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	DEWA Chiller Station L	
UNFCCC reference number of the project activity	7260	
Version number of the monitoring report	2.0	
Completion date of the monitoring report	04/05/2016	
Monitoring period number and duration of this monitoring period	Monitoring period number: 1 Duration of monitoring period: (01/01/2013 – 31/12/2014)	
Project participant(s)	1. Dubai Carbon Centre of Excellence (DCCE) 2. Dubai Electricity & Water Authority (DEWA)	
Host Party	United Arab Emirates	
Sectoral scope(s)	Sectoral Scope 1: Energy Industries (renewable - / non-renewable sources)	
Selected methodology(ies)	AMS-II.B Supply Side Energy Efficiency Improvements – Generation (Ver. 09)	
Selected standardized baseline(s)	N/A	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	53,600 tCO_2	
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
	N/A	95,197 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

Purpose of the Project Activity and the measures taken for GHG emission reductions or net GHG removals by sinks

The purpose of the project activity is the efficiency improvement of three gas turbines (L71, L72 and L73) installed at Station L Phase 1 of Dubai Electricity and Water Authority (DEWA) (DEWA being the project proponent) by implementing an inlet air chilling system called Thermal Energy Storage and Turbine Inlet Air Cooling (TESTIAC).

Emission reductions associated with the Project Activity are due to a reduced fossil fuel consumption to generate the same output of electricity (compare to the baseline scenario) during operation of the TESTIAC system.

Brief description of the installed technology and equipment

The project activity will cool the inlet air of 3 gas turbines, each a model GE PG9351 (FA+e) installed at Station L Phase 1, down to approximately 25 degrees Celsius. The TESTIAC system will cool in continuous mode for 8 hours per day, 7 days per week; the thermal energy storage system will re-charge during the 16 hours/day when it is not cooling. The TESTIAC system will be operated during 7 months of the year, between April – October, when ambient temperatures in Dubai are at their highest.

The effect of cooling the ambient air is to increase the efficiency of the gas turbine by increasing the density of inlet air, thereby increasing the air mass flow rate into the (constant volumetric flow) gas turbine.

Relevant dates for the Project Activity

Letter of Acceptance issued to EPC Contractor:	29/04/2010
Site Mobilization & ground breaking:	25/08/2010
Trial run start date:	30/10/2011
COD	29/11/2011

Total GHG emission reductions or net GHG removals by sinks achieved in this monitoring period

The total GHG emission reductions associated with the Project Activity during this monitoring period are 95,197 tCO_2.

A.2. Location of project activity

>>

Host Party

United Arab Emirates

Region/State/Province

Emirate of Dubai

City/Town/community

Dubai, Jebel Ali district

Physical/geographical location

Longitude 55.11129545
Latitude 25.05208411

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)
United Arab Emirates (host)	Dubai Electricity and Water Authority (DEWA)	No
	Dubai Carbon Centre of Excellence (DCCE)	No

A.4. Reference of applied methodology and standardized baseline

>>

Applied Methodology

AMS-II.B Supply side energy efficiency improvements – generation (Version 9)[1]

Applied Tool

Tool to determine the remaining lifetime of equipment" (Version 01)[2]

[1] https://cdm.unfccc.int/methodologies/DB/69MEFLV8HH6LBRAFQRAZ3XEF2BYTMG
[2] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-10-v1.pdf

A.5. Crediting period of project activity

>>

Type

Fixed Crediting Period

Start date

01/01/2013

Length

10 years

A.6. Contact information of responsible persons/entities

>>

Dubai Carbon Centre of Excellence
Ms Suraiya Tasnim suraiyat@dcce.ae
Mr Thomas Bosse thomasb@dcce.ae

Dubai Carbon Centre of Excellence is also a project participant.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>>

Implementation Status

The Project Activity became operational on 18/11/2011. (After Internal PT in winter conditions)

During the monitoring period 01/01/2013 - 31/12/2014 the Project Activity was in normal operation.

