MONITORING REPORT

Version: 1.3
Preparation date: 01.03.2012

KUYUCAK 25.6 MW WIND FARM PROJECT, TURKEY

GOLD STANDARD – GS576

Monitoring period number: 1

Monitoring period dates: 11.11.2010-31.12.2011 (first and last days included)

Prepared by:

MAVI CONSULTANTS
SUSTAINABILITY MANAGEMENT

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

The *Kuyucak 25.6 MW Wind Farm Project, Turkey*, hereafter referred to as the Project, involves a grid-connected onshore wind farm project in Manisa Province, consisting of 14 wind turbines with a total installed power generation capacity of 25.6 MW.

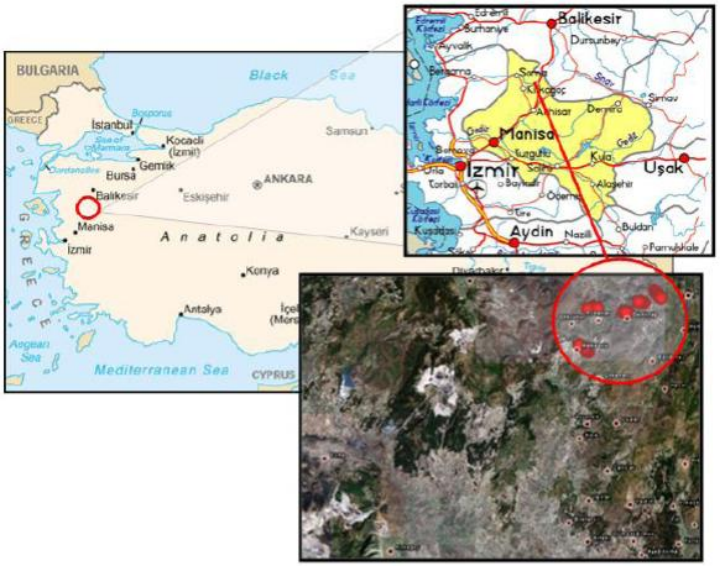
1. **Purpose of the project activity and the measures taken to reduce greenhouse gas emissions:** The Project aims to generate electricity from wind energy and feed it to the national electricity grid. The national electricity settlement centre manages supply of power plants such that the power generation of thermal power plant-dominated generation system is reduced at the same amount the Project activity exports power. This ensures that the emissions are actually decreased.
2. **Brief description of the installed technology and equipments:** The wind-driven blades are connected to an electricity generator, which produces electrical energy and supplies it to the grid without storage. When the wind speed is low, the wind farm might draw some electricity from the grid. Enercon, a German turbine manufacturer, has been selected as technology provider due to the quality of its products in terms of high reliability, grid friendliness, low maintenance requirements and low noise levels.
3. **Relevant dates for the project activity:** The generation has started operating in November 2010. After the testing period, the official power generation is initiated on 11.11.2010, the date on which the Project was registered at the TEIAS' online financial settlement system (PMUM). Therefore, the crediting period conservatively starts on 11.11.2010.
4. **Total emission reductions achieved in this monitoring period**: 47,993 tCO_2.

A.2. Project Participants

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Turkey (host)	Alize Enerji Elektrik Üretim A.Ş. (private entity)	No
Turkey (host)	Mavi Consultants (private entity)	No

A.3. Location of the project activity:

The project is located in Kuyucak region, Demirtaş village (distance 1.5 km), Akçakısrak village (distance 3 km), Gölcük town (distance 2.1 km), Kocaiskan village (3.4 km), Kırkağaç town (distance 35 km), Manisa province (distance 100 km).



The geographical location of the Project covers an area around 39° 17' N, 27° 53' E approximately.

The locations of the turbines are displayed in the map in *Annex III – Turbine Locations*. The actual coordinates of the turbines have been checked by governmental authorities[1] and found to be in compliance with the coordinates given in the license below.

The coordinates of the turbines are as the following[2]:

Table 1. Turbine Coordinates[3]

	E	N
Turbine Nr	**UTM Coordinates**	
T1	580524	4351573
T2	580612	4351382
T3	581936	4352619
T4	582033	4352407
T5	582174	4352226
T6	582315	4352010
T7	582446	4351920
T8	575661	4347256
T9	579189	4350599
T10	579009	4350576
T11	578880	4350549
T12	575551	4347387
T13	575434	4347540
T14	575230	4347589

A.4. Technical description of the project

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

[1] This protocol is submitted to the DOE.
[2] Source: Generation License
[3] Source: Generation License

only the net electricity generation of the Project. The main equipment used in the Project is wind turbines with the following specifications;

Table 2. The technical details of the wind turbines used[4]

Manufacturer	Enercon
Type of Turbines Used	E70, 2300 kW each (limited to 2000 kW for the Project) E44, 900 kW each (limited to 800 kW for the Project)
Number of Turbines	12 x E70 2 x E44
Specifications	Gearless, variable speed, variable pitch control. Rotor Diameter: 71 m (E70), 44 m (E44). Rotational speed: 6-21.5 rpm (E70), 12-34 rpm (E44) Cut-out wind speed: 28-34 m/s Remote monitoring: Enercon SCADA
Connection	154 kV high voltage to Soma B transformer station

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

- ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version 07;
- "Tool to calculate the emission factor for an electricity system", Version 01.1;
- "Tool for the demonstration and assessment of additionality", Version 05.2.

