



MONITORING REPORT

Version: 1.3

Preparation date: 10.01.2012

ALIZE ÇAMSEKI 20.8 MW WIND FARM PROJECT, TURKEY

GOLD STANDARD - GS399

Monitoring period number: 2

Monitoring period dates: 01.09.2010-31.10.2011 (first and last days included)

Prepared by:





CONTENTS

- A. General description of the project activity
 - A.1. Brief description of the project activity
 - A.2. Project participants
 - A.3. Location of the project activity
 - A.4. Technical description of the project
 - A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity
 - A.6. Registration date of the project activity
 - A.7. Crediting period of the project activity and related information
 - A.8. Name of responsible person(s)/entity(ies)
- B. Implementation of the project activity
 - B.1. Implementation status of the project activity
 - B.2. Revision of the monitoring plan
 - B.3. Request for deviation applied to this monitoring period
 - B.4. Notification or request of approval of changes
- C. Description of the monitoring system
- D. Data and parameters monitored
 - D.1. Data and parameters used to calculate baseline emissions
 - D.2. Data and parameters used to calculate project emissions
 - D.3. Data and parameters used to calculate leakage emissions
 - D.4. Other relevant data and parameters
- E. Emission reductions calculation
 - E.1. Baseline emissions calculation
 - E.2. Project emissions calculation
 - E.3. Leakage calculation
 - E.4. Emission reductions calculation
 - E.5. Comparison of actual emission reductions with estimates in the registered CDM-PDD
 - E.6. Remarks on difference from estimated value

**SECTION A. General description of the project activity****A.1. Brief description of the project activity: >>**

The “*Alize Çamseki 20.8 MW Wind Farm Project, Turkey*”, hereafter referred to as the Project, involves a grid-connected onshore wind farm project in Turkey, consisting of 11 wind turbines with a total installed power generation capacity of 20.8 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 electricity settlement centre ensures 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 emission reductions are 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 will 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 in June 2009. The first verification ended on 31.08.2010 and this monitoring period starts right after this date, 01.09.2010.
4. **Total emission reductions achieved in this monitoring period:** 51,924.

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 – Sustainability Management Ltd. (private entity)	No

A.3. Location of the project activity:

The coordinates of the turbines are as the following¹:

The Project is located in Turkey, Çanakkale Province. It is in Ezine District, Çamseki Town, Üvecik Village.

The project has a ca. 1 km distance from Üvecik village, 18 km from Ezine town and 40 km from Canakkale province.

The coordinates of the Project are approximately 39° 53' N, 26° 13' E.

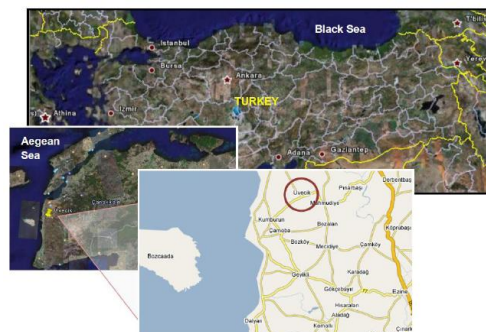


Table 1. Turbine Coordinates

Turbine Nr	E	N
T1	4 31 234	44 15 670
T2	4 31 089	44 15 740
T3	4 30 960	44 15 836
T4	4 30 552	44 15 750
T5	4 30 392	44 15 765
T6	4 30 003	44 15 684
T7	4 29 870	44 15 783
T8	4 29 746	44 15 893
T9	4 29 636	44 16 015
T10	4 29 512	44 16 122
T11	4 30 807	44 15 918

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 only the net electricity generation of the Project. The main equipment used in the Project is wind turbines the technical specifications of which are provided in Table 13 and Table 14;

Table 2. The details of the wind turbines used²

Manufacturer	Enercon
Type of Turbines Used	E82, 2000 kW each. Hub height: 78 m. E48, 800 kW each. Hub height: 65 m.
Number of Turbines	10 x E82 1 x E48
Connection	154 kV high voltage to Ezine transformer station

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

¹ Source: Generation License

² Source: PDD



- 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;
- “Tool for the demonstration and assessment of additionality”, Version 05.

A.6. Registration date of the project activity:

The Gold Standard registration date is 29.06.2010.