Description technology

The main equipment installed as part of the Project Activity is summarized as follows:

Thermal Storage:

Type of storage:	Water / Stratified
Temperature difference:	14.0º C / 36.5º C
Method of stratification:	Natural/Concentric Diff.
Tank usable volume:	24,871 m^3

Refrigeration plant:

Total refrigeration capacity:	42,000 kW
Water inlet temperature:	36.5º C
Water outlet temperature:	14.0º C
2 x Compressors screw type (HP):	+19.7º C / +51º C
Refrigeration capacity per compressor:	11,950 kW
2 x Compressor screw type (LP):	+10.5º C / +51º C
Refrigeration capacity per compressor:	9,126 kW

Pumping groups:

Low speed condition (normal operation)

Total flow rate:	3,257 m^3/h
Number of running pumps:	5
Pumps speed:	1,220 rpm
Flow rate per pump:	651 m^3/h

Normal speed condition (emergency operation):

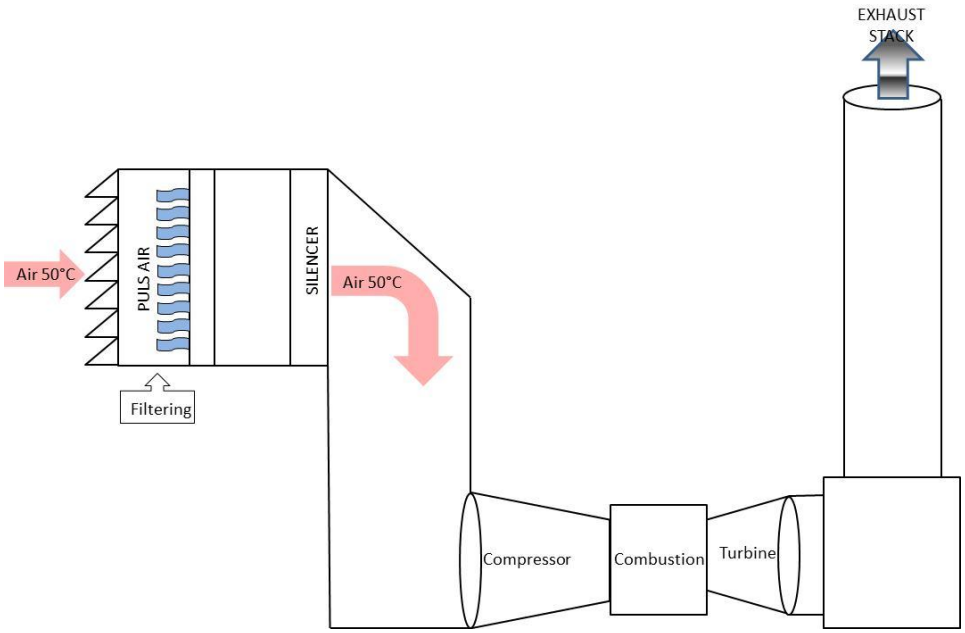
Total flow rate:	5,428 m^3/h
Number of running pumps:	5
Pumps speed:	1,790 rpm
Flow rate per pump:	1,086 m^3/h

Chilled water production pumping group (2+1):

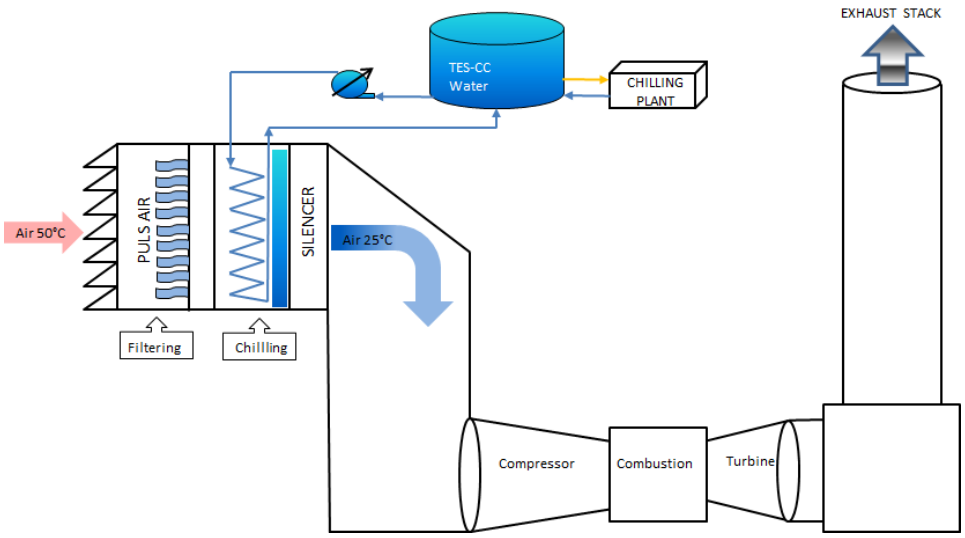
Total flow rate:	1,775 m^3/h
Number of running pumps:	2
Pump speed:	1,490 rpm
Flow rate per pump:	888 m^3/h

The following sketches illustrate the current gas turbine system at Station L with and without the TESTIAC system:

Without the TESTIAC system, the ambient air passes through the filter section to the gas turbine and then to the exhaust stack. In this case, the temperature of the ambient air is equal to the temperature of the inlet air.