A.6. Registration date of the project activity:

The Gold Standard registration date is 15.04.2011.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

The crediting period of the Project is 7 years. The first crediting period starts on 11.11.2010. This date is the same as the validated operational start date, therefore it is in agreement with the PDD and the validation report.

A.8. Name of responsible person(s)/entity(ies):

Name	Role and Responsibility	Contact Information
Salih Uysal, Managing Director, Demirer Enerji	Proper implementation of the monitoring plan and management of the monitoring and verification procedures in the name of the Project owner.	**Alize Enerji Elektrik Üretim A.S.** Mazhar Osman Sok. 9/1 Feneryolu, Kadıköy – Istanbul, TURKEY. Tel: +90 216 3364223 Fax: +90 216 3364223
Yagmur Karabulut, Mavi Consultants	Mavi Consultants is assigned by the Project owner as carbon consultant for the completion of the monitoring report and support during verification.	**Mavi Consultants** Baba Efendi S. 5/2 Akaretler 34357 Istanbul, TURKEY Tel: +90 212 3270922 Fax: +90 212 3270925

[4] Source: Wind turbine manufacturer's web site (www.enercon.de)

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

1. **The starting date of operation of the project activity:** The Project has started operating on 11.11.2010 with approval by the Ministry of Energy and Natural Resources. The test operation has started before this date. The Project consists of one site and of two construction phases. The installation is fully completed and the Project is in commercial operation. The Project was registered at the TEIAS' online financial settlement system (PMUM) as of 11.11.2010. Therefore, the crediting period conservatively starts on this date. The overview is provided below:

Table 3. Project phases

Project Phase	Commissioning Date	Added Capacity [MW]	Total Capacity [MW]
Phase 1: License number of the turbines: T8, T12, T13, T14	11.11.2010	2 MW x 4 = 8 MW	8
Phase 2: License number of the turbines: T1, T2, T3, T4, T5, T6, T7, T9, T10, T11	09.12.2010	2 MW x 8 + 0.8 MW x 2 = 17.6 MW	25.6

2. **The information regarding the actual operation of the project activity:** The Project is in operation in agreement with the description in the registered PDD. There are no significant overhaul times, downtimes of equipment, exchange of equipment or any other similar special event.

3. **Events or situations that occurred during the monitoring period, which may impact the applicability of the methodology and how the issues resulting from these events or situations are being addressed:** There have not been any changes which may impact the applicability of the methodology used.

B.2. Revision of the monitoring plan

Monitoring Plan Revisions / Forward Action Requests: The following issues have been raised during the Project validation, registration or verification phases;

By:	Forward Request	Explanation of the Project Proponent
Gold Standard	FAR 1: A detailed investigation/ study by an independent third party should be prepared before the first request for issuance of credits for this project activity. The study should discuss whether the project site is in fact on a bird migration route or not and if it is, what mitigation measures will be undertaken during the migration season to ensure there is no negative impact on migrating birds. PP shall	In order to comply with this request, the Project owner has assigned an ornithologist to compile a study[5] about the impact of the Project on birds. The study concludes that the Project does not have any significant negative potential impact on birds and the Project is not located on bird migration routes.

[5] This study is submitted to the DOE.

	also monitor this parameter as per outcome of the proposed study.	The study suggests coloring the tips of turbine blades to warn birds in advance. The installed turbines, in compliance with this request, use blades with red tips to minimize bird-related risks.
Validating DOE	FAR 7: "… it must be assured by micrositing and/or technical means that noise immission levels for housing zones (morning-afternoon-night of 65, 60, 55 dB(A)) will be met. This will be checked during first verification."	This FAR addresses Gold Standard sustainability indicators. This parameter is monitored. Please see Gold Standard section, monitoring indicator ID.5 for details.

B.3. Request for deviation applied to this monitoring period

N/A

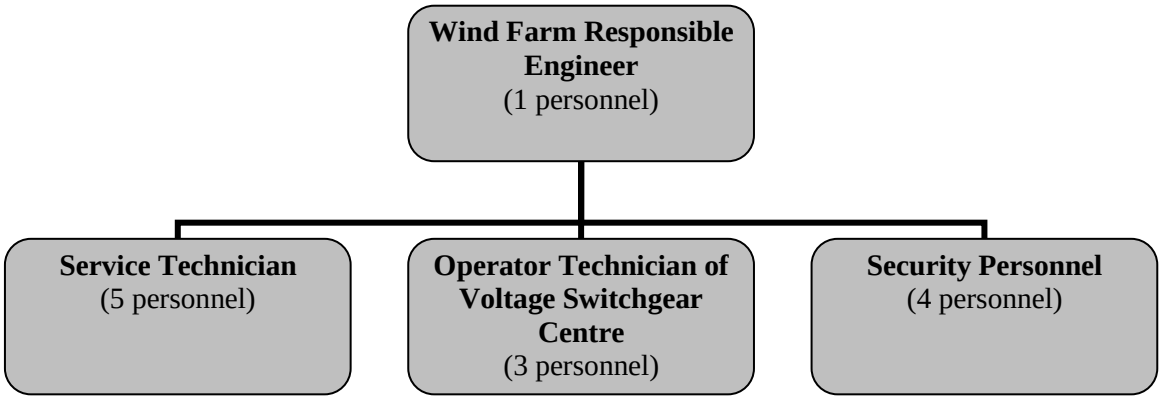
B.4. Notification or request of approval of changes

N/A

SECTION C. Description of the monitoring system

The monitoring plan involves the determination of the baseline emissions occurring within the project boundary during the crediting period. As the project boundary is defined as the national grid of Turkey, the baseline emissions from electricity generation activities in Turkey are calculated and monitored based on national official data.

