



**Monitoring report form
(Version 05.1)**

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT

Title of the project activity	Solar for Forest	
UNFCCC reference number of the project activity	GS 3305	
Version number of the monitoring report	3	
Completion date of the monitoring report	08/01/2016	
Monitoring period number and duration of this monitoring period	1 st period. 01/08/2014 – 30/11/2015	
Project participant(s)	The Aegean Forest Foundation	
Host Party	Turkey	
Sectoral scope(s)	Grid connected renewable electricity generation	
Selected methodology(ies)	AMS-I.D Version 17.0	
Selected standardized baseline(s)	-	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	2014 - 228 tCO ₂ e (01/08/2014-31/12/2014) 2015 - 502 tCO ₂ e (01/01/2015-30/11/2015) Total: 730 tCO ₂ e (16 Months) Annual: 548 tCO ₂ e	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	-	630

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The project is a micro scale photovoltaic (PV) energy system project with a capacity of 500 kW in the provincial boundaries of İzmir.

As per the Turkish regulations; renewable energy generation plants having a capacity of 1MWe or less are not obliged to obtain a generation license from the EMRA (Energy Market Regulatory Authority).

A total of some 926.576 MWh of electricity is estimated to be generated annually. A portion of the generated electricity was intended to meet the energy demand for irrigation pumps which serve for a nearby olive grove consisting of 30,000 trees. However since the direct transmission of electricity from project site to the irrigation site is not possible due to technical reasons all of the generated electricity is fed to the national grid. In order to increase the efficiency of the plant, part of electricity will be used for plant's electricity needs and this amount will be deducted from the monthly gross generation (i.e. watchman's house, security camera, and water treatment). Remaining electricity will be sold to the state within the framework of renewable energy incentives according to which the government commits to buy the any amount of excess electricity produced on a certain tariff (13.3 C\$/kWh for solar systems). The revenues from the electricity sales will again be used for the purpose of planting more trees with an estimation of 40,000 trees/year.

The project also aims to provide a model for the regional industrial and commercial facilities, encouraging them to utilize the unused areas of their buildings or lands to generate electricity.

Still the incentive framework includes the unlicensed energy producers and the government guarantees to purchase any amount of excess electricity generated. However, unlicensed producers are not allowed to sell electricity to other entities other than the state. The milestones of the Project are shown in Table 1.

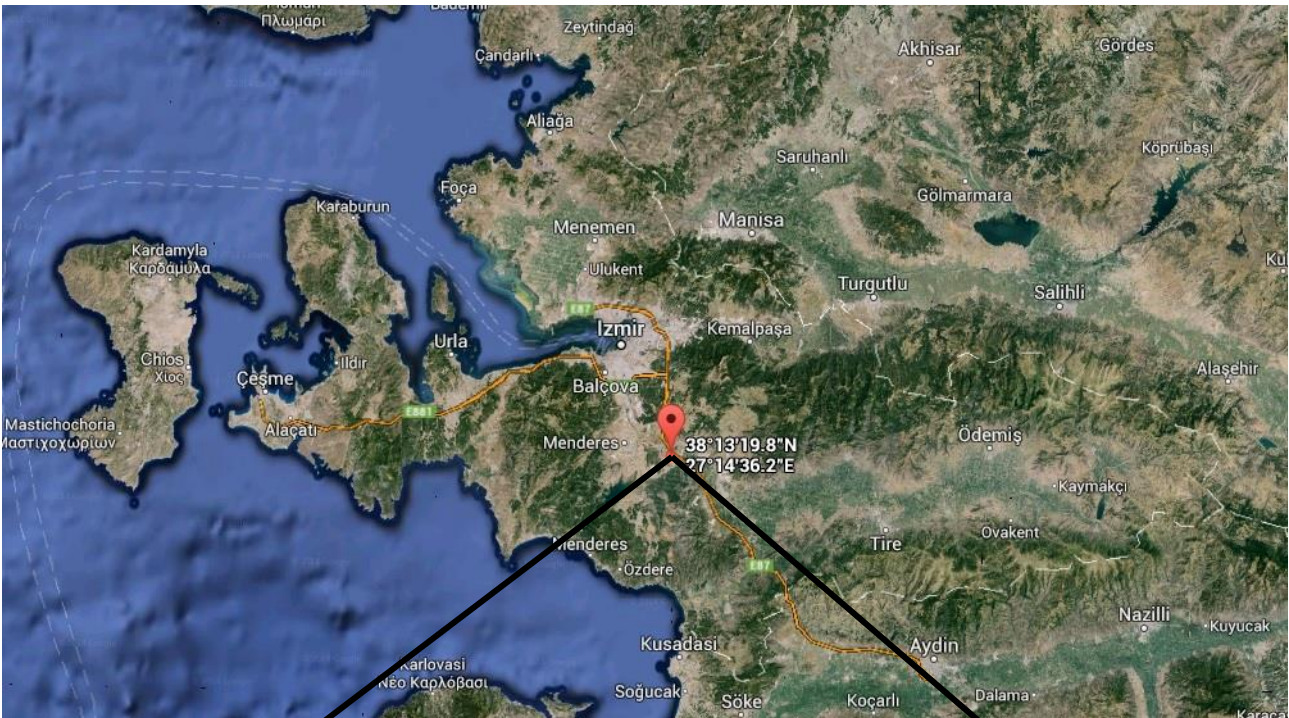
Energy assessments yielded that the proposed area of implementation has about 1.6 times more sunlight exposure potential than the average of Turkey. This situation can be translated into the fact that a PV Project in Pancar-Menderes region has a shorter payback period compared to the most of the similar implemented or proposed projects within Turkey.