With the TESTIAC system, cooling coils will cool the ambient air after the filter section. The purpose of the air-cooling coils is to produce indirect cooling of the air going to the turbine compressor, by means of cold water. These coils will use cooling water coming from the Thermal Storage Tank. The water is cooled in an ammonia-based refrigeration plant.



B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>> This section is left blank intentionally.

B.2.2. Corrections

>> This section is left blank intentionally.

B.2.3. Changes to start date of crediting period

>> This section is left blank intentionally.

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

>> This section is left blank intentionally.

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

>> This section is left blank intentionally.

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

>> This section is left blank intentionally.

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

>> This section is left blank intentionally.

SECTION C. Description of monitoring system

>>

Management structure and responsibility

The Project Proponent is responsible for the day-to-day operations and reporting.

Management structure

The manager of the Project Activity assumes overall responsibility for the monitoring process, including the follow-up of daily operations, allocation of tasks to personnel involved with the monitoring work, review of the monitored results/data and quality assurance of measurements and the process of training new staff.

Responsibility of the personnel directly involved in day-to-day monitoring

The personnel involved with the day-to-day monitoring are given appropriate training. Following tasks are carried out:

- Supervise and verify metering and recording: the staff will coordinate internally with other departments to ensure and verify adequate metering and recording of data, including hourly recording of TESTIAC system operation, hourly fuel consumption and electricity generation;
- Collection of additional data, sales/invoices: the staff will collect sales receipts and relevant data for monitoring of the Project Activity;
- Calibration: the staff will coordinate with the responsible organizations to ensure that calibration of the metering instruments is carried out in accordance with instructions (schedules, procedures) for quality assurance from the technology provider;
- Data archives: the staff will be responsible for storing all monitoring data and making it available to the DOE for the verification of emission reductions.

Support and third party participation

The staff will receive support from CDM experts (internal and/or external) in their responsibilities through the following actions:

- Provide the staff with a calculation template in electronic form for calculation of annual emission reductions;
- Follow-up of the monitoring plan and continuous on-demand advice to the staff;
- Compilation of the monitored data and preparation of the monitoring report;
- Coordination with DOEs for the preparation of periodic verifications.

Monitoring equipment and installation:

All Project equipment is in compliance with national standards.

The gas and distillate fuel oil consumption of the gas turbines is monitored by flow meters and tariff meters respectively. Electricity meters situated in the control room monitor the generated electricity by the gas turbines and consumed electricity by the TESTIAC system.

Data collection & Aggregation Trail:

Measurements via Meters:

Readings take place every hour and are recorded in a logbook by the operator of the control room. The hourly report records are then submitted to the operation management. The meter-readings of the beginning and the end of a calendar month is extracted from the hourly report by the operation management, archived as soft copy and electronically backed up.

The used hourly electricity, flow, and tariff meter-reading records for the calendar month give the

- generated/consumed electricity as captured in the monitored parameters $EG_{PJ,L71\text{-}73,y}$ & $EC_{PJ,TESTIAC1\text{-}2,y}$,

- consumed distillate fuel oil as captured in the monitored parameters $FC_{DFO,L71\text{-}73,y}$, and
- consumed natural gas as captured in the monitored parameters $FC_{NG,L71\text{-}73,y}$

via difference respectively.

Measurements via Suppliers:

The measurement value of the natural gas and distillate fuel oil energy content is provided by the fuel supplier via report and is submitted to the Operation management. The operation management then calculates an average weighted measurement value per calendar month based on the fuel supplier report. The result is archived as soft copy and electronically backed up.

These are captured in the monitored parameters $NCV_{NG,y}$ and $NCV_{DFO,y}$.

Data monitoring management and recording

All monitoring data and records are archived in electronic form and as paper printouts. Electronic documents are backed-up on compact disc or hard disc. The soft copy is shared with the relevant managements, mainly the CDM consultant or other DEWA departments when and as required.

The project proponent also keeps copies of additional relevant documents and prepares a periodic monitoring report, which includes the monitoring parameter data and data summary, the calibration records and the emission reductions calculation. The recorded data is kept for at least two years after the end of the crediting period or issuance of CERs, whichever occurs later.

Quality control and Quality assurance

The metering equipment is properly calibrated in accordance with the instructions (schedules, procedures) for quality assurance from the technology provider and in line with General Guidelines to SSC methodologies specifying calibration at least once in three years.