Organizational structure[6]:



Responsibilities:

The Managing Director of Demirer Enerji (mother company of the Project) is responsible for the information flow and monitoring procedures in the name of the Project owner. These responsibilities include:

- Ensuring the information flow between the Project owner company and the DOE,
- Proper implementation of the monitoring plan,
- Management of the monitoring and verification procedures.

For monitoring-related tasks, the Wind Farm Responsible Engineer is responsible for management and organization of trainings and carrying out data handling.

Activities related to invoicing and human resources are managed by Demirer Enerji.

Mavi Consultants provide consulting services for the Project owner during these tasks. Details are provided in section A.8.

Information flow:

The power generation data are stored by PMUM, the financial settlement centre of TEIAS (the national grid operator). The website of PMUM (http://dgpys.teias.gov.tr/dgpys) is accessible by the Project owner with their unique user ID and password. Once accessed, the Project owners are able to call electricity generation and consumption reports of their own projects. The same reports are used by the

[6] Please note that 5 Service Technicians are part-time employees of the Project since they also work in a nearby wind farm by the same Project owner. Moreover, 1 service technician is employed since November 2010, 2 service technicians are employed since December 2010 and 2 other service technicians are employed since June 2011.

Project owner for invoicing purposes. The electricity generation data are reported on a monthly basis. The procedure involves the following tasks:

1. Accessing the website of PMUM (http://dgpys.teias.gov.tr/dgpys) using the user ID and password assigned to the Project owner,
2. Obtaining the electricity generation and consumption reports, for each month in the monitoring period,
3. Storing these monthly reports in electronic format (*pdf or print-screen) and in printed hardcopies.

Data recording and aggregation:

The block diagram of the electricity circuit system is provided to the DOE separately.

There are two measurement devices; a primary measurement device and a secondary (i.e. back-up or check-meter) measurement device for quality assurance, to be used if the primary meter fails. Both the primary and back-up measurement devices measure and store the aggregate total electricity import and export for the whole Project in real-time. The Enercon SCADA system also stores various data (e.g. electricity generated by each turbine, energy supplied etc.) electronically.

The invoices are kept by the Project owner as hardcopies. Furthermore, the PMUM system stores the reports electronically, which is accessible to the Project owner whenever necessary.

After the monthly reports are obtained from PMUM, data are aggregated using a separate spreadsheet. The monthly generation and consumption data are entered to the spreadsheet, which automatically calculates the emission reductions during the monitoring period. This spreadsheet file is attached in the *Annex II* of this report. The procedure of data generation, aggregation, calculation and reporting are managed by the responsible people stated above.

Emergency procedures for the monitoring system:

In case of an organisational change within the Project owner, a qualified person is or will be assigned for carrying out and management of the monitoring and verification procedures.

In case of a fire, earthquake or other similar emergency situation, the electricity data after the settlement with TEIAS will be valid, i.e. the electricity generation and consumption figures used for invoicing purposes during or after the emergency will be used for the calculation of emission reductions.

In case the PMUM report cannot be reached online, the monthly generation protocols signed by both the Project owner and TEIAS will be used. These protocols are the source of the PMUM data and provide the same values, under normal circumstances, in hardcopy format. Therefore this is conservative.

In other unforeseen cases, the emission reductions will be calculated in a conservative manner in agreement with relevant UNFCCC and Gold Standard guidance, rules and conditions. Although SCADA data are not used for monitoring purposes, they are of high quality and can principally be used for monitoring purposes in case of emergencies conservatively.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	**Combined Margin Emission Factor**
Data unit:	**tCO_2/MWh**
Description:	The combined margin emission factor is the weighted average of the operating and build margins and describes the emission factor of the baseline scenario.
Source of data used:	Baseline calculations in the PDD
Value(s) :	0.635
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The GHG emission reductions of the Project will be calculated by multiplying the ex-ante combined margin emission factor with the net electricity exported.
Additional comment:	

Data / Parameter:	**Leakage**
Data unit:	**tCO_2**
Description:	Leakage is emissions arising due to activities such as power plant construction, fuel handling and land inundation.
Source of data used:	The baseline methodology suggests not considering the leakage for this technology.
Value(s) :	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Additional comment:	

Data / Parameter:	**Project Emissions**
Data unit:	**tCO_2**
Description:	Project emissions involve direct emissions (such as fossil fuel consumption of construction equipment or vehicles for on-going operations and maintenance) by the Project activity.
Source of data used:	This is suggested by the baseline methodology, and the quantity of fossil fuels used for the Project Activity is negligibly small.
Value(s) :	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions
Additional comment:	There is a diesel generator in the Project for emergency cases. This generator is only used for covering the electricity need of the control

	building on site, when the grid is offline. Therefore its use is very limited and the related emissions are negligible. This is in agreement with the used UNFCCC methodology. Please see the Gold Standard section, monitoring indicator ID.4 for more details.