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 crediting period will be renewed twice. The first crediting period started on 01.07.2009. The monitoring period of this report starts on 01.09.2010 and ends on 31.10.2011, which is earlier than the ending date of the 7 years crediting period.

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, Technical Manager, Mavi Consultants	Mavi Consultants is assigned by the Project owner as the 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

**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 24.06.2009 with an official approval by the Ministry of Energy and Natural Resources. The Project was registered at the TEIAS' online financial settlement system (PMUM) as of 01.07.2009. The Project consists of one site and of one phase.
2. **The information regarding the actual operation of the project activity:** The Project is implemented in line with the design that was explained in the 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: N/A.

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

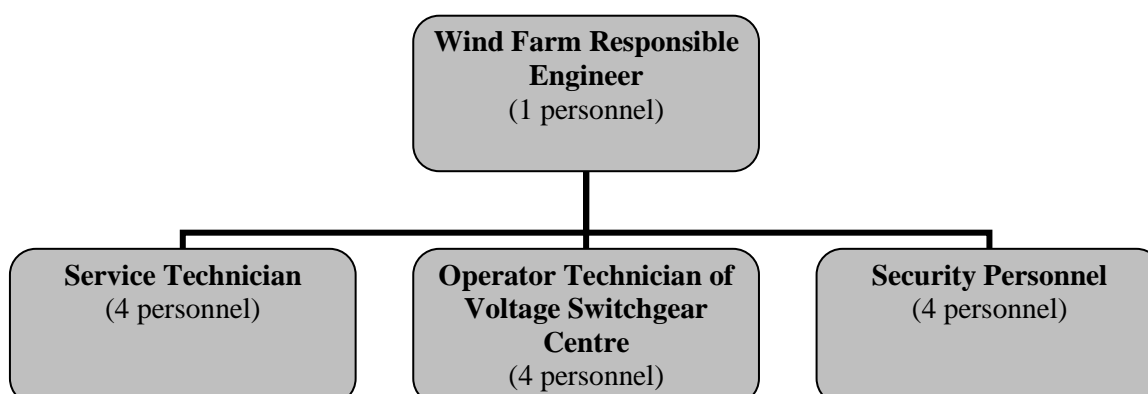
There are no deviations applied to this monitoring period.

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:**Responsibilities:**

The Managing Director of Demirer Enerji 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.

The Responsible Engineer is responsible for monitoring issues on site.

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

Information flow:

The data generation information is 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 to 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 Project owner for invoicing TEIAS. The electricity generation data are reported on a monthly basis. The procedure involves the following tasks (managed by the responsible person stated above):

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

**Data recording and aggregation:**

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

There are two measurement devices; the 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 all of the wind turbines, 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 prepared by Mavi Consultants. 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 person stated above.

Emergency procedures for the monitoring system:

In case of an organisational change within the Project owner, a qualified person 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 on the internet, 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 give the same values, 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 guidance, rules and conditions. Although SCADA data is not used for monitoring, it is 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	The GHG emission reductions of the Project will be calculated by



used for (Baseline/ Project/ Leakage emission calculations)	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.