Emergency procedures

In case of emergencies (conditions under which the project proponent has not been able to monitor due to an unexpected accident), the Project Participant will not claim emission reductions due to the project activity for the duration of the emergency. The Project Participant follows the below procedure for declaring the emergency period to be over:

1. The project proponent ensures that all requirements for monitoring of emission reductions have been re-established.

2. The monitoring staff and the manager of the project activity will both sign a statement declaring the emergency situation to have ended and normal operations to have resumed

SECTION D. Data and parameters

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

Data/parameter:	$EG_{PJ,m,y}$
Unit	MWh
Description	Quantity of electricity generated in each of the three GTs L71-L73 in year y
Source of data	Measurements by electricity meters of the project proponent
Value(s) applied)	GT L71 = 1,181,933 GT L72 = 1,280,253 GT L73 = 1,186,645
Choice of data or measurement methods and procedures	Average of the three most recent historic years 2008-2010 before implementation of the TESTIAC system
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter:	$FC_{NG,m,y}$
Unit	Nm^3
Description	Quantity of fuel type natural gas combusted by GT *m* (L71-L73) in year *y*
Source of data	Measurements by gas flow meter(s) of the project proponent
Value(s) applied)	GT L71 = 372,614,986 GT L72 = 419,410,682 GT L73 = 391,108,221
Choice of data or measurement methods and procedures	Average of the three most recent historic years 2008-2010 before implementation of the TESTIAC system
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter:	$FC_{DFO,m,y}$
Unit	IG
Description	Quantity of fuel type distillate fuel oil combusted by GT *m* (L71-L73) in year *y*
Source of data	Measurements by volume flow meter(s) of the project proponent
Value(s) applied)	GT L71 = 60,531 GT L72 = 127,935 GT L73 = 199,950
Choice of data or measurement methods and procedures	Average of the three most recent historic years 2008-2010 before implementation of the TESTIAC system
Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter:	$NCV_{NG,y}$
Unit	GJ/m^3
Description	Net calorific of fuel type natural gas in year *y*
Source of data	Values provided by the fuel supplier in invoices on a monthly basis providing daily averages
Value(s) applied)	0.0337
Choice of data or measurement methods and procedures	Average of the three most recent historic years 2008-2010 before implementation of the TESTIAC system

Purpose of data	Calculation of baseline emissions
Additional comments	-

Data/parameter:	$NCV_{DFO,y}$
Unit	GJ/IG
Description	Net calorific of fuel type distillate fuel oil in year *y*
Source of data	Values provided by the fuel supplier in invoices on a monthly basis providing daily averages
Value(s) applied)	0.1633
Choice of data or measurement methods and procedures	Average of the three most recent historic years 2008-2010 before implementation of the TESTIAC system
Purpose of data	Calculation of baseline emissions
Additional comments	-

D.2. Data and parameters monitored

Data / Parameter:	$EG_{PJ,L71,y}$
Unit:	MWh
Description:	Quantity of electricity generated in gas turbine L71 in year y
Measured/Calculated/ Default:	Measured Electricity meter is used to measure electricity consumption
Source of data:	Daily records, aggregated per month for all electricity meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 974,541 2014: 1,445,496
Monitoring equipment:	Type: NEXUS 1250-2E-120-D2-GETC-60HZ Accuracy Class: +/-.04% Serial Number: 312-81573 Calibration frequency: once in 3 years Date of last calibration: 31.01.2013 Validity of calibration: 30.01.2016
Measuring/Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 22
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$EG_{PJ,L72,y}$
Unit:	MWh
Description:	Quantity of electricity generated in gas turbine L72 in year y
Measured/Calculated/ Default:	Measured Electricity meter is used to measure electricity consumption
Source of data:	Daily records, aggregated per month for all electricity meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 1,327,796 2014: 1,119,713

Monitoring equipment:	Type: NEXUS 1250-2E-120-D2-GETC-60HZ Accuracy Class: +/- .04% Serial Number: 311-80090 Calibration frequency: once in 3 years Date of last calibration: 31.01.2013 Validity of calibration: 30.01.2016
Measuring/Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 22
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$EG_{PJ,L73,y}$
Unit:	MWh
Description:	Quantity of electricity generated in gas turbine L73 in year y
Measured/Calculated/ Default:	Measured Electricity meter is used to measure electricity consumption
Source of data:	Daily records, aggregated per month for all electricity meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 1,299,985 2014: 1,051,888
Monitoring equipment:	Type: NEXUS 1250-2E-120-D2-GETC-60HZ Accuracy Class: +/-.04% Serial Number: 311-80254 Calibration frequency: once in 3 years Date of last calibration: 15.01.2013 Validity of calibration: 14.01.2016
Measuring/Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 22
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$EC_{PJ,TESTIAC1,y}$
Unit:	MWh
Description:	Quantity of electricity consumed by the TESTIAC system as per energy meter 1 in year y
Measured/ Calculated/ Default:	Measured Electricity meter is used to measure electricity consumption
Source of data:	Daily records, aggregated per month for all electricity meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 3,417 2014: 2,784