D.2. Data and parameters monitored

Data / Parameter:	**ID.1 Net electricity generation**
Data unit:	**MWh**
Description:	The net electricity generated by the Project during the monitoring period
Measured /Calculated /Default:	Measured
Source of data:	The PMUM website (http://dgpys.teias.gov.tr/dgpys). The data imported from this website are read from the primary measurement device (or the back-up device in case the primary device is inaccurate, malfunctioning etc.)
Value(s) of monitored parameter:	Net electricity generation of the Project activity is as the following[7]:
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The measurement devices have the following specifications: **Table 4. Specifications of measurement devices used** **Calibration frequency:** According to the Article 9 of the relevant regulation[10], periodical inspections of "gauges for electric, water, coal

Year	**Start date**	**End date**	**Net power generation [kWh]**
2010	11.11.2010	31.12.2010	3,757,484 kWh
2011	01.01.2011	31.12.2011	71,822,992 kWh
Total	11.11.2010	31.12.2011	**75,580,476 kWh**

Serial Number	Device Model	Manufacturer	Model Year	Date of initial calibration[8]	Accuracy
401681	A1500[9]	ELSTER	2009	17.11.2009	0.2 S
401680	A1500[9]	ELSTER	2009	17.11.2009	0.2 S

[7] The net electricity generation data from the measurement devices should be interpreted with the document "Metering Devices First and Last Index Protocols". This document is provided to the DOE.
[8] Calibration documents are provided to the DOE.
[9] Primary measurement device
[10] "Measurement and Measuring Tools Inspection Regulation", Date: 24/07/1994, Official Gazette Number: 22000

gas, natural gas and, current and voltage measuring transformers will be made once in 10 years". This is in line with the monitoring plan and national requirements. TEIAS will decide when to carry out the next calibration. The Project owner has no control over or access to the measurement devices and is *not* entitled to perform any type of maintenance or calibration.

Date of last calibration:

The measurement devices have been controlled and approved by TEIAS on 23.10.2010. The measurement devices have not been calibrated again since their first installation. Please see *Table 4. Specifications of measurement devices used* for details.

Responsible personnel: TEIAS is responsible for monitoring and ensuring that the measurement devices satisfy the requirements. TEIAS is also responsible for the calibration of the measurement devices. In case of any detected problem (e.g. failure of one of the measurement devices, inconsistency between the readings of the primary and the back-up meter etc.), the plant manager in the name of the Project owner is responsible for coordinating the necessary maintenance and calibration procedure with TEIAS.

Validity: The technical specifications and the calibration procedure are in agreement with the national regulations[11] and the monitoring plan. The list of the incidents occurred during the monitoring period which might have an impact on the measurement devices is given below;

Table 5. Extraordinary Events (during monitoring period)

Potential Risks of Inaccuracy	Occurrence?	Information
Calibration of the measurement devices (carried out by TEIAS)	None	This is in line with the monitoring plan.
Malfunction, replacement, resetting, repair service or any other relevant activity regarding the measurement devices	None	This is in line with the monitoring plan.

[11] According to the "Communiqué for Measurement Devices used in the Electricity Market", Article 11, the measurement devices used for power plants are subject to the following requirements:

Capacity of the circuit, where the meter is connected	Larger than 100 MVA	Between 100 and 10 MVA (inclusive)	Less than 10 MVA
Active energy meters	IEC-EN 60687 0.2S class	IEC-EN 60687 0.5S class	IEC-EN 60687 0.5 class
Reactive energy meters	**IEC-EN 61268 0.2S class	**IEC-EN 61268 0.2S class	**IEC-EN 61268 0.2S class

The Project capacity falls into the second category. Sources:
Turkish: http://www.epdk.gov.tr/mevzuat/teblig/elektrik/sayac/sayacson.doc
English: http://www.epdk.gov.tr/english/regulations/electric/meters.doc

	<table><tr><td>Accident (fire, technical equipment failure, theft of equipment etc.) which could compromise the accuracy</td><td>None</td><td>This is in line with the monitoring plan.</td></tr></table> As seen from the *Table 5*, there is not any extraordinary event which could be critical in assessing the accuracy of this monitoring parameter.
Measuring/ Reading/ Recording frequency:	The primary and back-up measurement devices measure, read and record various data such as electricity generated and consumed, in real-time. There is no sampling involved.
Calculation method (if applicable):	The PMUM (TEIAS) Market Balancing Center website[12] is accessed and the monthly reports are recorded, using the Project Owner's own user ID and password. These reports do not show the net electricity generation, but Power Export and Power Import data. Therefore, their difference is calculated to obtain the net electricity generation of the Project. These data in the PMUM interface are copied and pasted to a prepared spreadsheet, which will perform the calculations. The TEIAS PMUM system does not report the *Net Electricity Generated*; therefore it is calculated via a spreadsheet. For each month, the *Power Export* and the *Power Import* values are extracted from the PMUM monthly reports. The *Power Export* is denoted as "Iletim Sistemine Veris Miktari" (ISVM) and the *Power Import* is denoted as "Uzlasmaya Esas Cekis Miktari" (UECM) in the monthly report in Turkish language. Net Electricity Generated = Power Export – Power Import This difference (which is equal to monthly net electricity generation) is added to each other for each month of the monitoring period to find the total net electricity generation of the Project. The monitoring spreadsheet, together with the scans of the PMUM reports, is submitted to the DOE. The calculation and formulae are clearly visible in the spreadsheet.
QA/QC procedures applied:	The initial values of the measurement devices are recorded with a protocol (submitted to the DOE) with TEIAS. This prevents any over-calculation of GHG emission reductions. There are two measurement devices continuously measuring and recording electricity generation and consumption of the Project activity. The primary measurement device is used for invoicing, and the secondary measurement device is used for quality control and back-up purposes. Both measurement devices comply with industry standards, UNFCCC and national requirements. This ensures the quality and continuity of monitored data. TEIAS reads monthly recorded values that were measured until 24:00 of the last day of the preceding month. Based on this reading, the invoices are prepared by the Project owner. The monthly measurement device

