANAYİ VE TİC. A.Ş	7,36	Fuel-oil	29.08.2006
Kırka	8,20	Fuel-oil	28.09.2006
SÜPER FİLM AMBALAJ SANAYİ ve TİCARET A.Ş.	25,32	Fuel-oil	26.11.2006
MARDİN ENERJİ SANTRALİ	33,00	Fuel-oil	06.04.2007
İDİL-2 ENERJİ SANTRALİ	24,00	Fuel-oil	06.04.2007
SİİRT ENERJİ SANTRALİ	24,00	Fuel-oil	06.04.2007
Menderes Elektrik Gr-I	7,95	Geothermal	10.05.2006
Hacılar Gr I-II	13,3	Hydro (run of river)	14.06.2003
Pamuk HEPP Gr I-II-III	23,3	Hydro (run of river)	20.10.2003
Mercan Gr I-II-III	19,1	Hydro (run of river)	25.12.2003
Ere (Bir Kapılı HES) Grup-I	48,5	Hydro (run of river)	11.03.2004
Elta Elk (Dodurga) Gr I-II-III-IV	4,1	Hydro (run of river)	26.04.2004
İskur Tekstil (Süleymanlı) Gr I-II	4,6	Hydro (run of river)	28.04.2004
Bereket Enerji (Feslek Hes) Gr 1-2	9,5	Hydro (run of river)	05.08.2004
Tektuğ (Kargılık) Gr I-II	23,90	Hydro (run of river)	24.04.2005
İçtaş Enerji (Yukarı Mercan) Gr I-II	14,20	Hydro (run of river)	21.05.2005
Bereket Enerji (Dalaman) Gr XIII-XIV-XV	7,50	Hydro (run of river)	15.07.2005
ŞANLIURFA GR I-II	51,80	Hydro (run of river)	01.03.2006
BEREKET ENERJİ GÖKYAR HES 3 GRUP	11,62	Hydro (run of river)	05.05.2006
MOLU EN. Zamantı Bahçelik GR I-II	4,22	Hydro (run of river)	31.05.2006
SU ENERJİ (Balıkesir) GR I-II	4,60	Hydro (run of river)	27.06.2006
BEREKET ENERJİ (Mentaş Reg) GR I-II	26,60	Hydro (run of river)	31.07.2006
BAHÇELİK HES	4,17	Hydro (run of river)	01.08.2006
Basaran Hidroelektrik Santrali	0,60	Hydro (run of river)	11.08.2006
KAREL PAMUKOVA SANTRALİ	9,30	Hydro (run of river)	11.08.2006
EKİN (Başaran Hes) (Nazilli)	0,60	Hydro (run of river)	11.08.2006
Kızıldüz HES	16,00	Hydro (run of river)	13.09.2006
Şahmallar HES	14,00	Hydro (run of river)	13.09.2006
Kalealtı HES	15,00	Hydro (run of river)	20.11.2006
Kürtün Gr-I	42,5	Hydro (with Dam)	26.09.2003
Batman Gr I-III	128,0	Hydro (with Dam)	14.11.2003
Batman Gr II-IV	70,0	Hydro (with Dam)	09.12.2003
Kürtün Gr-II	42,5	Hydro (with Dam)	18.12.2003
Muratlı Gr I-II	115,00	Hydro (with Dam)	02.06.2005
Yamula Gr I-II	100,00	Hydro (with Dam)	30.07.2005