Monitoring equipment:	Type: Make -Northern Design Ltd, UK , Type 6 Accuracy Class: +/-1% Serial Number: 58485 Calibration frequency: once in 3 years Date of last calibration: New meter commissioned in 26.10.2011 Periodical Calibration: 27.11.2014 Validity of calibration: 26.11.2017
Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 22
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$EC_{PJ,TESTIAC2,y}$
Unit:	MWh
Description:	Quantity of electricity consumed by the TESTIAC system as per energy meter 2 in year y
Measured/ Calculated/ Default:	Measured Electricity meter is used to measure electricity consumption
Source of data:	Daily records, aggregated per month for all electricity meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 3,097 2014: 4,789
Monitoring equipment:	Type: Make -Northern Design Ltd, UK , Type 6 Accuracy Class: +/-1% Serial Number: 58677 Calibration frequency: once in 3 years Date of last calibration: New meter commissioned in 12.12.2011 Periodical Calibration: 26.11.2014 Validity of calibration: 27.11.2017
Measuring/ Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 22
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$FC_{NG,L71,y}$
Unit:	Nm^3
Description:	Quantity of fuel type natural gas combusted in gas turbine L71 in year y
Measured/Calculated / Default:	Measured Tariff meter is used to measure natural gas consumption
Source of data:	Daily records, aggregated per month for all meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 316,896,297 2014: 467,393,713

Monitoring equipment:	Type: Emerson – Fisher/Rosemount Differential Pressure Transmitter Accuracy Class: +/-0.15% Serial Number: 7877891 Calibration frequency: Twice a year Calibration Dates: • 18.01.2012 • 07.11.2012 • 13.03.2013 • 24.10.2013 • 19.01.2014 • 30.10.2014 Validity of calibration: 8-9 months as per OEM instructions and authorized engineer's experience, as outlined in GD/GQP20
Measuring/Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 20
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$FC_{NG,L72,y}$
Unit:	Nm^3
Description:	Quantity of fuel type natural gas combusted in gas turbine L72 in year y
Measured/Calculated / Default:	Measured Tariff meter is used to measure natural gas consumption
Source of data:	Daily records, aggregated per month for all meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 432,955,816 2014: 364,988,531
Monitoring equipment:	Type: Emerson – Fisher/Rosemount Differential Pressure Transmitter Accuracy Class: +/-0.15% Serial Number: 7877892 Calibration frequency: At least twice a year Calibration Dates: • 25.04.2012 • 08.10.2012 • 14.11.2012 • 14.03.2013 • 27.03.2013 • 25.11.2013 • 19.03.2014 • 25.12.2014 Validity of calibration: 8-9 months as per OEM instructions and authorized engineer's experience, as outlined in GD/GQP20
Measuring/Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 20
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$FC_{NG,L73,y}$
Unit:	Nm^3

Description:	Quantity of fuel type natural gas combusted in gas turbine L73 in year y
Measured/Calculated / Default:	Measured Tariff meter is used to measure natural gas consumption
Source of data:	Daily records, aggregated per month for all meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 422,625,458 2014: 342,471,221
Monitoring equipment:	Type: Emerson – Fisher/Rosemount Differential Pressure Transmitter Accuracy Class: +/-0.15% Serial Number: 7877893 Calibration frequency: Twice a year Calibration Dates: • 26.02.2012 • 14.11.2012 • 23.04.2013 • 23.12.2013 • 23.04.2014 • 16.11.2014 Validity of calibration: 8-9 months as per OEM instructions and authorized engineer's experience, as outlined in GD/GQP20
Measuring/Reading/ Recording frequency:	Continuous
Calculation method (if applicable):	-
QA/QC procedures:	GD/GQP 20
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$FC_{DFO,L71,y}$
Unit:	IG (Imperial Gallon)
Description:	Quantity of fuel type distillate fuel oil combusted in gas turbine L71 in year y
Measured/Calculated / Default:	Measured Volume flow meter is used to measure distillate fuel oil consumption
Source of data:	Daily records, aggregated per month for all volume flow meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 85,275 2014: 64,325
Monitoring equipment:	Type: MASS FLOW TRANSMITTER Accuracy Class: +/- 0.15 % KG/M3 Serial Number: 3021302 Calibration frequency: N/A (FACTORY CALIBRATED) Date of last calibration: N/A Validity of calibration: N/A
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	-
QA/QC procedures:	GD General Quality Procedure GD/GQP 20
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$FC_{DFO,L72,y}$
Unit:	IG (Imperial Gallon)
Description:	Quantity of fuel type distillate fuel oil combusted in gas turbine L72 in year y