[12] http://dgpys.teias.gov.tr/dgpys

	readings are transferred and stored in the web server of PMUM (the financial settlement agency of TEIAS). The monthly measurement device reading protocols are stored as hardcopy by the Project owner. The electronic reports are stored by TEIAS and are accessible by the Project owner by any time. This ensures that the monitored data are stored both by the Project owner and the TEIAS PMUM system, both as hardcopy and softcopy, ensuring security and quality. Independent from PMUM, the Project owner stores the hardcopies of the monthly protocols until at least 2 years after the end of the crediting period. The Power Export and Import data are based on protocols signed by TEIAS and the Project owner. These protocols are used as the basis of PMUM reports and invoicing. Therefore this data source is of high quality. The baseline calculations are carried out electronically with a spreadsheet; therefore the calculations are transparent, easily reproducible and of high quality. The Enercon SCADA system enables real time monitoring and analysis of data (also for each turbine) and provides support for maintenance. This system automatically records all electricity generation data for each single wind turbine 7/24. This ensures that extraordinary situations can be identified quickly. This system improves quality control and reduces operational risks. The Project owner is able to monitor the electricity generation data by the use of a SCADA system, however it has no control over, or access to the measurement devices and cannot perform any type of maintenance or calibration. **Involvement of other parties:** The quality assurance and control for the plant operation is managed by a separate contract between the Project owner and the service company of the turbine manufacturer Enercon. Enercon Servis Ltd. performs repair and maintenance works for the wind energy converters during the monitoring period. This contract ensures successful operation and maintenance of the Project activity.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

The Project mainly involves electricity capacity addition, which reduces CO_2 through the substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. According to the baseline methodology, the emission reduction ER_y by the project activity during a given year y is found as;

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

where BE_y is calculated as;

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

The combined emission factor $EF_{grid,CM,y}$ for the project activity is calculated as a weighted average of Operating Margin emission factor and Build Margin emission factor as described in the baseline methodology;

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

Where $w_{OM} = 0.75$ and $w_{BM} = 0.25$ by default according to the methodology.

Operating margin (OM): The following formula and data are used for OM calculations (using the ex-ante, simple OM method):

Table 6. Gross and Net Electricity Generation [GWh] in Turkey

		2002	2003	2004	2005	2006	Avg. Share
Coal		4,093	8,663	11,998	13,246	14,217	6.7%
Lignite		28,056	23,590	22,450	29,946	32,433	18.0%
Fuel Oil		9,505	8,153	6,690	5,121	4,232	4.6%
Diesel oil		271	4	7	3	58	0.1%
LPG		35	3	33	34	0	0.0%
Naphtha & Asphaltite		933	1,036	940	326	50	0.5%
Natural Gas		52,497	63,536	62,242	73,445	80,691	43.6%
low cost-must run	**Renew, & Wastes**	174	116	104	122	154	0,1%
	Hydro	33,684	35,330	46,084	39,561	44.244	26,3%
	Geothermal	105	89	93	94	94	0,1%
	Wind	48	61	58	59	127	0,0%
Gross Total		129,400	140,581	150,698	161,956	176,300	**100%**
Gross Total, excluding lc-mr resources		95,389	104,985	104,360	122,120	131,681	**73.5%**
Net generation		123,727	135,248	145,066	155,469	169,543	
Net Delivery Ratio [%]		95.6%	96.2%	96.3%	96.0%	96.2%	

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

Table 7. Calculation of the OM emission factor

Parameter	2004	2005	2006
CO_2 Emissions [$ktCO_2$]	76,185[13]	74,426	82,787
GEN_y [GWh]	100,923	117,864	127,208
$EF_{grid,OMsimple,y}$ [tCO_2/MWh]	0.755	0.631	0.651
OM emission factor [tCO_2/MWh]	**0.679**		

Build margin (BM): The following formulae and data are used for MM calculations (using the ex-ante method):

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

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

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

Fuel Type	Generation of New Capacity Additions, GWh	Average Efficiency[14], η	Emission Factor, tCO_2/TJ	CO_2 Emissions, $ktCO_2$
Coal	1,462.5	39.0%	89.5	1,208
Lignite	11,440.0	39.0%	90.9	9,599
Fuel Oil	565.3	39.5%	75.5	389
Diesel oil	4.1	39.5%	72.6	3
LPG	0.0	60.0%	61.6	0
Naphtha & Aphaltite	322.9	39.5%	69.3	204
Natural Gas	19,592.0	60%	54.3	6,383
Renewables and wastes	127.0	0%	0	0
Hydro	1,754.9	0%	0	0
Geothermal & Wind	167.4	0%	0	0
Total	**35,436**			**17,786**
Build Margin EF	**0.502**			

$EF_{grid,CM,y}$ = 0.679 tCO_2/MWh * 0.75 + 0.502 tCO_2/MWh * 0.25 = **0.635 tCO_2/MWh**

Baseline emissions are calculated using formula (2);

BE_y = 75,580,476 kWh * 0.635 tCO_2/MWh = **47,993 tCO_2**

Data used for calculations and further details are available in the PDD. Definitions can be found in *Table 10*.

[13] Official 2004 emission figure stemming from electricity generation activities (Source: Statistical Year Book 2006, page 20). Used directly since the identified lc-mr sources do not generate CO_2 emissions.
[14] Source: Annex 1 of the "Tool to calculate the emission factor for an electricity system"

E.2. Project emissions calculation

As described in section D.1, project emissions are considered as ex-ante and to be zero.