Çolakoğlu (Capacity Addition)	45,0	Imported Coal	05.05.2004
İÇDAŞ ÇELİK GR-I	135,00	Imported Coal	30.11.2005
K. MARAŞ	6,00	Imported Coal	08.12.2005
İskenderun (İsken) Gr I-II	1.320,0	Imported Coal	23.11.2003
Elbistan-B Gr I	360,00	Lignite	15.02.2005
Çan Gr II	160,00	Lignite	15.03.2005
Boraks	10,66	Lignite	28.09.2006
Eti Bor (Borik Asit) Gr I-II	10,4	LPG	29.08.2003
İzmir Gr I-II-III-IV-V-VI	1.590,7	N.Gas	28.03.2003
Özakım	7,0	N. Gas	19.06.2003
Baydemirler Gr II-III	2,1	N. Gas	11.07.2003
Tübaş	1,4	N. Gas	11.07.2003
Sönmez Flament Gr-I	4,1	N. Gas	30.10.2003
Bahariye Mensucat (Isolated)	1,0	N. Gas	01.01.2004
Ankara D.G. (Baymina) Gr I-II-III	798,0	N. Gas	08.01.2004
Atateks 2 GM	5,6	N. Gas	20.02.2004
Tanrıverdi 4 GM	4,7	N. Gas	24.03.2004
Tekboy Tekstil 1 GM	2,2	N. Gas	18.05.2004
Kombassan Kağıt Gıda ve Teks	5,5	N. Gas	09.06.2004
Ayen Ostim Enerji Üretim	31,1	N. Gas	11.06.2004
Bis Enerji 2 GT	73,0	N. Gas	16.06.2004
Şahinler Enerji 1 GM	3,2	N. Gas	29.06.2004
Besler Gr-2, BT (5,2+7,5)	12,7	N. Gas	07.07.2004
Çelik Enerji Ür. Şti. 2 GM	2,4	N. Gas	09.07.2004
Kombassan Kağıt Matbaa Gıda	5,5	N. Gas	24.09.2004
Habaş Aliağa Gr I-II	89,2	N. Gas	08.10.2004
Standart Profil 3 GM	6,7	N. Gas	22.10.2004
Altınmarka Gıda Gr I-II-III	3,6	N. Gas	17.12.2004
Metem Enerji (Peliklik) Gr I-II-III	11,7	N. Gas	29.01.2005
Metem Enerji (Hacışıramat) Gr I-II	7,8	N. Gas	29.01.2005
Mercedes Benz Turk Gr I-II-III-IV	8,3	N. Gas	04.02.2005
Baydemirler Gr IV-V-VI	6,2	N. Gas	04.02.2005
Entek Elk. Koç Uni. Gr I-II	2,3	N. Gas	07.02.2005
Bis Enerji Gr VII	43,70	N. Gas	18.03.2005
Karege Gr IV-V	18,10	N. Gas	07.04.2005
Ak Enerji (K.paşa) Gr I-II	87,20	N. Gas	30.04.2005
Nuh Enerji-2 Gr I	47,00	N. Gas	24.05.2005
Yongapan (Kast.Entg) Gr-II	5,20	N. Gas	25.05.2005
Tezcan Galvaniz Gr I-II	3,50	N. Gas	27.05.2005
Hayat Kağıt Gr-I	7,53	N. Gas	27.05.2005
Habaş Aliağa Gr-III	44,62	N. Gas	02.06.2005
Akbaşlar Gr-II (isolated)	9,00	N. Gas	24.06.2005
Zeynep Giyim San. Gr-I	1,17	N. Gas	07.07.2005
Çebi Enerji GT	43,37	N. Gas	23.08.2005
Can Enerji Gr-I	4,00	N. Gas	25.08.2005
EVYAP GR I-II	5,12	N. Gas	27.08.2005