Milestones	Date
EIA Exemption	27/02/2013
Connection Agreement	02/09/2013
Board Decision for Consideration of Carbon Revenue	20/11/2013
Solar PV Supply Agreement*	25/12/2013
Commissioning Date (Provisional Acceptance)	31/07/2014
Start Date of Crediting Period	01/08/2014
Observer's Visit	25/12/2014
Stakeholder Feedback Round	06/03/2015 - 10/05/2015

*Project start date

A.2. Location of project activity

The project is located in the western Turkey within the provincial borders of İzmir. The project site lies within the district known as Pancar – Menderes of İzmir province.



Project Location	
Latitude	38°13'19.8" N
Longitude	27°14'36.2" E
Province	İzmir
Town / District	Pancar - Menderes

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Turkey	<p>1- Ege Orman Vakfı İktisadi İşletmesi (The Aegean Forest Foundation, EGEVAK) (Project Owner)</p> <p>2- GTE Karbon Sürdürülebilir Enerji Eğitim Danışmanlık Ve Ticaret Anonim Şirketi (GTE Carbon) (Project Developer)</p>	No

A.4. Reference of applied methodology and standardized baseline

The proposed project applies the approved small scale CDM methodology;

AMS-I.D.: Grid connected renewable electricity generation --- Version 17.0

The above methodology refers to the following tools:

- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, version 02
- Tool to calculate the emission factor for an electricity system, version 04.0

A.5. Crediting period of project activity

The Project uses two times renewable crediting periods. (7 years, 0 months)

This is the first crediting period. (01/08/2014 – 31/07/2021)

Start date and length of the crediting period corresponding of this monitoring period:

01/08/2014 – 30/11/2015

A.6. Contact information of responsible persons/entities

Contact Person	Company	Position	Telephone	E-mail
Yasemen Bilgili	The Aegean Forest Foundation (EGEVAK)	Vice General Manager	+90 232 464 51 60	yasemen.bilgili@egeorman.org.tr
M. Kemal Demirkol	GTE Carbon	Managing Director	+90 312 472 35 00	kemal@gtecarbon.com

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

Solar panels are designed to absorb the sun's rays as a source of energy for generating electrical energy. In order to harness the sunlight in the most efficient way; collector angling studies have been performed and the optimum inclination has been tested.

The applied technology involves using 2,000 collector panels which make use of crystal silicon modules and the below table summarizes the main system parameters:

Number of Collectors	2,000
Collector Capacity (Each)	250 W
Total Capacity	500 kW
Collector Efficiency	15%
Inverter Efficiency	98%
Transmission Losses	1.5%
Other Losses (Temperature, Shadowing, Dust etc.)	10%
Overall System Efficiency	13%

Main components of the applied technology are listed below:

1- Photovoltaic Module:

The project makes use of crystal silicon modules technology (c-Si)

2- Inverter:

Inverter is used to convert the direct current (DC) to alternative current (AC). Project has implemented SMA Sunny Tripower inverters (STP 17000TL).