D.2. Data and parameters monitored

Data / Parameter:	EG_y (Annual net electricity amount fed to the grid by the project activity)
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:	<p>Net electricity generation of the Project activity is as the following:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Start date</th> <th>End date</th> <th>Net power generation [kWh]</th> </tr> </thead> <tbody> <tr> <td>2010</td> <td>01.09.2010</td> <td>31.12.2010</td> <td>23,576,869 kWh</td> </tr> <tr> <td>2011</td> <td>01.01.2011</td> <td>31.10.2011</td> <td>58,194,177 kWh</td> </tr> <tr> <td>Total</td> <td>01.09.2010</td> <td>31.10.2011</td> <td>81,771,046 kWh</td> </tr> </tbody> </table>	Year	Start date	End date	Net power generation [kWh]	2010	01.09.2010	31.12.2010	23,576,869 kWh	2011	01.01.2011	31.10.2011	58,194,177 kWh	Total	01.09.2010	31.10.2011	81,771,046 kWh		
Year	Start date	End date	Net power generation [kWh]																
2010	01.09.2010	31.12.2010	23,576,869 kWh																
2011	01.01.2011	31.10.2011	58,194,177 kWh																
Total	01.09.2010	31.10.2011	81,771,046 kWh																
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)	<p>The measurement devices have the following specifications:</p> <p>Table 3. Specifications of measurement devices used</p> <table border="1"> <thead> <tr> <th>Serial Number</th> <th>Device Model</th> <th>Manufacturer</th> <th>Model Year</th> <th>Date of initial calibration</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td>95834743</td> <td>ZMD402CT44.2407 S2</td> <td>LANDIS+GYR</td> <td>2009</td> <td>25.06.2009</td> <td>0.2 s</td> </tr> <tr> <td>95834742</td> <td>ZMD402CT44.2407 S2</td> <td>LANDIS+GYR</td> <td>2009</td> <td>25.06.2009</td> <td>0.2 s</td> </tr> </tbody> </table> <p>Calibration frequency: According to the Article 9 of the relevant regulation³, periodical inspections of “gauges for electric, water, coal 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 cannot perform any type of maintenance or calibration.</p> <p>There has not been any calibration made during the monitoring period.</p> <p>Date of last calibration: 02.07.2010⁴ (both primary and back-up devices)</p> <p>Responsible personnel: TEIAS is responsible for monitoring and ensuring that the measurement devices satisfy the requirements. TEIAS is also responsible of 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 Responsible Engineer, in the name of the Project owner, is responsible for coordinating with TEIAS the necessary maintenance and calibration.</p> <p>Validity: The technical specifications and the calibration procedure are in agreement with the national regulations⁵ and the monitoring plan.</p>	Serial Number	Device Model	Manufacturer	Model Year	Date of initial calibration	Accuracy	95834743	ZMD402CT44.2407 S2	LANDIS+GYR	2009	25.06.2009	0.2 s	95834742	ZMD402CT44.2407 S2	LANDIS+GYR	2009	25.06.2009	0.2 s
Serial Number	Device Model	Manufacturer	Model Year	Date of initial calibration	Accuracy														
95834743	ZMD402CT44.2407 S2	LANDIS+GYR	2009	25.06.2009	0.2 s														
95834742	ZMD402CT44.2407 S2	LANDIS+GYR	2009	25.06.2009	0.2 s														

³ “Measurement and Measuring Tools Inspection Regulation”, Date: 24/07/1994, Official Gazette Number: 22000

⁴ Reference: Calibration test protocols for both devices. The measurement devices have been calibrated only once during the monitoring period.



	<p>The list of the incidents occurred during the monitoring period which might have an impact on the measurement devices is given below;</p> <p>Table 4. Extraordinary Events (during monitoring period)</p> <table border="1"> <thead> <tr> <th>Potential Risks of Inaccuracy</th> <th>Occurrence?</th> <th>Information</th> </tr> </thead> <tbody> <tr> <td>Calibration of the measurement devices (carried out by TEIAS)</td> <td>None</td> <td>This is in line with the monitoring plan.</td> </tr> <tr> <td>Malfunction, replacement, resetting, repair service or any other relevant activity regarding the measurement devices</td> <td>None</td> <td>This is in line with the monitoring plan.</td> </tr> <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> </tbody> </table> <p>As seen from the <i>Table 4</i>, there is not any extraordinary event which could be critical in assessing the accuracy of this monitoring parameter.</p>	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.	Accident (fire, technical equipment failure, theft of equipment etc.) which could compromise the accuracy	None	This is in line with the monitoring plan.
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.											
Accident (fire, technical equipment failure, theft of equipment etc.) which could compromise the accuracy	None	This is in line with the monitoring plan.											
Measuring/ Reading/ Recording frequency:	<p>The primary and back-up measurement devices measure, read and record various data such as electricity generated and consumed, in real-time.</p> <p>There is no sampling involved.</p>												
Calculation method (if applicable):	<p>The PMUM (TEIAS) Market Balancing Center website⁶ will be accessed and the monthly reports will be recorded, using the Project Owner's own user ID and password. These reports do not show the <i>Net Energy Export to the Grid</i>, but <i>Energy Export to the Grid</i> and <i>Energy Import from the Grid</i> data. Therefore, their difference is calculated to obtain the net electricity generation of the Project. These data in the PMUM interface will be copied and pasted to a prepared spreadsheet, which will perform the calculations.</p> <p>The TEIAS PMUM system does not report the <i>Net Electricity Generated</i>; therefore it is calculated via a spreadsheet.</p> <p>For each month, the <i>Energy Export to the Grid</i> and the <i>Energy Import from the Grid</i> values are extracted from the PMUM monthly reports. The <i>Energy Export to the Grid</i> is denoted as "İletim Sistemine Veris Miktarı" (ISVM) and the <i>Energy Import from the Grid</i> is denoted as "Uzlaşmaya Esas Cekis Miktarı" (UECM) in the monthly report in Turkish language.</p>												