E.3. Leakage calculation

As described in section D.1, leakage is considered as ex-ante and to be zero.

E.4. Emission reductions calculation / table

As described in section E.1, Formula (1), the emission reductions are calculated as below;

$ER_y = BE_y – PE_y – LE_y =$ **47,993** tCO_2

For the parameter "y", the whole monitoring period is used.

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

The Project results in the following GHG emission reductions;

Table 8. GHG Emission Reductions Achieved

Vintage year	Period[15]	Emission Reductions, tCO_2
2010	11.11.2010-31.12.2010	2,386.0
2011	01.01.2011-31.12.2011	45,607.6

The total GHG emission reductions and ex-ante calculated estimation are provided below;

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	**71,578**	**47,993**[16]

The time interval for the ex-ante calculated carbon credits is one year, whereas the monitoring period is longer than one year.

E.6. Remarks on difference from estimated value in the PDD

Compared to the initial power generation estimates, the numbers indicate that the Project underperforms. The Project has not operated at full capacity the whole monitoring period, as the Project consists of two consecutive construction phases. The Project owner considers this to be the main reason for undershooting the estimated reductions.

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[15] The measurement devices' and PMUM records for each day start at 00.00 and end at 24.00.

[16] The sum is rounded down for conservativeness.

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		

ATTACHMENT

GOLD STANDARD INFORMATION

According to the PDD, two types of parameters are monitored for this Gold Standard project;

i. GHG Emission Reductions: GHG Emission reductions are monitored in accordance with the UNFCCC requirements and the additional conservative approach of the Gold Standard.

ii. Sustainable Development Screen: As required by the rules of the Gold Standard, the choice of indicators is based on the issues that have been highlighted to be important during the sustainable development assessment. These indicators are monitored to ensure the sustainable development contribution of the Project. During the sustainable development assessment, no issues have been highlighted as having a negative impact on sustainable development. The project provides power from a renewable resource and thereby contributes to local economy in various ways. It also creates positive environmental and social impacts, compared to the baseline of energy generation from fossil fuel resources.

Table 9. Summary of monitored parameters

ID number	Data variable	Source of data	Data unit	Way of obtaining data
ID.1	EG_y, Annual net electricity amount fed to the grid by the project activity	TEIAS	MWh	Measurement
ID.2	Local employment: quality and quantity	Project Owner	N/A	Estimation Measurement
ID.3	Air quality: SO_2 and NO_x emissions reduced	TEIAS	metric tons	Calculation
ID.4	Diesel Oil consumption	Project Owner	liters	Measurement
ID.5	Noise Emission	Project Owner	N/A	Estimation Measurement

The monitoring report for the ID.1 has been provided above. The monitoring reports of the ID.2 - ID.5 are explained below.

Sustainable Development Indicator: ID.2

No		ID.2
Indicator		Quality and quantity of local employment
Mitigation measure		N/A (positive indicator)
Repeat for each parameter		
Chosen parameter		**a. Quality**: i. Relevant health and safety precautions. ii. Health and safety trainings given to personnel.
Current situation of parameter		All safety equipment is available and used by personnel. No work accident has happened during the monitoring period. **Conclusion:** The Project contributes positively.
Future target for parameter		i. All necessary health and safety precautions are taken during the monitoring period. ii. Necessary trainings are given to the personnel regarding safety and emergency procedures.
Way of monitoring	How	Estimated. Qualitative Assessment: Training certificates and attendance records are checked.
	When	Continuously. Details are summarized in *Table* and *Table 12*.
	By who	Project manager on site.
Repeat for each parameter		
Chosen parameter		**b. Quantity**: Number of local people permanently employed by the Project.
Current situation of parameter		According to the social security contribution documents of the Project, the Project provides 8 full-time and 5 part-time jobs in total, all of them being local. Details are provided in *Table 133*. **Conclusion:** The Project contributes positively.
Future target for parameter		The Project aims to employ the same number of local people each year.
Way of monitoring	How	Measurement. The number of permanent local employment is counted. Residence records of the Project personnel are checked.
	When	Every monitoring period.
	By who	Plant manager on site.

Deviation from the monitoring plan:
N/A

QA/QC:

The Project is in accordance with the TEIAS's Technical Specification Document ("ITM") that contains the necessary precautions to ensure Occupational Health and Safety.

Health and safety precautions and equipment are legal necessities and have to be in compliance with national regulations. Moreover, Enercon, the manufacturer of the turbines, also provides a health and safety training to ESTR technicians.

The trainings instructed by public institutions, such as first aid and high voltage, are mandatory trainings. This ensures that the employees are trained properly according to national standards and requirements.

The trainings given by Enercon Servis Ltd and its affiliated companies are managed by Enercon, which ensures that the Project is properly maintained, operated and managed. Since these trainings are governed by contractual agreements and are provided by credible 3rd parties, the quality and sufficiency of the trainings are ensured.

Results:

The targets in the monitoring plan have been reached and the Project has contributed positively to employment quality and quantity in the region.