Measured/Calculated / Default:	Measured Volume flow meter is used to measure distillate fuel oil consumption
Source of data:	Daily records, aggregated per month for all volume flow meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 14,449 2014: 54,247
Monitoring equipment:	Type: MASS FLOW TRANSMITTER Accuracy Class: +/- 0.15 % KG/M3 Serial Number: 3020535 Calibration frequency: N/A (FACTORY CALIBRATED) Date of last calibration: N/A Validity of calibration: N/A
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	-
QA/QC procedures:	GD General Quality Procedure GD/GQP 20
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$FC_{DFO,L73,y}$
Unit:	IG (Imperial Gallon)
Description:	Quantity of fuel type distillate fuel oil combusted in gas turbine L73 in year y
Measured/Calculated / Default:	Measured Volume flow meter is used to measure distillate fuel oil consumption
Source of data:	Daily records, aggregated per month for all volume flow meters are used. Monitoring data provided by project proponent
Value(s) of monitored parameter:	2013: 56,813 2014: 124,505
Monitoring equipment:	Type: MASS FLOW TRANSMITTER Accuracy Class: +/- 0.15 % KG/M3 Serial Number: 3020407 Calibration frequency: N/A (FACTORY CALIBRATED) Date of last calibration: N/A Validity of calibration: N/A
Measuring/Reading/ Recording frequency:	Yearly
Calculation method (if applicable):	-
QA/QC procedures:	GD General Quality Procedure GD/GQP 20
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$NCV_{NG,y}$
Unit:	GJ/m³
Description:	Net calorific of fuel type natural gas in year *y*
Measured/Calculated / Default:	Measured
Source of data:	Supplier records
Value(s) of monitored parameter:	2013: 0.0331 2014: 0.0332

Monitoring equipment:	-
Measuring/Reading/ Recording frequency:	Obtained as recorded in invoice during each fuel delivery per month providing daily average
Calculation method (if applicable):	-
QA/QC procedures:	The supplier values are checked to verify if they are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines.
Purpose of data:	Calculation of project emissions
Additional comment:	-

Data / Parameter:	$NCV_{DFO,y}$
Unit:	GJ/IG
Description:	Net calorific of fuel type distillate fuel oil in year y
Measured/Calculated / Default:	Measured
Source of data:	Supplier records
Value(s) of monitored parameter:	2013: 0.1623 2014: 0.1623
Monitoring equipment:	-
Measuring/Reading/ Recording frequency:	Obtained as recorded in invoice during each fuel delivery per month providing daily average
Calculation method (if applicable):	-
QA/QC procedures:	The supplier values are verified as being within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines.
Purpose of data:	Calculation of project emissions
Additional comment:	-
Data/parameter:	$EF_{NG,CO2,y}$
Unit	tCO_2/GJ
Description	Emission factor of fuel type Natural Gas
Source of data	IPCC default value of the fuel type natural gas at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories (http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html)
Value(s) applied)	0.0543 tCO_2/GJ
Choice of data or measurement methods and procedures	-
Purpose of data	Calculation of baseline and project emissions
Additional comments	-

D.3. Implementation of sampling plan

>>

This section is left blank intentionally.

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

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

Baseline emissions are calculated as follows:

Year 2013

$$BE_y = \sum_m (EG_{PJ,m,y} - \frac{EC_{PJ,TESTIAC,y}}{m = 3}) \times EF_{BL,m,CO2}$$

		L71	L72	L73	
B_{Ey}	Baseline emissions in year *y*	2,162,303			tCO_2
$EG_{PJ,m,y}$	Quantity of electricity generated in each of the three GTs m L71-L73 in year y	974,541	1,327,796	1,299,985	MWh
$EF_{BL,m,CO2}$	Baseline Emission Factor for each of the three GTs m L71-L73	0.583	0.606	0.611	tCO_2/MWh
$EC_{PJ,TESTIAC,y}$	Quantity of electricity consumed by the TESTIAC system in year y	6,513			MWh
m	Gas turbines GTs L71-L73				

$$EF_{BL,m,CO2} = \frac{\sum_i \sum_h \frac{FC_{m,i,h} \times NCV_{i,h}}{EG_{m,h}} \times EF_{NG,CO2,y}}{h = 3}$$