⁵ 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/documents/10157/326b88e3-e36f-4d7c-af43-1f8b5959a203>

English: <http://www2.epdk.gov.tr/english/regulations/electric/meters.doc>

⁶ <http://dgpys.teias.gov.tr/dgpys>



	<p><i>Net Energy Export to the Grid = Energy Export to the Grid – Energy Import from the Grid</i></p> <p>This difference (which is equal to monthly net energy export to the grid) is added to each other for each month of the monitoring period to find the total net energy export to the grid of the Project.</p> <p>This has no impact on the data used in the calculations.</p> <p>The monitoring spreadsheet, together with the scans of the PMUM reports as evidence, is submitted to the verifying DOE. The calculation and formulae are clearly visible in the spreadsheet.</p>
QA/QC procedures applied:	<p>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.</p> <p>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.</p> <p>TEIAS personnel monthly perform on-site measurements for both the primary and secondary (back-up) measurement devices on the first days of the month. The reading involves obtaining the recorded values that were measured until 24:00 of the last day of the preceding month. Based on this reading, a protocol is prepared by TEIAS on site and then signed by both parties each month. The invoice is then prepared by the Project owner and delivered to TEIAS. The monthly measurement device 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 is stored both by the Project owner and the TEIAS PMUM system, both as hardcopy and softcopy, ensuring its 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.</p> <p>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.</p> <p>The baseline calculations are carried out electronically with spreadsheet software; therefore the calculations are transparent and of high quality.</p> <p>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 parameters can be identified quickly. This system improves the quality</p>



control and minimizes any operational risks.

The switchgear station, where the measurement instruments are read periodically by TEIAS, is only accessible to TEIAS. The project participant 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 operation period. This contract ensures successful operation and maintenance of the Project activity for a certain period of time.

SECTION E. Emission reductions calculation
E.1. Baseline emissions calculation

The Project mainly involves electricity capacity addition, which reduces CO₂ 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;

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

where BE_y is calculated as;

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

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;

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

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 5. Gross and Net Electricity Generation [GWh] in Turkey⁷

	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 low-cost 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%		

⁷ Reference: PDD, Table 6.

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

Table 6. Calculation of the OM emission factor

Parameter	2004	2005	2006
CO ₂ Emissions [ktCO ₂]	76,185 ⁸	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):

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

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

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

Fuel Type	Generation of New Capacity Additions, GWh	Average Efficiency ⁹ , 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 & Asphaltite	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	60.4	0%	0	0
Total	35,329			17,786
Build Margin EF	0.503			

$$EF_{grid,CM,y} = 0.679 \text{ tCO}_2/\text{MWh} * 0.75 + 0.503 \text{ tCO}_2/\text{MWh} * 0.25 = \mathbf{0.635 \text{ tCO}_2/\text{MWh}}$$

Baseline emissions are calculated using formula (2);

$$BE_y = 81,771,046 \text{ kWh} * 0.635 \text{ tCO}_2/\text{MWh} = \mathbf{51,924 \text{ tCO}_2}$$

⁸ 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 CO₂ emissions.

⁹ Source: Annex 1 of the “Tool to calculate the emission factor for an electricity system”



Data used for calculations and further details are available in the PDD. Definitions can be found in *Table 9*.

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;

$$ER_y = BE_y - PE_y - LE_y = 51,924 \text{ tCO}_2$$

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 7. GHG Emission Reductions Achieved

Vintage year	Period	Emission Reductions, tCO ₂
2010	01.09.2010-31.12.2010	14,971
2011	01.01.2011-31.10.2011	36,953

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 ₂ e)	51,955	51,924

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

The actual annual net GHG emission reduction in this monitoring period (from monitoring period start date of 01.09.2010 until 30.08.2011) corresponds to 42,890 tCO₂. This figure is lower than the estimated annual reductions in the PDD, 51,955 tCO₂. Therefore, it can be deduced that the Project underperformed in this monitoring period. The Project owner believes the reason of this to be poor wind conditions during the monitoring period.