Sustainable Development Indicator: ID.3

No		ID 3
Indicator		Air Quality
Mitigation measure		Reduction of baseline SO_2 and NO_x emissions: The Project, by replacing electricity from fossil fuel combustion and the related fuel consumption, reduces the baseline SO_2 and NO_x emissions from electricity generation. The reductions of SO_2 and NO_x emissions will be calculated by multiplying net electricity generation of the Project activity with the SO_2 and NO_x intensities referred above.
Repeat for each parameter		
Chosen parameter		**a)** SO_2 reductions **b)** NO_x reductions
Current situation of parameter		**a) SO_2 emissions:** The Project's net electricity generation is 75,580,476 kWh, therefore the Project has resulted in a SO_2 reduction of: 75,580,476 kWh * 4.07 kg/MWh = 307.5 tons SO_2 **b) NO_x emissions:** The Project's net electricity generation is 75,580,476 kWh, therefore the Project has resulted in a NO_x reduction of: 75,580,476 kWh * 2.50 kg/MWh = 189.3 tons NO_x Information about the calculation of emission intensities for SO_2 and NO_x are provided below. **Conclusion:** The Project contributes positively to air quality.
Future target for parameter		The Project is expected to reduce the following emission amounts annually: SO_2: 5.31 kg/MWh * 112,763 MWh = 598.8 t SO_2 NO_x: 1.65 kg/MWh * 112,763 MWh = 186.1 t NO_x
Way of monitoring	How	Calculation. By multiplying the net electricity generation of the Project with the NO_x and SO_2 emission intensities calculated above.
	When	Every monitoring period.
	By who	Plant manager on site.

Deviation from the monitoring plan:
The SO_2 and NO_x intensities that were included in the monitoring plan have been revised, since more recent data is available. These intensities will be updated in the coming monitoring reports, based on the availability of data.

The revised monitoring plan uses the following SO_2 and NO_x baseline emission intensities:

a) SO_2 emissions: Total host county emissions are 759,204[17] tons in 2009. Net system electricity generation in 2009 is 186,619[18] GWh, corresponding to 4.07 kg/MWh SO_2 intensity.

b) NO_x emissions: Total host county emissions are 467,373[17] tons in 2009. Net system electricity generation in 2009 is 186,619[1818] GWh, corresponding to 2.50 kg/MWh NO_x intensity.

[17] Source: National GHG inventory of Turkey, 1990-2009, http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/ukr-2011-crf-14oct.zip, Workbook TUR-2011-2009, Worksheet:Table1s1

[18] Source: TEIAS, http://www.teias.gov.tr/istatistik2009/32(75-09).xls

QA/QC:

SO_2 and NO_x intensities are used for the calculation. These intensities are based on publicly available official data from the 2011 national inventory report of Turkey that has been submitted to UNFCCC ("TURKEY Greenhouse Gas Inventory, 1990 to 2009[17]"). This report's Annex 7 does not specifically report the SO_2 and NO_x emission uncertainties; therefore an accurate uncertainty percentage is unavailable. However, considering Turkey's 2008 overall emission uncertainty (including sinks) of 11.9%, it can be concluded that the uncertainty of this indicator is within acceptable limits.

For QA/QC details of the net electricity generation, which is one of the input parameters of the calculations of SO_2 and NO_x reductions, please refer to the relevant section of the D.2, monitored parameter number ID.1.

Results:

The outcomes of the calculations suggest that the actual performance did not fully reach the targets but that the Project positively contributes to air quality by substituting fossil-fuel based power and thus effectively reducing SO_2 and NO_x emissions.

Sustainable Development Indicator: ID.4

No		ID.4
Indicator		Diesel Oil consumption
Mitigation measure		N/A
Repeat for each parameter		
Chosen parameter		The amount of diesel oil consumed by the Project during the monitoring period.
Current situation of parameter		The backup generator on site consumes diesel oil and is operated when there is a black out in the grid. The generated power is used only for office consumption and is not related to the wind turbines. It is also operated periodically for short periods for maintenance purposes to keep it operational. Diesel generator operation logs show a total operational duration of approximately 7 hours during the whole monitoring period. Invoices of purchased diesel oil for the Project also suggest that diesel oil use is negligible in terms of project emissions. **Conclusion:** The Project emissions can be neglected.
Future target for parameter		Project emissions will be negligible.
Way of monitoring	How	Estimated. Quantitative Assessment: Diesel oil purchase invoices.
	When	Continuously.
	By who	Project manager on site.

Deviation from the monitoring plan:
N/A

QA/QC:

The personnel periodically maintain the diesel generator, which can be followed up at the maintenance log. Diesel oil purchases are also traceable with invoices. Therefore, the diesel oil consumption is verifiable with documents and is of high quality.

Results:

The outcomes suggest that the diesel oil consumption of the Project is too low to take into account for project emission calculations.

Sustainable Development Indicator: ID.5

No		ID.5
Indicator		Noise emissions
Mitigation measure		N/A
Repeat for each parameter		
Chosen parameter		Noise emission of wind turbines.
Current situation of parameter		This indicator is also the FAR-7 of the validation report. The Project utilises Enercon wind turbines, which have the unique feature of gearless power transmission. This not only results in less heat generation, it also means less waste oil and less noise because of lower friction. A noise test of the Project has been conducted by a lab on 08.12.2010. This report[19] assesses the noise emission of the Project according to the national legal noise thresholds. The result of the report suggests that the Project creates a noise less than the limits and is therefore in agreement with the FAR's requests. The noise levels witnessed during the site visit with the DOE were hardly audible. Local people interviewed during the site visit about noise emissions have not voiced any complaints. Therefore noise emissions of the Project do *not* affect local people negatively. **Conclusion:** The Project's noise emissions remain within acceptable limits for nearby residential areas.
Future target for parameter		The Project is expected to generate noise emissions at socially acceptable and legal levels.
Way of monitoring	How	Estimated. Qualitative and quantitative Assessment: Evaluation of product test result, project lab report and local interviews.
	When	Continuously.
	By who	Project manager on site.