HABAŞ ALİAĞA GR-IV	44,62	N. Gas	21.09.2005
AYKA TEKSTİL GR-I	5,50	N. Gas	24.09.2005
ALTEK ALARKO GR I-II	60,10	N. Gas	14.10.2005
MOSB GR I-II-III-IV-V-VI-VII	84,83	N. Gas	11.11.2005
GRANİSER GRANİT GR-I	5,50	N. Gas	14.11.2005
ZORLU ENERJİ YALOVA GR I-II	15,93	N. Gas	26.11.2005
KÜÇÜKÇALIK TEKSTİL GR I-II-III-IV	8,00	N. Gas	27.11.2005
KORUMA KLOR GR I-II-III	9,60	N. Gas	03.12.2005
BOSEN GR-III	51,02	N. Gas	30.12.2005
EKOTEN TEKSTİL GR-I	1,93	N. Gas	16.02.2006
ERAK GİYİM GR-I	1,37	N. Gas	22.02.2006
AYDIN ÖRME GR-I	7,52	N. Gas	25.02.2006
MARMARA ELEKTRİK (Çorlu) GR-I	8,73	N. Gas	13.04.2006
MARMARA PAMUK (Çorlu) GR-I	8,73	N. Gas	13.04.2006
ENTEK (Köseköy) GR-IV	47,62	N. Gas	14.04.2006
ELSE TEKSTİL (Çorlu) GR I-II	3,16	N. Gas	15.04.2006
SÖNMEZ ELEKTRİK (Çorlu) GR I-II	17,46	N. Gas	03.05.2006
KASTAMONU ENTEGRE (Balıkesir) GR-I	7,52	N. Gas	24.05.2006
BOZ ENERJİ GR-I	8,73	N. Gas	09.06.2006
AMYLUM NİŞASTA (ADANA)	14,25	N. Gas	09.06.2006
ŞIK MAKAS (Çorlu) GR-I	1,58	N. Gas	22.06.2006
ANTALYA ENERJİ GR I-II-III-IV	34,92	N. Gas	29.06.2006
HAYAT TEM. VE SAĞLIK GR I-II	15,04	N. Gas	30.06.2006
EKOLOJİK EN. (Kemerburgaz) GR-I	0,98	N. Gas	31.07.2006
MAKSİ ENERJİ ELEKTRİK ÜRETİM OTOPRODÜKTÖR GRUBU SAN. VE TİC.A.Ş	7,70	N. Gas	01.08.2006
ECZACIBAŞI-BAXTER	1,00	N. Gas	01.08.2006
ÇELİK ENERJİ ÜRETİM KOCAELİ SANTRALI	2,33	N. Gas	01.08.2006
AYDIN ÖRME AKYAZI SANTRALI	7,52	N. Gas	01.08.2006
EROĞLU GİYİM (Çorlu) GR-I	1,17	N. Gas	01.08.2006
Mersin Kojenerasyon Santralı	126,10	N. Gas	28.08.2006
YILDIZ ENTEGRE KOJENERASYON SANTRALİ	6,18	N. Gas	21.09.2006
Cerkezkoy Enerji Elektrik Uretimi A.S	53,97	N. Gas	27.09.2006
BURGAZ ELEKTRİK ÜRETİM A.Ş.	6,91	N. Gas	29.12.2006
BİRLİK MENSUCAT	7,20	N. Gas	01.01.2007
KİLSAN OTOPRODÜKTÖR TESİSİ	3,20	N. Gas	19.03.2007
T Enerji Üretim A.Ş.	1,58	N. Gas	19.04.2007
YILDIZ MDF GE LM 2500 GAS TURBINE	28,54	N. Gas	30.04.2007
Zorlu Enerji (Sincan) Gr-I	39,7	N. Gas + Diesel-oil	31.05.2003
Zorlu Enerji (Sincan) Gr-II BT	10,6	N. Gas + Diesel-oil	18.07.2003
KARKEY KARADENİZ ELEKTRİK ÜRETİM A.Ş	98,40	N. Gas + Diesel-oil	18.09.2006
TÜPRAŞ - İzmit Rafinerisi	85,00	N. Gas + Fuel-oil	04.08.2006
T.Ş.F.A.Ş. KAZIM TAŞKENT ESKİŞEHİR ŞEKER FABRİKASI	15,72	N. Gas + Fuel-oil	04.09.2006
Karege Gr I-II-III (Arges)	34,0	N. Gas + Fuel-oil	30.07.2003

