# GOLD STANDARD – VOLUNTARY EMISSION REDUCTION
# 1ST PERIODIC MONITORING REPORT
# MONITORING PERIOD: 10/07/2009 – 28/02/2010

# KELTEPE WIND FARM PROJECT - TURKEY

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# SECTION A. General project activity information

## A.1 Title of the project activity:

Keltepe Wind Farm Project - Turkey

## A.2. Gold Standard registration:

Validation date: 04/12/2008
Registration date: 18/09/2009

## A.3. Short description of the project activity:

The project involves the operation of a 20.7 MW onshore wind farm in the Balıkesir province in Turkey. The project is constructed and operated by Demirer and consists of 23 wind turbines E44 of 900 kW, supplied by Enercon. The project activity included the establishment of a grid connection by development of 13 km of new transmission line between the project and the national grid. The project is connected to the 154 kV high-voltage transmission lines at the Göbel transformer station to deliver the generated 72.2 GWh/year net electricity to the Turkish national grid. By replacing fossil fuel power generation in Turkey, the greenhouse gas emission reduction is estimated to be 46,501 t CO2-eq/year.

## A.4. Monitoring period:

Monitoring period covered by this report: 10/07/2009 – 28/02/2010 (both days are included)

### A.5. Methodology applied to the project activity:

The reference Baseline and Monitoring methodology is the following:

Approved consolidated baseline methodology ACM0002
"Consolidated baseline methodology for grid-connected electricity generation from renewable sources", version 7 of 26-30 November 2007[1], scope 01.

### A.6. History of implementation including time table for major project parts:

The project installation is finished according to the description in the PDD and completely operational. The most important milestones are included in the following table:

| Date | Milestone |
|---|---|
| 01 Jul 08 | Start of construction |
| 04 Dec 08 | Validation of project activity |
| Feb 2009 | Completion of the installation |
| 10 Jul 09 | Official start of operation |
| 10 Jul 09 | Start of the first crediting period and first monitoring period |
| 18 Sep 09 | Registration of project activity |
| 28 Feb 10 | End of the first monitoring period |

### A.7. Intended deviations or revisions to the registered PDD or monitoring plan:

No deviations to the monitoring procedure documented in the registered monitoring plan occurred. The project capacity is 20.7 MW, as in the validated and registered PDD. A difference of the turbine model between the initial design of 19 MW and the actual registered design of 20.7 MW was necessary to comply with safety standards. And due to a delay in the corresponding update of the operation licence, the wind farm has been operated first at 18.9 MW, corresponding to only 21 units. The two last turbines therefore started later. The complete documentation of project history with reference to the licenses is made available to the verifying DOE.

### A.8. Changes during the monitoring period:

There are no major changes during this period. But the electricity meters from Köhler have been replaced by meters from Actaris, which have a better scale, in August 2009, as shown in section B.1.1.

### A.9. Person(s) responsible for the preparation and submission of the monitoring report:

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1 http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_323M30IDF1IH6AG3GRCJ4PKR9CKM7P

# SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4.

## B.1. Monitoring equipment:

### B.1.1. Table providing information on the equipment used:

| PDD Identification code | Device | Manufacturer | Model | Serial number | Date of installation | Date of Initial-calibration |
|---|---|---|---|---|---|---|
| ID11 | Electricity meter (primary) | KÖHLER | Tr.3.3.4.C. 4.OP 5 | 958341 | 10.07.2009 | 10.07.2009 |
| ID 11 | Electricity meter (secondary) | KÖHLER | Tr.3.3.4.C. 4.OP 5 | 958333 | 07.08.2009 | 07.08.2009 |
| ID 11 | Electricity meter (primary) | SCHLUMBERGER | SL7000 | 530317 48 | 12.08.2009 | 12.08.2009 |
| ID 11 | Electricity meter (secondary) | SCHLUMBERGER | SL7000 | 530317 49 | 12.08.2009 | 12.08.2009 |

The Köhler meters (class 0.5 active, class 2 reactive) have been replaced on 12th of August by Schlumberger Actaris meters that have a better scale (class 0.2 S and 0.5 S active, class 2 reactive).