		L71	L72	L73	
$EF_{BL,m,CO2}$	Baseline Emission Factor for each of the three GTs m L71-L73	0.583	0.606	0.611	tCO_2/MWh
$FC_{m,i,h}$	Quantity of fuels i (NG and DFO) combusted in each of the three GTs m L71-L73 in any of the three historic years 2008-2010 h	see Monitoring Report Excel calculation Spread Sheet Annex 2_Historic Data 2008-2010			Nm^3 and IG
$NCV_{i,h}$	Net calorific value of fuels i (NG and DFO) in any of the three historic years 2008-2010 h				GJ/Nm^3 and GJ/IG
$EF_{NG,CO2,y}$	CO_2 emission factor of natural gas	see Monitoring Report Excel calculation Spread Sheet Annex 3_Default Values			tCO_2/GJ
$EG_{m,h}$	Electricity generation in each of the three GTs m L71-L73 in any of the three historic years 2008-2010	see Monitoring Report Excel calculation Spread Sheet Annex 2_Historic Data 2008-2010			MWh
h	Three most recent historic years before implementation of the TESTIAC system 2008-2010	see Monitoring Report Excel calculation Spread Sheet Annex 2_Historic Data 2008-2010			

Year 2014

$$BE_y = \sum_m (EG_{PJ,m,y} - \frac{EC_{PJ,TESTIAC,y}}{m = 3}) \times EF_{BL,m,CO2}$$

		L71	L72	L73	
B_{Ey}	Baseline emissions in year *y*	2,158,480			tCO_2
$EG_{PJ,m,y}$	Quantity of electricity generated in each of the three GTs m L71-L73 in year y	1,445,496	1,119,713	1,051,888	MWh
$EF_{BL,m,CO2}$	Baseline Emission Factor for each of the three GTs m L71-L73	0.583	0.606	0.611	tCO_2/MWh
$EC_{PJ,TESTIAC,y}$	Quantity of electricity consumed by the TESTIAC system in year y	7,573			MWh
m	Gas turbines GTs L71-L73				

$$EF_{BL,m,CO2} = \frac{\sum_i \sum_h \frac{FC_{m,i,h} \times NCV_{i,h}}{EG_{m,h}} \times EF_{NG,CO2,y}}{h = 3}$$

		L71	L72	L73	
$EF_{BL,m,CO2}$	Baseline Emission Factor for each of the three GTs m L71-L73	0.583	0.606	0.611	tCO_2/MWh
$FC_{m,i,h}$	Quantity of fuels i (NG and DFO) combusted in each of the three GTs m L71-L73 in any of the three historic years 2008-2010 h	see Monitoring Report Excel calculation Spread Sheet Annex 2_Historic Data 2008-2010			Nm^3 and IG
$NCV_{i,h}$	Net calorific value of fuels i (NG and DFO) in any of the three historic years 2008-2010 h				GJ/Nm^3 and GJ/IG
$EF_{NG,CO2,y}$	CO_2 emission factor of natural gas	see Monitoring Report Excel calculation Spread Sheet Annex 2_Historic Data 2008-2010			tCO_2/GJ
$EG_{m,h}$	Electricity generation in each of the three GTs m L71-L73 in any of the three historic years 2008-2010	see Monitoring Report Excel calculation Spread Sheet Annex 3_Default Values			MWh
h	Three most recent historic years before implementation of the TESTIAC system 2008-2010	see Monitoring Report Excel calculation Spread Sheet Annex 2_Historic Data 2008-2010			

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

Project emissions are calculated as follows:

Year 2013

$$PE_y = \sum_m EG_{PJ,m,y} \times EF_{PJ,m,CO2}$$

		L71	L72	L73	
PE_y	Project Emissions in year y	2,106,929			tCO_2
$EG_{PJ,m,y}$	Quantity of electricity generated in each the three GTs m L71-L73 in year y	974,541	1,327,796	1,299,985	MWh
$EF_{PJ,m,CO2}$	Project Emission Factor for each of the three GTs m L71-L73	0.585	0.586	0.584	tCO_2/MWh
m	Gas turbines GTs L71-L73	see Monitoring Report Excel calculation Spread Sheet Annex 1_Operating Data 2013			

$$EF_{PJ,m,CO2} = (\sum_i \frac{FC_{m,i,y} \times NCV_{i,y}}{EG_{PJ,m,y}}) \times EF_{NG,CO2,y}$$