AKMAYA SAN. VE TİC. A.Ş.	6,91	N. Gas + Fuel-oil	29.12.2006
Yurtbay Gr I-II	7,8	N. Gas + LPG	16.05.2003
Pakmaya (Köseköy) Gr II-III	2,1	N. Gas + LPG	02.07.2003
Pakmaya (Düzce) Gr II-III	2,1	N. Gas + LPG	02.07.2003
İSKO Dokuma İşletmeleri San. ve Tic. A.Ş.	27,50	N. Gas + LPG	01.08.2007
Enerji-SA (Mersin) Gr GT	41,7	N. Gas + Naphtha	05.10.2003
Ak-En (Batı Çim) Gr BT	14,5	N. Gas + Naphtha	26.10.2003
Enerji-SA (Çanakkale) Gr BT	21,6	N. Gas + Naphtha	01.11.2003
Enerji-SA (Mersin) Gr BT	21,6	N. Gas + Naphtha	22.11.2003
Entek Gr-IV	31,1	N. Gas + Naphtha	12.02.2004
AKÇA ENERJİ GR-III	8,73	N. Gas + Naphtha	14.12.2005
Ak-En (Uşak) Gr III	5,1	Naphtha	26.10.2003
Enerji-SA (Adana) 1 BT	49,8	Naphtha	23.06.2004
Alkim Alkali Kim. Gr I-II (Dazkırı)	3,4	Solid + Liquid	03.05.2003
Ayen Ostim Enerji Üretim (BT)	9,9	Steam	01.10.2004
Modern Enerji (NG+LPG) Gr-II	7,68	Steam	13.06.2005
Modern Enerji (NG) Gr-III	8,38	Steam	14.06.2005
ZORLU ENERJİ KAYSERİ GR-IV	38,63	Steam	26.10.2005
AK ENERJİ (K.paşa) GR-III	40,00	Steam	09.11.2005
HABAŞ ALİAĞA GR-V	23,00	Steam	24.11.2005
ALTEK ALARKO GR-III	21,89	Steam	23.02.2006
NUH ENERJİ-2 GR-II	26,08	Steam	02.03.2006
EKOLOJİK ENERJİ HASDAL	5,65	Waste	03.11.2006
Eti Mad.(Ban. Asit) Gr-I	11,50	Waste Heat	15.07.2005
ITC-KA ENERJİ ÜRETİM SAN. VE TİC.AŞ.	1,00	Waste Heat	16.11.2006
Sunjüt (WEPP) Gr I-II	1.20	Wind	22.04.2005
BARES II	(VER Project) 30.00	Wind	20.04.2006
ALİZE ENERJİ ÇEŞME SANTRALI	1.50	Wind	01.08.2006
TEPERES	0.85	Wind	26.09.2006
Karakurt WF	(VER Project) 10.8	Wind	20.04.2007
Anemon enerji elektrik üretim a.ş	(VER Project) 30.40	Wind	01.02.2007
Mare	(VER Project) 39.20	Wind	01.04.2007

Table 16: Recent power plants

DATA SOURCES OF ALL PARAMETERS USED IN THE PDD AT HAND:

Data / Parameter:	**Gross electricity production**
Data unit:	MWh
Description:	Electricity supplied to the grid by relevant sources (2003-2005)
Source of data used:	Turkish Electricity Transmission Company (TEIAŞ), Annual Development of Turkey's Gross Electricity Generation of Primary Energy Resources (1940-2005) http://www.teias.gov.tr/istatistik2005/35.xls
Value applied:	Table 5
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**Net electricity production**
Data unit:	MWh
Description:	Net electricity fed into the grid. Used for the calculation of the net/gross relation
Source of data used:	Turkish Electricity Transmission Company (TEIAŞ), Annual Development of Electricity Generation- Consumption and Losses in Turkey (1984-2005), http://www.teias.gov.tr/istatistik2005/34.xls
Value applied:	Table 6
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	

Data / Parameter:	**CO_2 emissions**
Data unit:	tCO_2
Description:	CO_2 emissions generated due to electricity production (2003-2005)
Source of data used:	Fuel consumption data: Turkish Electricity Transmission Company (TEIAŞ), see http://www.teias.gov.tr/istatistik2005/46.xls Emission Factors and Net Calorific Values (NCVs): Revised 2006 IPCC Guidelines: Volume 2: Energy
Value applied:	Table 4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Annual CO_2 emissions are calculated based on the consumption data from all the power plants in Turkey, based on data from TEIAŞ, the national electricity transmission company. Emission factors and net calorific values are taken from the official IPCC Guidelines for National Greenhouse Gas Inventories.
Any comment:	