### B.1.2. Calibration procedures:

The calibration of the monitoring equipment was carried out according to the information provided in the PDD. The PDD mainly includes the following obligation for the calibration of the appropriate meters:

*"TEIAŞ[2] is responsible for calibration and maintenance of the devices. If any difference occurs between primary and secondary device TEIAŞ performs the necessary maintenance and calibration."*

No differences between the meters occur since the initial calibration, so no further calibrations were necessary.

## B.2. Data collection (accumulated data for the whole monitoring period):

### B.2.1. List of fixed default values:

| PDD Identification code | Parameter | Default value | Unit | Description |
|---|---|---|---|---|
| ID 8 | EF | 0.644 | $tCO_2$-eq/MWh | Emission factor of the Turkish grid estimated ex- |

[2] *TEIAŞ is the name of the Turkish grid company. However in this project, the local company responsible of the grid is called UEDAŞ (cf Annex 1 for the list of abbreviations).*

| | | | | |
|---|---|---|---|---|
| | | | | ante |
| ID 9 | NCV_Diesel | 0.0366 | GJ / L | Net calorific value of Diesel |
| ID 10 | EF_$CO_2$,Diesel | 0.074 | $tCO_2$-eq / GJ | $CO_2$ Emission Factor of Diesel |

### B.2.2. Data concerning GHG emissions by sources of the baseline:

| PDD Identification code | Data variable | Unit | Description |
|---|---|---|---|
| ID 11 | EG | MWh | Electricity supplied by the project activity to the grid. |

### B.2.3. Data concerning GHG emissions by sources of the project activity:

| PDD Identification code | Data variable | Unit | Description |
|---|---|---|---|
| ID 12 | FC_Diesel | liters | Diesel consumption of the auxiliary power unit |

### B.2.4. Data concerning leakage:

No leakage needs to be considered.

### B.2.5. Data concerning environmental impacts:

For this paragraph we refer to the Gold standard monitoring report (Section E).

## B.3. Data processing and archiving:

Data handling was carried out according to the description in the PDD. The officials from UEDAŞ performed monthly the measurements for both the primary and secondary device, under the control of the plant personnel of Demirer. The UEDAŞ personnel, in the first days of the month read the values obtained at 24:00 of the last day of the month before. A reading protocol was signed by both parties. An invoice (receipt of sale) was prepared by Demirer and delivered to UEDAŞ.

## B.4. Special event log:

The following special event in recorded in addition to the milestones described in section A.6:

| Date | Event |
|---|---|
| 12 Aug 09 | Replacement of Köhler meter by Schlumberger Actaris meters.<br><br>The internal calculation of August electricity generation as the sum of the value from 1st to 12th with Köhler and from 12th to 31st with Schlumberger Actaris has been shown to the DOE during verification onsite visit. |

## SECTION C. Quality assurance and quality control measures

The Project owner is Demirer Enerji Üretim San. Ve Tic. A.S. (called "Demirer") and is therefore responsible for the operation and the monitoring of the project activities.

### C.1. Documented procedures and management plan:

#### C.1.1. Roles and responsibilities:

For Demirer Mr. Muhammet Edip ERDOĞAN is the plant manager responsible for monitoring issues within the project. He reports directly to the Operational Manager, Mr. Sarper BAŞAK, who carries out the data handling.
Mrs. Çagla BALCI ERIS is a Carbon Development Manager. She is responsible for data handling and invoices of the wind farms; originating and marketing the carbon credits (including all steps of the complete project cycle)
The wind farm responsible engineer sends to Mr. Sarper BASAK and Mrs. Çagla BALCI ERIS the electricity generation report every week and meter reading protocol every month.

#### C.1.2. Trainings:

The plant engineer and two services technicians attended a safety training. The plant engineer also attended an extended electrical training of 12 days in Germany. A new system of internal trainings about Occupational Safety and Health has also been set up since the beginning of 2010. See also section E.