		L71	L72	L73	
$EF_{PJ,m,CO2}$	Project Emission Factor for each of the three GTs m L71-L73 (tCO_2/MWh)	0.585	0.586	0.584	tCO_2
$FC_{m,i,y}$	Quantity of fuels i (natural gas and distillate fuel oil [DFO]) combusted in each of the three GTs L71-L73 in year y	see Monitoring Report Excel calculation Spread Sheet Annex 1_Operating Data 2013			Nm^3 and IG
$NCV_{i,y}$	Net calorific value of fuels i (natural gas and distillate fuel oil [DFO]) in year y				GJ/Nm^3 and GJ/IG
$EF_{NG,CO2,y}$	CO_2 emission factor of natural gas	see Monitoring Report Excel calculation Spread Sheet Annex 3_Default Values			tCO_2/GJ
m	Gas turbines GTs L71-L73	see Monitoring Report Excel calculation Spread Sheet Annex 1_Operating Data 2013			

Year 2014

$$PE_y = \sum_m EG_{PJ,m,y} \times EF_{PJ,m,CO2}$$

		L71	L72	L73	
PE_y	Project Emissions in year y	2,118,657			tCO_2
$EG_{PJ,m,y}$	Quantity of electricity generated in each the three GTs m L71-L73 in year y	1,445,496	1,119,713	1,051,888	MWh
$EF_{PJ,m,CO2}$	Project Emission Factor for each of the three GTs m L71-L73	0.583	0.588	0.588	tCO_2/MWh
m	Gas turbines GTs L71-L73	see Monitoring Report Excel calculation Spread Sheet Annex 1_Operating Data 2014			

$$EF_{PJ,m,CO2} = (\sum_i \frac{FC_{m,i,y} \times NCV_{i,y}}{EG_{PJ,m,y}}) \times EF_{NG,CO2,y}$$

		L71	L72	L73	
$EF_{PJ,m,CO2}$	Project Emission Factor for each of the three GTs m L71-L73 (tCO_2/MWh)	0.583	0.588	0.588	tCO_2
$FC_{m,i,y}$	Quantity of fuels i (natural gas and distillate fuel oil [DFO]) combusted in each of the three GTs L71-L73 in year y	see Monitoring Report Excel calculation Spread Sheet Annex 1_Operating Data 2014			Nm^3 and IG
$NCV_{i,y}$	Net calorific value of fuels i (natural gas and distillate fuel oil [DFO]) in year y				GJ/Nm^3 and GJ/IG
$EF_{NG,CO2,y}$	CO_2 emission factor of natural gas	see Monitoring Report Excel calculation Spread Sheet Annex 3_Default Values			tCO_2/GJ
m	Gas turbines GTs L71-L73	see Monitoring Report Excel calculation Spread Sheet Annex 1_Operating Data 2014			

E.3. Calculation of leakage

>>

$LEy = 0\ tCO_2$

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_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	4,320,783	4,225,586	0	0	95,197	95,197

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_2e)	53,600	95,197

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

>> The achieved emission reduction during the monitoring period of 2013-2014 is attributed partially due to changes in usage of DFO between the years, the NCV change from 0.034GJ/Nm^3 in baseline emission factor calculation to 0.033GJ/Nm^3 in project emission factor calculation, and

the higher natural gas consumption corresponding with this emission factor due to higher gross electricity production by 22% by L71 in 2014, and 4% by L72 & 10% by L73 in 2013.

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

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Dubai Electricity & Water Authority (DEWA)
Street/P.O. Box	564
Building	DEWA Headquarters, Oud Metha
City	Dubai
State/region	Dubai
Postcode	564
Country	United Arab Emirates
Telephone	+971 4 324 4444
Fax	+971 4 324 8111
E-mail	Nebojsa.Simic@dewa.gov.ae
Website	www.dewa.gov.ae
Contact person	Nebojsa Simic
Title	Specialist - Projects & Commissioning
Salutation	Mr.
Last name	Simic
Middle name	-
First name	Nebojsa
Department	Projects & Commissioning
Mobile	+971 50 455 2328
Direct fax	+971 4 304 1471
Direct tel.	+971 4 802 4394
Personal e-mail	-

Project participant and/or responsible person/ entity	☒ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Dubai Carbon Centre of Excellence (DCCE)
Street/P.O. Box	333992
Building	Dubai Petroleum Compound
City	Dubai
State/region	Dubai
Postcode	333992
Country	United Arab Emirates
Telephone	+971 4 307 2600
Fax	+971 4 344 6665
E-mail	ireduce@dcce.ae
Website	www.dcce.ae
Contact person	Thomas Bosse
Title	Technical Director
Salutation	Mr.
Last name	Bosse
Middle name	-
First name	Thomas
Department	Technical department
Mobile	+971 55 737 3709
Direct fax	-
Direct tel.	+971 4 307 2197
Personal e-mail	-

- - - - -

Document information

Version	*Date*	*Description*
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • 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: • 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 *F-CDM-MR* to *CDM-MR-FORM*; • 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