3- Electrical connection components:

These components consist of electrical cabling, connection jacks, cable tray, DC collection pane, DC brake, AC cable, AC field pane, metering devices, grounding and lightning protection systems

4- Transformer room:

A cabinet is constructed, in which the inverters are placed and high voltage line is connected to the distribution hub.

5- Holder Mechanic Construction Components:

Structure is made of stainless materials and shadowing effect is taken into account when placing the holders.

6- Data Monitoring/Archiving Equipment:

Computerized monitoring system is integrated to the generation equipment. Hourly, daily and monthly inputs/outputs are monitored and recorded in real time. Any failure during operation is notified by the system over the internet and remote monitoring of operation parameters such as module and environment temperature or light intensity is possible.

B.2. Post-registration changes**B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline**

>>

B.2.2. Corrections

>>

B.2.3. Changes to start date of crediting period

>>

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

>>

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

>>

B.2.6. Changes to project design of registered project activity

>>

B.2.7. Types of changes specific to afforestation or reforestation project activity

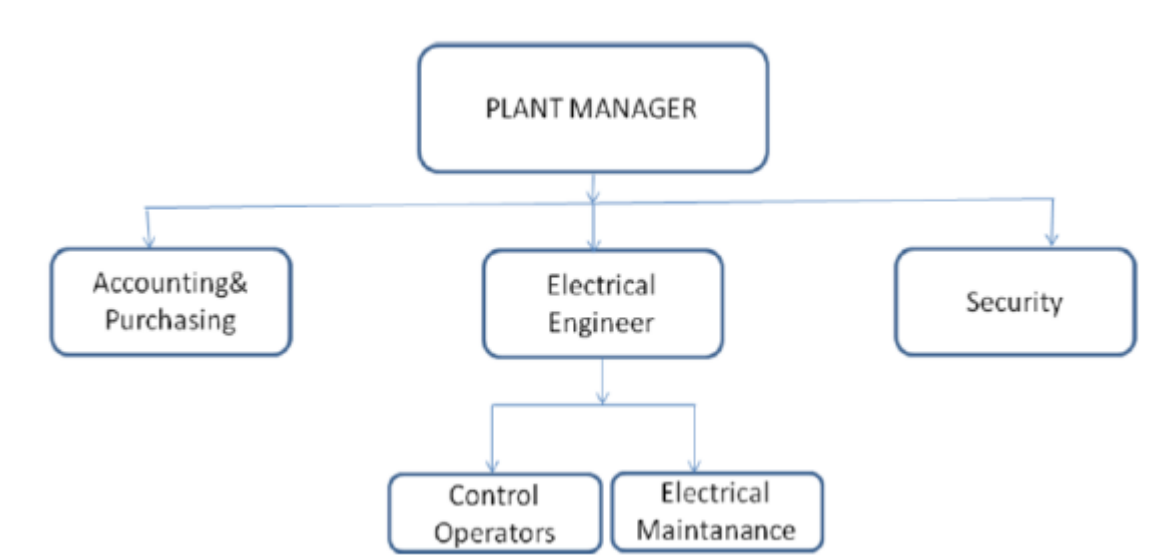
>>

SECTION C. Description of monitoring system

Monitoring plan is applied according to the selected methodology (AMS-I.D). According to the applied methodology, all data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. Essential parameters will be monitored if not indicated otherwise in the tables below. All measurements will be conducted with calibrated measurement equipment according to the relevant standards.

The results of the readings are saved electronically and made available by TEIAS via official website. Invoicing is based on the data published on the website.

The monitoring system organization chart is shown in Figure below, in which the authority and responsibility of project management are defined.



Plant Manager: Responsibility for running the plant and compliance with VER monitoring plan. Electrical engineers or technicians will be assisting the plant manager through controlling and electrical maintenance.

Accounting Manager: Responsible for keeping data about generation and consumption.

GTE Carbon: Responsible for emission reduction calculations, preparing monitoring report and periodical verification process.