### C.2. Involvement of Third Parties:

Support and consultancy regarding the Gold Standard VER obligations is provided by OneCarbon International B.V., a company purchased by ORBEO.

### C.3. Internal control measures and cross check possibilities:

The internal control procedures maintain the reliability and accuracy in data transfer and calculations.

The plant personnel records on regular basis the hourly values from the meters and verify that data from spare meter is consistent with data from main meter.
The wind farm responsible engineer performs regular checks of this procedure at the end of the month: he controls the monthly data of main and spare meters. If any difference occurs between main and spare meters, UEDAŞ has to be informed for the necessary maintenance and calibration.
Furthermore, the plant engineer sent the weekly and monthly data to Mr. Sarper Basak and Mrs. Çagla Balci Eris for the control and data storage (cf C.1.1).

There is analysis- and maintenance system (SCADA) operated by Enercon. This system records automatically all electricity generation data and wind parameters of each single windmill.
In this way jumps or periods with not normal operating conditions can be identified and explained.

### C.4. Troubleshooting procedures:

As the measuring devices are sealed by UEDAŞ, Demirer cannot intervene with the devices. In case of unforeseen problems or failures of the meters or if any differences occurs between primary and secondary devices UEDAŞ has to be informed for necessary maintenance and calibration. There is an

agreement between Demirer and UEDAŞ that in case of problems or failures of the meters UEDAŞ reacts as fast as possible to solve the problem.

Furthermore, a logbook is written all the time where observations and all other information necessary to document are included.

## SECTION D. Calculation of GHG emission reductions

### D.1. The used formulas:

The total emission reductions can be calculated with the results of the below described equations. The emission reduction is equal to the baseline emissions minus project emissions and leakage emissions. Leakage emissions in this project are considered to be zero. There are negligible project emissions in this kind of project (cf. Section D.2.1). The general equation is as follows:

$ER = BE – (PE + L)$ **(1)**

Where:
ER = Emission reduction
BE = Baseline emissions
PE = Project emissions
L = Leakage

According to the applied methodology version the emission reductions are the baseline emissions calculated as the electricity supplied to the grid multiplied by the grid emission factor.

$ER = BE = EF * EG$ **(2)**

Where:
ER = Emission reduction in tonnes $CO_2$-eq
BE = Baseline emissions in tonnes $CO_2$-eq
EF = Grid emission factor in t$CO_2$-eq/MWh (ID 8)
EG = Electricity supplied to the Grid in MWh (ID 11)

The electricity meters are measuring two parameters: The electricity supplied to the grid ($EG_{export}$) and the electricity consumption from the grid ($EG_{import}$). To achieve the net amount of supplied electricity, the difference has to be calculated:

$EG = EG_{export} – EG_{import}$ **(3)**

Where:
EG = Net electricity supplied to the Grid in MWh (ID 11)
$EG_{export}$ = Electricity supplied to the Grid in MWh
$EG_{import}$ = Electricity consumption from the Grid in MWh

### D.2. GHG emission reductions (referring to B.2. of this document):

#### D.2.1. Project emissions:

The project emission is negligible. According to the invoices, 729 litres of diesel have been bought.

| name | FC_Diesel (ID 12) | NCV_Diesel (ID 9) | EF_CO2,Diesel (ID 10) | PE |
|---|---|---|---|---|
| unit | Litres (L) | GJ / L | tCO2-eq / GJ | t CO2-eq |
| value during 1st PV | 729 | 0.0366 | 0.074 | 1.97 |

As expected, the project emissions are negligible because PE << 1% of BE. This is the a posteriori demonstration of equation (2), ER = BE.