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		

**APPENDIX I****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	<p>FAR 1 (Previous issuance review)</p> <p>In light of the availability of new information through credible external third parties that indicates that the project site borders an ‘Important Nature Site’ (Site 305) and that it is also on a bird migration route that is active during the migration of birds from/ to the Bosphorus, a detailed investigation/study by an independent third party should be prepared before the next request for issuance. Such study should discuss what mitigation measures, if any, are needed to ensure that the project activity has no negative impacts on local birds’ feeding, breeding or roosting activities due to its proximity to an ‘Important Nature Site’. The study should also 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 bird.</p>	<p>The impact of the Project on bird migration during the monitoring period has been assessed with an expert study. According to this study, the Project has no significant impact on migrating birds and the site is not located in a sensitive area which would require site observations. The study suggests wind turbine blades to be painted with colored edges, so that birds can avoid collision with blades.</p> <p>The blades used in the Project activity are colored with red stripes as a mitigation measure, therefore the Project is in compliance with the expert suggestion.</p>
Verifying DOE	<p>FAR1 (Previous verification report)</p> <p>During the site visit, project personnel were interviewed about the bird death and the personnel confirm no bird death was observed on the project site during the monitoring period. The village head was interviewed about the bird migration and local birds and he confirmed that he has not observed any bird deaths. It was verified through the records and interviews with the village head that project is not located on bird migration route.</p>	<p>Please refer to the explanation provided for Gold Standard’s FAR1.</p>



	<p>On the conservative side, the effect of the project on bird migration and local birds should continue monitoring. Please continue monitoring the effect of the project on local birds.</p>	
Verifying DOE	<p>FAR2 (Previous verification report) According to news published on internet on 27.07.2010, wind energy plants including Alize Enerji Camseki Wind Farm are under consideration by the Turkish General Staff and the effects of wind turbines to the radar signal has being researched. During the first verification period, the research has not finished. Please, check the results at the second verification period.</p>	<p>The Turkish Army carries out a general evaluation of the electromagnetic impact of wind turbines on military radars, which includes all wind farms in Turkey. This evaluation is not finished yet.</p>

**APPENDIX II****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 8. Summary of monitored parameters

ID number	Data variable	Source of data	Data unit	Way of obtaining data
EG _y	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

The monitoring report for the EG_y(Annual net electricity amount fed to the grid by the project activity) has been provided above. The monitoring reports of the ID.2 and ID.3 are explained below.

**Sustainable Development Indicator: ID.2**

No	ID.2	
Indicator	Quality and quantity of local employment	
Mitigation measure	N/A (positive indicator)	
<i>Repeat for each parameter</i>		
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: it will be checked whether the actual practice is in line with the targets.
	When	Every monitoring period. Details are summarized in <i>Table 10</i> and <i>Table 11</i> .
	By who	Project manager on site.
<i>Repeat for each parameter</i>		
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 employs 13 people in total, all of them being local. HV technicians and security guards (8 out of the 13 people) are responsible for the Project only. The remaining 5 people (Responsible Engineer and technicians) are responsible for two closely located wind farms belonging to the same Project owner (Alize Elektrik), therefore these 5 people have been considered as part-time personnel in this monitoring report. Details are provided in <i>Table 12. Employment Information</i> . 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	Responsible Engineer 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 complied with to be in line with national regulations. Moreover, Enercon, the manufacturer of the turbines, also provide 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 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 guaranteed.

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.	
<i>Repeat for each parameter</i>		
Chosen parameter	<p>a) SO₂ reductions</p> <p>b) NO_x reductions</p>	
Current situation of parameter	<p>a) SO₂ emissions: The Project's net electricity generation is 81,771,046kWh, therefore the Project has resulted in a SO₂ reduction of: 81,771,046kWh * 5.31 kg/MWh = 434.3 tons SO₂</p> <p>b) NO_x emissions: The Project's net electricity generation is 81,771,046kWh, therefore the Project has resulted in a NO_x reduction of: 81,771,046kWh * 1.65 kg/MWh = 135 tons NO_x</p> <p>Information about the calculation of emission intensities for SO₂ and NO_x are provided below.</p> <p>Conclusion: The Project contributes positively.</p>	
Future target for parameter	The Project is expected to reduce the following emission amounts annually: SO ₂ : 5.31 kg/MWh * 81,800 MWh = 434.4 t SO ₂ NO _x : 1.65 kg/MWh * 81,800 MWh = 135 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	Responsible Engineer on site.