Installation of meter and data monitoring has been carried out according to the regulations by TEIAS. Three metering devices will be used for monitoring the electricity generated by the power plant as defined in the PDD and the most conservative reading will form the basis of invoicing. Readings have been done by using main metering devices and spare metering device will be used for comparison only. Measurement results will be cross checked with records for sold electricity (e.g. invoices/receipts).

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data / Parameter:	$EF_{CO_2,2012}$
Data unit:	t CO ₂ e/kWh
Description:	CO ₂ emission factor of the grid electricity in year 2012
Source of data used:	Latest TEIAS (National Energy Transmission Company) statistics and capacity report published

on January 2014 based on the data from the year 2012, have been used.

Value applied: 0.000592

Justification of the choice of data or description of measurement methods and procedures actually applied: A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the Emission Factor for an electricity system , version 4.0”

Calculated as following:

$$EF_{CO2,2012} = 0.75 * EF_{OM,2012} + 0.25 * EF_{BM,2012}$$

Any comment: -

D.2. Data and parameters monitored

Data/parameter:	EG_{facility,y}																						
Unit	MWh/y																						
Description	Quantity of net electricity supplied to the grid in year y																						
Measured/calculated/default	Calculated																						
Source of data	Energy meter readings will be used																						
Value(s) of monitored parameter	EG _{facility,2014} (5 months) = 305.6 EG _{facility,2015} (11 months) = 759.2 Total : 1,064,768																						
Monitoring equipment	Specifications of the metering devices are as follows: <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>Manufacturer</th> <th>Device Model</th> <th>Serial Number</th> <th>Last Calibration</th> <th>Accuracy Class</th> </tr> </thead> <tbody> <tr> <td>KÖHLER (main)</td> <td>AEL.TF.21</td> <td>21000041</td> <td rowspan="3" style="text-align: center;">01.11.2013</td> <td>0.5 S</td> </tr> <tr> <td>KÖHLER</td> <td>AEL.TF.21</td> <td>21000042</td> <td>0.5 S</td> </tr> <tr> <td>KÖHLER</td> <td>AEL.TF.21</td> <td>21000040</td> <td>0.5 S</td> </tr> </tbody> </table> <p>Calibration tests were performed 01.11.2013 Results are presented in the calibration document.</p>					Manufacturer	Device Model	Serial Number	Last Calibration	Accuracy Class	KÖHLER (main)	AEL.TF.21	21000041	01.11.2013	0.5 S	KÖHLER	AEL.TF.21	21000042	0.5 S	KÖHLER	AEL.TF.21	21000040	0.5 S
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KÖHLER	AEL.TF.21	21000042		0.5 S																			
KÖHLER	AEL.TF.21	21000040		0.5 S																			
Measuring/reading/recording frequency:	Continuous measuring and monthly recording																						
Calculation method (if applicable):	Generation data will be recorded by three metering devices continuously. These records will provide the data for the monthly invoicing to TEIAS. . Measurement results will be cross checked with records for sold electricity (e.g. invoices/receipts). On-site metering records are used for cross-checking purposes and the most conservative data set is opted for calculations where available.																						
QA/QC procedures:	Maintenance and calibration of the metering devices will be made by TEIAS periodically. In case of significant difference between three devices, maintenance will be done before waiting for periodical maintenance according to regulations of TEIAS.																						
Purpose of data:	Calculation of baseline emissions or baseline net GHG removals by sinks																						

Additional comments:	-
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D.3. Implementation of sampling plan

>> N/A

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

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Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity and calculated as follows:

$$BE_y = (EG_{\text{facility},y} - EG_{\text{baseline}}) * EF_{\text{grid},\text{CM},y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

EG_{facility,y} = Electricity supplied by the project activity to the grid (MWh)

EG_{baseline} = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero

EF_{grid,CM,y} = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest available version of the "Tool to calculate the emission factor for an electricity system"

Realized baseline emissions

$$EF_{\text{grid},\text{CM},y} = 592 \text{ tCO}_2/\text{GWh}$$

$$EG_{\text{facility},2014} \text{ (5 months)} = 305.6$$

$$EG_{\text{facility},2015} \text{ (11 months)} = 759.2$$

$$BE_{2014} = (0.306 \text{ GWh}) \times (592 \text{ tCO}_2/\text{GWh}) = 181 \text{ tCO}_2\text{e}$$

$$BE_{2015} = (0.759 \text{ GWh}) \times (592 \text{ tCO}_2/\text{GWh}) = 449 \text{ tCO}_2\text{e}$$

$$\text{TOTAL: } 630 \text{ tCO}_2\text{e}$$

Since the project is a Greenfield project, EG_{baseline} is considered zero.