Deviation from the monitoring plan:
N/A

QA/QC:

A noise test has been carried out by an authorized lab and the results are reported, which suggests that the noise level of the Project is lower than legal thresholds. This evaluation is based on calculations and quantitative tests and is therefore of high quality.

Noise emissions have also been discussed with local people in nearby villages. These interviews have been conducted randomly, reducing the probability of biased opinions.

[19] This report is provided to the DOE.

Results:

The outcomes suggest that the Project's noise emission levels are *not* significantly high. The noise generated by the turbines is hardly audible or within acceptable limits for local people in the vicinity.

Annex I – Information about Monitoring Parameters

Table 10. Definitions of the parameters

Parameter	Definition
$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	Amount of fossil fuel type *i* consumed in year y (ton or $000m^3$)
$NCV_{i,y}$	Net calorific value of fossil fuel type *i* in year y (TJ/kt or TJ/mil m3)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/TJ]
GEN_y	Net electricity delivered to the grid, excl. low-cost/must-run sources (MWh)
$EG_{m,y}$	Net electricity delivered to the grid by power unit m in year y [MWh]
$EF_{EL,m,y}$	CO_2 emission factor of power unit m in year y [tCO_2/MWh]
BE_y	Baseline emissions in year y
EG_y	Net electricity delivered to the grid in year y
PE_y	Project emissions in year y
LE_y	Leakage in year y

Table 11. Health and safety precautions

Checklist	Assessment
Safety equipment is available and sufficient.	Positive. The available safety equipment include safety rope, rescue rope, working clothes, protection glasses, safety shoes, helmets, medicine box and fire extinguishers.
Personnel use safety equipment continuously and correctly.	Positive. The personnel on site effectively use the required equipment such as the working clothes, protection glasses, safety shoes and helmets, depending on their roles and responsibilities.
The project does not involve hazardous work.	Positive. The Project does not involve any activity that is hazardous.
No accident has happened during monitoring period.	Positive. There has not been any work accident (i.e. personal injury, first aid etc.) on site during the monitoring period.
Compliance with national health and safety regulations.	Positive. There has not been any incompliance with relevant regulations in the host country.

Table 12. Trainings

Description	Managed / Given By	Participants	Date / Duration	Certificate
High Voltage	Demirer Enerji, Enercon Service	Wind farm responsible engineer and all 3 HV switchgear technicians.	22/10/2010, 18/03/2011, 25/03/2011, 23/09/2011, 30/09/2011	Certificates
High Voltage[20]	TEIAS	Wind farm responsible engineer and all 3 HV switchgear technicians.	Various dates determined by TEIAS.	HV licenses
Occupational Health and Safety	Enercon, another 3rd party	All 5 service technicians.	06/07/2010,14/03/2011,28/ 06/2011, 30/06/2011, 05/10/2011	Certificates

[20] TEIAS' training also includes extensive health and work safety courses.

Firefighting	Fire Department of Metropolitan Municipality of Izmir	3 service technicians.	12/01/2011	Certificates
First Aid	Turkish Red Crescent	3 service technicians.	15-16/01/2011	Certificates
Technical Training	Enercon	2 service technicians.	15-17/08/2011	Certificates

Table 13. Employment Information

Position	Task	Number of Staff	Employer	How many of them are local people?
Plant Responsible Engineer	Responsible from operational and maintenance activities and management of the plant on site: • responsible from HV and MV Systems • responsible from turbines	1	*Alize Enerji Elektrik Üretim A.S.*	1
Operator Technician of Voltage Switchgear Centre	Routine controls, intervention in case of grid breakdowns, reading the electricity measurement devices.	3	*Alize Enerji Elektrik Üretim A.S.*	3
Security Guard	Ensure security of the plant.	4	*Alize Enerji Elektrik Üretim A.S.*	4
Service Technician[6]	Servicing of the turbines. Maintenance and intervention in case of turbine problems.	5	*Enercon Servis Ltd.*	5
Total	8 full-time and 5 part-time	13	*By the Project Owner and its subcontractor Enercon Servis Ltd.*	13

Annex II – Electricity Generation Data

Project Name: Kuyucak 25.6 MW Wind Farm Project, Turkey
Period start: 11/11/2010
Period end: 31/12/2011

Year	Month	Gross Energy Generation (kWh)	Self-Consumption (kWh)	Net-electricity Generation (kWh)	Emission Reduction (tCO_2)
2010	November	715,641	4,706	710,935	451.44
2010	December	3,048,137	1,588	3,046,549	1934.56
2011	January	3,524,517	3,419	3,521,098	2235.90
2011	February	4,824,106	1,074	4,823,032	3062.63
2011	March	5,823,008	514	5,822,494	3697.28
2011	April	6,655,854	260	6,655,594	4226.30
2011	May	4,557,780	1,068	4,556,712	2893.51
2011	June	4,215,444	2,235	4,213,209	2675.39
2011	July	4,486,089	353	4,485,736	2848.44
2011	August	9,654,796	0	9,654,796	6130.80
2011	September	7,833,614	161	7,833,453	4974.24
2011	October	6,396,459	1,496	6,394,963	4060.80
2011	November	7,726,315	1,115	7,725,200	4905.50
2011	December	6,137,502	797	6,136,705	3896.81
TOTAL		75,599,262	18,786	75,580,476	**47,993**

Annex III – Turbine Locations