Data / Parameter:	**List of BM power plants with capacity**
Data unit:	Name of a power plant, MW, fuel type, date of operation
Description:	List of the power plants build between 02/2005 and 08/2007 along with their capacities, fuel type and the date of operation;
Source of data used:	Turkish Electricity Transmission Company (TEIAŞ) http://www.teias.gov.tr/

Value applied:	Table 16: Recent power plants
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAŞ is a national electricity transmission company, which makes available the official data of all power plants in Turkey. The list of power plants is not publicly available, but was provided for the purpose of determining the build margin.
Any comment:	

Data / Parameter:	**Full load hours per energy source**
Data unit:	h
Description:	Amount of the full load hours regarding the different plant types (2004-2006)
Source of data used:	Turkish Electricity Transmission Company (TEIAŞ) http://www.teias.gov.tr/istatistik2005/3.xls http://www.tuik.gov.tr/PreHaberBultenleri.do?id=464&tb_id=3 http://www.teias.gov.tr/yukdagitim/kuruluguc.xls http://www.teias.gov.tr/istatistik2005/35.xls
Value applied:	Table 9
Justification of the choice of data or description of measurement methods and procedures actually applied :	TEIAŞ is the national electricity transmission company, which makes available the official data of all power plants in Turkey.
Any comment:	The data was calculated from the installed capacity [MW] and the amount of the generated electricity [MWh] from the different plant types.

Data / Parameter:	**Technology specific emission factor of the 20%-plants**
Data unit:	tCO_2/MWh
Description:	Calculated specific emission factors based on the carbon emission factor data and the electrical efficiency data for all relevant energy sources (natural gas, lignite, coal/anthracite, fuel/motor oil).
Source of data used:	1. TEIAS: http://www.teias.gov.tr/istatistik2005/47.xls 2. TEIAS: http://www.teias.gov.tr/istatistik2005/35.xls 3. "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2, Energy (carbon emission factor) 4. European Commission Report (July 2006): Integrated Pollution Prevention and Control (IPPC) - Best Available Techniques for Large Combustion Plants (electrical efficiency for lignite, coal/anthracite, fuel/motor oil)
Value applied:	Table 10
Justification of the choice of data or description of measurement methods and procedures actually applied :	As no plant specific efficiency data is available, average numbers were calculated with the help of statistical data from TEIAS.
Any comment:	

Annex 3

MONITORING PLAN

The Monitoring Plan (MP) describes how the performance of the proposed Çatalca WPP Project will be monitored and verified in terms of its greenhouse gas emission reductions (ERs) and conformance with all relevant Clean Development Mechanism criteria and Gold Standard requirements.

In order to fulfil all relevant aspects and to enable following the train of thoughts of the MP the approach is structured step by step by going through all bullets under section D. Additional necessary information for monitoring is described under the bullet (see section D).

The MP builds on the baseline scenario identified in the main text of the Project Design Document (PDD) of the proposed project and is fully consistent with it.

The MP is based on the approved methodology ACM0002, "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources" (Version 6). The MP will be used by the Project Entity, ERTÜRK, and by appointed consultants.

The MP's instructions should be followed to successfully measure and track the project impacts and prepare for the periodic audit and verification process that will have to be undertaken to certify the achieved emission reductions.

Specifically, the MP provides the requirements and instructions for:

- Establishing and maintaining the appropriate monitoring system, including spreadsheets for the calculation of GS VERs;
- Implementing the necessary measurement and management operations;
- Preparing for the requirements of independent, third party verification and audits.

The project owner can update and adjust the MP to meet operational requirements, provided the verifier approves these modifications during the process of initial or periodic verification.

Reference to the project at hand:

The technical monitoring of the plant by SCADA system allows observation and intervention from all over the world. To make sure that the plant will operate as efficient as possible cameras will monitor the plant and in case of problems an automatic system will raise an alarm. An error massage will be sent to the supplier company as well as to the operator to guarantee a quick fault repair.

The entity determining the monitoring plan and supporting Sanko with the whole monitoring process is FutureCamp as the advisor. For any questions regarding the monitoring Sanko works together with the advisor in order to guarantee quality assurance as well as to meet all requirements for the Gold Standard.

The monitoring plan is provided under section D.