E.2. Calculation of project emissions or actual net GHG removals by sinks

>> The project activity involves the generation of electricity using solar energy therefore project activity does not result in greenhouse gas emissions.

$$PE_y = 0$$

E.3. Calculation of leakage

>> The energy generating equipment is not transferred from or to another activity. Therefore leakage is also considered as "0".

$$LE_y = 0$$

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂/yr)

LE_y = Leakage emissions in year y (t CO₂/yr)

$$ER_y = 630 - 0 - 0 = 630 \text{ tCO}_2\text{e}$$

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO ₂ e)	Project emissions or actual net GHG removals by sinks (t CO ₂ e)	Leakage (t CO ₂ e)	GHG emission reductions or net GHG removals by sinks (t CO ₂ e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	630	0	0	-	630	630

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO ₂ e)	548 (annual)	630

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

Estimated and realized emission reduction amounts are quite in agreement. Solar energy is believed to be very consistent in the long term but might show little deviations in the monthly figures. Generated electricity is directly affected by the sunlight and seasonal effects. Since the annual generation estimations are based on a whole year and the monitoring report involves partial years, the differences are acceptable. As per the ex-ante calculations in the registered PDD, emission reductions corresponding to 16 months have been calculated as 730 tCO₂e. In the current monitoring period between 01/08/2014 and 30/11/2015 the realized emission reductions have been observed to be 630 tCO₂e, slightly below the expected amount. The deviation from the estimations was found to be 14%. And the realized emission reductions are proved to be 86% of the expected amount. No major failure or operational breakdown has been experienced during this monitoring period.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	The Aegean Forest Foundation (EGEVAK)
Street/P.O. Box	Şair Eşref Bul.
Building	Huzur İş Hanı No:27/2
City	İzmir
State/region	Konak
Postcode	35260
Country	Turkey
Telephone	+90 232 464 51 60
Fax	+90 232 464 50 73
E-mail	egeorman@egeorman.org.tr
Website	http://www.egeorman.org.tr
Contact person	
Title	Vice General Manager
Salutation	Mrs
Last name	Bilgili
Middle name	
First name	Yasemen
Department	Management
Mobile	+90 533 305 34 17
Direct fax	+90 232 463 80 80
Direct tel.	+90 232 463 80 80
Personal e-mail	yasemen.bilgili@egeorman.org.tr

Project participant and/or responsible person/ entity	<input checked="" type="checkbox"/> Project participant <input checked="" type="checkbox"/> Person/entity responsible for completing the CDM-MR-FORM
Organization name	Global Tan Energy Limited
Street/P.O. Box	Ehlibeyt Mah 1259. Sokak
Building	7/2
City	Ankara
State/region	-
Postcode	06520
Country	Turkey
Telephone	+90 312 472 35 00
Fax	+90 312 472 33 66
E-mail	gte@gtecarbon.com
Website	www.gtecarbon.com
Contact person	
Title	Director
Salutation	Mr.
Last name	Demirkol
Middle name	Kemal
First name	Mehmet
Department	Management
Mobile	-
Direct fax	+90 312 472 35 00
Direct tel.	+90 312 472 33 66
Personal e-mail	kemal@gtecarbon.com