### D.2.2. Baseline emissions:

The baseline emissions for the project activity according to the PDD are included in the following table:

| Month | (A) Electricity supplied to the grid [MWh] | (B) Electricity consumption from the grid [MWh] | (C) = (A) - (B) EG (ID11) Net electricity supplied to the grid [MWh] | Baseline emission (acc. formulae 2: ER = EG * EF) [t $CO_2$-eq] |
|---|---|---|---|---|
| (10-31) Jul 09[3] | 3,946.74 | 0.00 | 3,947 | **2,541.70** |
| Aug 09[4] | 8,422.34 | 2.56 | 8,420 | **5,422.33** |
| Sep 09 | 5,364.97 | 2.29 | 5,362.68 | **3,453.57** |
| Oct 09 | 4,828.07 | 3.43 | 4,824.64 | **3,107.07** |
| Nov 09 | 4,845.19 | 5.11 | 4,840.08 | **3,117.01** |
| Dec 09 | 8,180.88 | 4.99 | 8,175.88 | **5,265.27** |
| Jan 10 | 5,106.37 | 5.52 | 5,100.86 | **3,284.95** |
| Feb 10 | 6,445.18 | 7.02 | 6,438.16 | **4,146.18** |
| **Sum 10.07.2009-31.12.2009** | 35,588.19 | 18.39 | 35,569.80 | **22,906.95** |
| **Sum 01.01.2010-28.02.2010** | 11,551.55 | 12.53 | 11,539.02 | **7,431.13** |
| **Sum 1st PV 10.07.2009-28.02.2010** | **47,139.74** | **30.92** | **47,108.82** | **30,338.08** |

### D.2.3. Leakage:

Leakage is considered to be zero (see also section B.2.3).

### D.2.4. Summary of the emissions reductions during the monitoring period:

[3] The electricity generation in July 2009 has been obtained as the sum of the periods:
- From 10th (start of operation, Köhler meters is at "0") to 23rd (Index Protocol of the value of the Köhler meter)
- From 23rd to the end of the month (protocol signed by both parties)

[4] The electricity generation of August 2010 has been obtained as the sum of the periods:
- From 1st to 12th measured by Köhler meter, thanks to an optical reading on the 14th of August.
- From 12th to the end of the month (protocol signed by both parties, with the Schlumberger Actaris meter).

According to the general equation

$$ER = BE = EF * EG$$

It can be followed that the emission reductions of the project activity is equal to the baseline emissions. The emission reductions per vintage and for the period which is covered by this monitoring report are therefore:

| | |
|---|---|
| **Vintage 2009 (10.07.2009-31.12.2009)** | 22,906 tCO2-eq |
| **Vintage 2010 (01.01.2010-28.02.2010)** | 7,431 tCO2-eq |
| **1st Monitoring Period (10.07.2009-28.02.2010)** | **30,337 tCO2-eq** |

### D.2.5 Comparison of the ex-post achieved emission reductions against the ex-ante estimated

The ex-ante estimated yearly volume in the PDD is 46,501 $tCO_2$-eq; based on this, a total of 31,000 $tCO_2$-eq could be extrapolated for a period of 8 months. The ex-post achievements are slightly lower but consistent with performance monitored in similar other wind farms.

## SECTION E. Gold Standard sustainable development indicators

According to the requirements of the Gold Standard, the project activity must be assessed against a matrix of sustainable development indicators. The contribution of the proposed project activity to the sustainable development of the country is based on indicators of local/global environmental sustainability, social sustainability & development and economic & technological development.

Four indicators were added to the monitoring plan. All documents regarding these additional parameters have been presented to the DOE during the on-site visit:

### SDI.1: Water Quality

Description: *Documents proving the disposal of waste water*

The project includes a wastewater tank and the monitoring consists of recording the bills related to emptying the tank by an external company. Due to the actual length of the monitoring period (7.5 months), emptying the tank was not necessary yet, and therefore there is no monitoring document to be checked during this first monitoring period.

### SDI.4: Soil condition

Description: *Visual inspection with regards to the excavation wastes*

The excavation wastes created by the construction of the wind farm have been used onsite for the road and the back fill of the foundations. The project participant has contractual agreement with the construction company that no excavation residues would be disposed outside the project in any inappropriate way, but that it will be integrated as indicated by the supervisor of construction.