Deviation from the monitoring plan:

The SO₂ and NO_x intensities that were included in the PDD have been revised in the 1st monitoring report and the values applied in the 1st monitoring period are used in this monitoring report as well.

Furthermore, it has been observed that a unit error exists in the monitoring plan in the PDD (ID.3, p.52 of the PDD) where the total grid net electricity generation is 189,762 MWh. This unit shall be GWh (not MWh). Therefore the deviation also includes the correction of this unit.

The previous monitoring report uses the following SO₂ and NO_x baseline emission intensities:

- a) **SO₂ emissions:** Total host county emissions are 1,007,780¹⁰ tons in 2008. Net system electricity generation in 2008 is 189,762¹¹ GWh, corresponding to 5.31 kg/MWh SO₂ intensity.

¹⁰ Source: National GHG inventory of Turkey, 1990-2008, http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2010-crf-15april.zip, Workbook TUR-2010-2008-v1.2, Worksheet: Table 1s1

¹¹ Source: TEIAS, [http://www.teias.gov.tr/istatistik2008/30\(84-08\).xls](http://www.teias.gov.tr/istatistik2008/30(84-08).xls)



- b) **NO_x emissions:** Total host county emissions are 313,240¹⁰ tons in 2008. Net system electricity generation in 2008 is 189,762¹¹ GWh, corresponding to 1.65 kg/MWh NO_x intensity.

QA/QC:

SO₂ and NO_x intensities are used for the calculation. These intensities are based on publicly available official data from the 2010 national inventory report of Turkey that has been submitted to UNFCCC (“TURKEY Greenhouse Gas Inventory, 1990 to 2008¹²”). This report’s Annex 7 does not specifically report the SO₂ 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 SO₂ and NO_x reductions, please refer to the relevant section of the D.2, monitored parameter number **EG_y**.

Results:

The outcomes of the calculations suggest that the targets in the monitoring plan have been reached and the Project positively contributes to air quality by substituting fossil-fuel based power and thus effectively reducing SO₂ and NO_x emissions.

¹² Source: National GHG inventory of Turkey, 1990-2008,
http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2010-crf-15april.zip, Workbook TUR-2010-2008-v1.2, Worksheet:Table1s1

**Annex I – Information about Monitoring Parameters****Table 9. 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>i</i> consumed in year y (ton or 000m ³)
$NCV_{i,y}$	Net calorific value of fossil fuel type <i>i</i> in year y (TJ/kt or TJ/mil m ³)
$EF_{CO_2,i,y}$	CO ₂ emission factor of fossil fuel type <i>i</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 <i>m</i> in year y [MWh]
$EF_{EL,m,y}$	CO ₂ emission factor of power unit <i>m</i> 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 10. 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 11. Trainings¹³

Description	Managed By	Participants	Date / Duration	Certificate
High Voltage	Demirer Enerji	All 4 HV switchgear technicians	Various dates on October 2010 and March 2011	Certificate of Attendance
Protection and Relay Systems in 154 kV Stations	Demirer Enerji	All 4 HV switchgear technicians	23/09/2011 and 30/09/2011	Certificate of Attendance
Firefighting	Fire Department of Metropolitan	Responsible Engineer and 2 service technicians	07/02/2011	List of Attendance

¹³ The trainings stated in the table belong to this monitoring period. The trainings that are conducted in the previous monitoring period are not included to the table.



	Municipality of Izmir			
First aid	Kizilay	Responsible Engineer	29-30/11/2010	Certificate
Health and Safety	ENERCON	Wind Farm Responsible Engineer and all 4 service technicians.	08/07/2011, 16/08/2011, 01/12/2010 and 13/01/2011	Certificate

Table 12. Employment Information

Position	Task	Number of Staff	Employer	How many of them are local people?
Plant Responsible Engineer ¹⁴	Responsible from operational and maintenance activities and management of the plant on site: <ul style="list-style-type: none"> responsible from HV and MV Systems responsible from turbines 	1	<i>Enercon Servis Ltd.</i>	1
Electricity Technician	Routine controls, intervention in case of grid breakdowns, reading the electricity measurement devices.	4	<i>Alize Enerji Elektrik Üretim A.S.</i>	4
Service Technician ¹⁴	Servicing of the turbines, Maintenance and intervention in case of turbine problems.	4	Enercon Servis Ltd.	4
Security Guard	Ensure security of the plant.	4	<i>Alize Enerji Elektrik Üretim A.S.</i>	3
Total	8 full time 5 part time ¹⁴	13	<i>By the Project Owner and its subcontractor</i>	13