Appendix 2. Monitoring of Sustainable Development Parametres

No	1	
Indicator	Air Quality	
Mitigation measure	Not Required	
Chosen parameter	SO ₂ and NO _x Emissions	
Current situation of parameter	<p>Total SO₂ emission related to electricity generation is about 621.31 Gg in 2012 according to National Inventory of Turkey¹. Considering that electricity generation in 2013 is 240,154 GWh², SO₂ emission per MWh is calculated as 0.70 kg/MWh.</p> <p>Total NO_x emission related to electricity generation is about 324.30 Gg in 2012 according to National Inventory of Turkey. NO_x emission per MWh is calculated as 1.35 kg.</p> <p>In parallel to the electricity generation, actual SO₂ emission reduction has been realized as about 0.74 tons during monitoring period.</p> <p>NO_x emission reduction corresponding to actual electricity generation is calculated as 1 ton.</p>	
Estimation of baseline situation of parameter	Electricity is supplied through national grid which is fossil fuel dominated and leads to greenhouse gas emissions	
Future target for parameter	Improving air quality through preventing fossil fuel combustion for electricity generation.	
Way of monitoring	How	Electricity generated by solar power, NO _x and SO ₂ emission data from GHG inventory of Turkey and TEIAS statistics for yearly national electricity data will be used as reference in calculation of the emission reductions.
	When	Annually
	By who	Project Owner

No	2	
Indicator	Biodiversity	
Mitigation measure	Fencing around the project site	
Chosen parameter	Number of affected mammals and birds	
Current situation of parameter	Plant is operational and fences are used around the project site	
Estimation of baseline situation of parameter	No potentially dangerous equipment installed in the project site	
Future target for parameter	Keeping the critic equipment safe and unexposed.	
Way of monitoring	How	Project site fences will be checked and repaired if there is any gap or broken sections. Collector panels will be observed to make sure they do not harm birds.
	When	Annually
	By who	Project Owner

No	3	
Indicator	Quality of Employment	
Mitigation measure	Not Required	
Chosen parameter	Number of certificates issued/trainings provided.	

¹ http://unfccc.int/files/national_reports/annex_i_ghg_inventories/national_inventories_submissions/application/zip/tur-2013-crf-12apr.zip

² [http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/kgucunkullan%C4%B1m\(14-22\)/14.xls](http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/kgucunkullan%C4%B1m(14-22)/14.xls)

Current situation of parameter		Certified trainings given in this monitoring period:			
		Attendee	Provided By	Subject	Issuance Date/Training Duration
		Birol Dizdar	Baki Holding	Fire & HSE & First Aid	1 day
		Dursun İtler	Yıldız Fire Extinguishing	Automatic Fire Sensing and Extinguishing Panel Use	1 day
Estimation of baseline situation of parameter		No scheduled trainings or an opportunity to build capacity among the site personnel.			
Future target for parameter		Ensuring that the staff is trained and certified for the required positions			
Way of monitoring	How	By reviewing of training certificates or training logs.			
	When	Annually			
	By who	Project Owner			

No		4			
Indicator		Livelihood of the poor			
Mitigation measure		No mitigation measure required.			
Chosen parameter		Number of people receiving social security system through a contract			
Current situation of parameter		Plant is operational and started supplying social security payments for the employees.			
		Employee	Position		
		Birol Dizdar	Electrical Engineer, Technical Officer		
		Dursun İtler	Watchman		
Estimation of baseline situation of parameter		No additional social security opportunities			
Future target for parameter		Ensuring that the staffs receive their social security payments timely and fully.			
Way of monitoring	How	By reviewing of social security documents			
	When	Annually			
	By who	Project Owner			

No		5			
Indicator		Quantitative employment and income generation			
Mitigation measure		No mitigation measure required.			
Chosen parameter		Created employment opportunities			
Current situation of parameter		Plant is operational; therefore the contracts are not signed.			
Estimation of baseline situation of parameter		No additional employment opportunities			
Future target for parameter		Ensuring that the project creates job opportunities.			
Way of monitoring	How	By reviewing of employment list			
	When	Annually			
	By who	Project Owner			

No		6			
Indicator		Water quality and quantity			
Mitigation measure		No operational wastewater generation is expected due the technology employed. Domestic wastewater will be periodically			

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		disposed to designated areas via trucks. Water consumption for cleaning the solar collectors will be in negligible amounts and project site also hosts a drainage system to properly handle the run off water and rain waters.
Chosen parameter		Appropriate disposal of waste water
Current situation of parameter		Domestic wastewater is being collected in cesspool.
Estimation of baseline situation of parameter		No domestic wastewater production in the baseline scenario
Future target for parameter		Disposal of waste water as required by the Law on Water Pollution Control
Way of monitoring	How	Assessing disposal methods during site visits and checking waste water disposal records.
	When	Annually
	By who	Project Owner

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		