Road fill works

Foundation backfill

The verifying DOE will have the opportunity to look at it onsite during the verification visit.

### SDI.6: Employment (quality)

Description: *number of employees trained with issued certificates*

The plant engineer (and wind farm manager ) attended a safety training about personal protective equipment, lowering a person, safety rules with turbine delivered by Enercon Service Turkey on 16.01.2009. Two service technicians attended the trainings with the same agenda but on different dates - on 16.04.2009 and on 22.05.2009 - , in order to ensure the continuity on the operation onsite.
Besides, the plant engineer attended also a complete electrical training programme of 12 days by Enercon Service Deutschland GmbH, in Germany in June 2009, with extensive knowledge transfer about

all technical, operation, inspection and maintenance of foundations, turbines, blades, generator, converting system, control system, etc.
And finally, since 2010, one service technician is in charge of training the other employees of the wind farm about Occupational Safety and Health: periodically, each technician will train his colleagues (the role of the "trainer" is alternating). Topics are Basic Work Instructions, Working in Construction Areas and Working With Cranes, etc.
Training frequencies, as described by the Operation Manager Sarper Basak, will be documented during the second verification, according to the FAR P1: employees (except safety personnel) are trained at list every 2 years on Safety Issues. First Aid trainings is delivered once for each Enercon Service Technician. Other trainings (e.g. about high voltage) are delivered on optional basis, and there is no required frequency.

Besides the impact in term of "employment quality" itself, the project contributes in general to knowledge transfer about several subject like operation and maintenance "from north to south and from urban to rural area". Enercon has been directly involved in this process, whereas TEIAS had no direct involvement yet because the wind farm is restricted to medium voltage area.

### SDI.10: Employment (numbers)

Description: *Number of employment created by the project monitored by the monthly salary payment sheet.*

It could be shown that the project activity creates a respectable number of permanent and high qualified jobs. Currently 7 full time positions for local people are directly related to the project: 1 wind farm manager (plant engineer), 2 positions for service technicians, 4 positions for personal of security. Moreover, additional jobs are created at technology suppliers and service and consultancy providers. Several of these additional positions are filled by local people as well.

### Other sustainable achievements

The project activity has also contributed to the improvement of life in the village through the construction of a road and donation of a computer and a printer, and a donation for the construction of the cultural centre[5].

[5] These additional achievements are not part of the registered monitoring plan and not in the scope of the verification of the DOE

## SECTION F. Open issues from validation and registration

From the validation, that took place in April to December 2008, one Forward Action Request (FAR) was formulated.

**FAR 1:** *"Emissions from auxiliary power unit are not taken into account as project emissions. Emissions from auxiliary power unit are not included in PDD and Monitoring plan as proposed. PP shall ensure that auxiliary emissions will be monitored and reported.*
*This shall be verified in the initial verification.*
*Comment: the expected volume of approximately 5t $CO_2$ is negligible compared to the expected annual emission reduction of 46,501 t $CO_2$, but should nevertheless be reported as project emissions."*

**Answer of the project participant:**
The PDD has been corrected accordingly and the respective diesel consumption has been monitored and reported in section D.2.1 of the monitoring report.

## Annex 1

### Definitions and acronyms

| | |
|---|---|
| ACM | : Approved Consolidated Methodology |
| CDM | : Clean Development Mechanism |
| DOE | : Designated Operational Entity |
| GHG | : Greenhouse Gases |
| GS | : Gold Standard |
| IPCC | : Intergovernmental Panel on Climate Change |
| PDD | : Project Design Document |
| STP | : Standard temperature and pressure |
| $tCO_{2\text{-}eq}$ | : Amount of greenhouse gases emission equivalent to the emission of one ton of carbone dioxide. |
| TEIAŞ | : Turkish Electricity Transmission Company |
| UEDAŞ wind farm | : Uludağ Elektrik Dağıtım Anonim Şirketi, name of the grid company for this |
| UNFCCC | : United Nations Framework Convention on Climate Change |
| VER | : Verified Emission Reductions |