Table 13. Technical specifications of the E48 type turbines¹⁵

Rated power	800 kW
Rotor diameter	48 m
Hub height	50 m / 60 m / 75 m / 76 m
Wind Zone (DIBt)	WZ III
Wind Class (IEC)	IEC/NVN IIA
WEC Concept	
	Gearless, variable speed, single blade adjustment
Rotor	
Type	Upwind rotor with active pitch control
Rotational direction	Clockwise
No. of blades	3
Swept area	1810 m ²
Blade material	GRP (epoxy resin), built-in lightning protection
Rotational speed	Variable, 16 – 31 rpm

¹⁴ Please note that the Responsible Engineer and the service technicians are also responsible for the operation of another nearby wind farm of the same Project owner. Therefore they have been considered as part-time personnel for this monitoring report.

¹⁵ Reference: Turbine factsheet



Pitch control	ENERCON single blade pitch system; one independent pitch system per rotor blade with allocated emergency supply
Drive train with generator	
Hub	Rigid
Main bearing	Tapered roller bearing pair
Generator	ENERCON direct-drive annular generator
Grid feed	
	ENERCON inverter
Brake systems	
	<ul style="list-style-type: none">• 3 independent pitch control systems with emergency power supply• Rotor brake• Rotor lock
Yaw System	
	Active via yaw gear, load-dependent damping
Cut-out wind speed	
	28 – 34 m/s (with ENERCON storm control)
Remote monitoring	
	ENERCON SCADA

**Table 14. Technical specifications of the E82 type turbines¹⁶**

Rated power	2000 kW
Rotor diameter	82 m
Hub height	78 m / 85 m / 98 m / 108 m / 138 m
Wind Zone (DIBt)	WZ III
Wind Class (IEC)	IEC/NVN IIA
WEC Concept	
	Gearless, variable speed, single blade adjustment
Rotor	
Type	Upwind rotor with active pitch control
Rotational direction	Clockwise
No. of blades	3
Swept area	5281 m ²
Blade material	GRP (epoxy resin), built-in lightning protection
Rotational speed	Variable, 6 – 18 rpm
Pitch control	ENERCON single blade pitch system; one independent pitch system per rotor blade with allocated emergency supply
Drive train with generator	
Hub	Rigid
Main bearing	Double raw-tapered / cylindrical roller bearings
Generator	ENERCON direct-drive annular generator
Grid feed	
	ENERCON inverter
Brake systems	
	<ul style="list-style-type: none"> • 3 independent pitch control systems with emergency power supply • Rotor brake • Rotor lock
Yaw System	
	Active via yaw gear, load-dependent damping
Cut-out wind speed	
	28 – 34 m/s (with ENERCON storm control)
Remote monitoring	
	ENERCON SCADA

¹⁶ Reference: Turbine factsheet

**Annex II – Electricity Generation Data****Project Name:** Alize Camseki 20.8 MW Wind Farm Project, Turkey**Period start:** 01/09/2010**Period end:** 31/10/2011

Year	Month	Energy Export to the Grid	Energy Import from the Grid	Net Energy Export to the Grid	Emission Reduction (tCO ₂)
2010	September	5,550,481	1,055	5,549,426	3523.89
2010	October	4,934,105	2,242	4,931,863	3131.73
2010	November	5,276,804	5,314	5,271,490	3347.40
2010	December	7,825,182	1,092	7,824,090	4968.30
2011	January	4,409,024	4,023	4,405,001	2797.18
2011	February	5,982,249	1,867	5,980,382	3797.54
2011	March	6,520,791	2,190	6,518,601	4139.31
2011	April	6,460,567	1,466	6,459,101	4101.53
2011	May	4,180,404	3,213	4,177,191	2652.52
2011	June	4,058,882	2,873	4,056,009	2575.57
2011	July	4,067,415	4,029	4,063,386	2580.25
2011	August	8,307,969	816	8,307,153	5275.04
2011	September	6,404,981	1,173	6,403,808	4066.42
2011	October	7,824,826	1,281	7,823,545	4967.95
TOTAL		81,803,680	32,634	81,771,046	51,924