Gold Standard for the Global Goals

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.07.2022**

VERSION **v. 1.1**

RELATED SUPPORT - **TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

KEY PROJECT INFORMATION

This template has been revised to aid a consistent interpretation and to better support project developers submitting documentation for certification. Please read the accompanying guide to understand how to complete this template accurately. **TEMPLATE GUIDE Monitoring Report v. 1.1**

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Key Project Information

GS ID (s) of Project (s)	GS5073
Title of the project (s) covered by monitoring report	Jbel Sendouq-Khalladi Wind Farm Project in Morocco
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	3.4
Version number of the monitoring report	Version 03.4
Completion date of the monitoring report	05/02/2024
Date of project design certification	17/09/2018
Date of Last Annual Report	Not Applicable as no Annual report was submitted in past due to COVID-19 pandemic, hence no date has been provided in the KPI section of MR.
Monitoring period number	2nd monitoring period
Duration of this monitoring period	01/07/2018 – 30/06/2020 (2 years, both days are included)
Project Representative	Moushine Alaoui M'hamadi, Acwa Power
Host Country	Morocco

Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	CDM Methodology: ACM0002 ver.12.3- Consolidated baseline methodology for grid-connected electricity generation from renewable sources
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
SDG 13: Climate Action	Emission Reduction	316,720	tCO_2
SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all	Renewable Electricity supplied to grid	651,420	MWh
SDG 8: Percentage of the employees have access to training,	Number of jobs created, Number of trainings conducted	10 jobs & 1 training each in year 2018, 2019, 2020	-

[1] The emission reductions has been kept to upper bound of sensitivity analysis range (+10%) for the monitoring period as per as per 2.1.3 (b) & . 2.1.4 of Rule Clarification: Assessment Approach for Reporting Higher Ex-post Emission Reductions.

healthcare and insurance			
SDG 3: Good, health, and well being	Number of CSR activities	2	Number

Table 2 – Product Vintages

		Amount Achieved		
Start Dates	**End Dates**	**Product A SDG13**	**…**	**…**
01/07/2018	31/12/2018	79,180 tCO_2	N/A	N/A
01/01/2019	31/12/2019	158,360 tCO_2	N/A	N/A
01/01/2020	30/06/2020	79,180 tCO_2	N/A	N/A

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

The objective of the project, the Jbel Sendouq-Khalladi ("Khalladi") wind farm project in Morocco, is to generate electricity using state-of-the-art wind power generation technology.

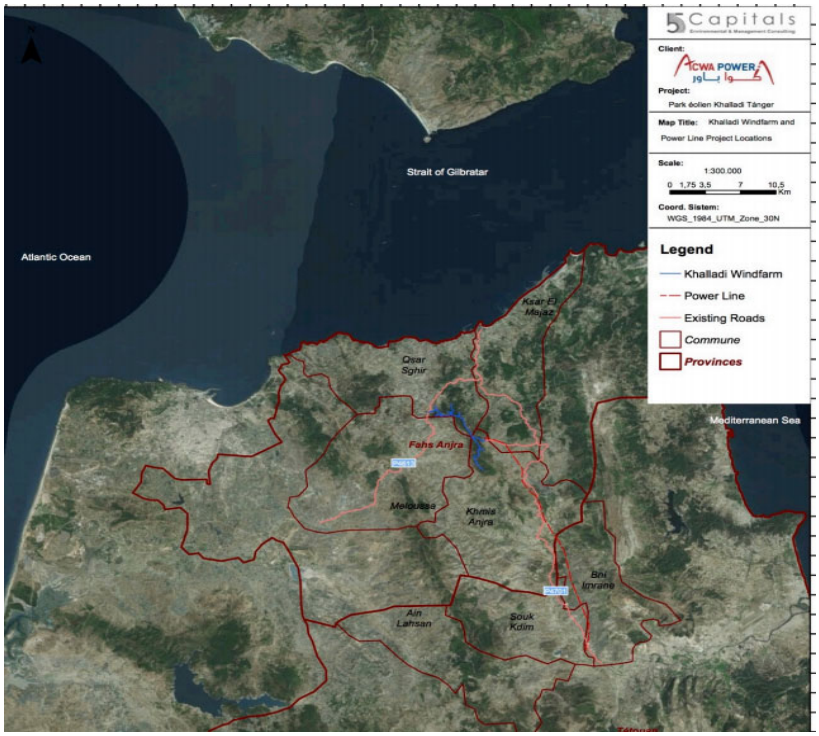
The project is located in the Tangier-Tetouan Region, Fahs Anjra Province, Morocco. 40 wind turbines with a nominal unit capacity of 3 MW are installed, providing a total capacity of 120 MW.

In the 2nd monitoring period of the project from 01/07/2018 to 30/06/2020 (both days are included), the project has a achieved a total of 316,720tCO_2 emission reduction.

A.2. Location of project

The Khalladi Windfarm project and 225kV Power Line project is located within the Tanger-Tetouan Region of Morocco. Specifically, the 120MW Windfarm built on the ridge of the Jbel Sendouq, which is located approximately 50Km east of Tangiers. The power lane (PL) will run 24km in a south-easterly direction, starting from the middle western flank of the Jbel Sendouq and culminating at the Tetouan Substation, located approximately 10km west of Tetouan. The wind farm (WF) is located within the Province of Fas Anjra and crosses through the Communes of Qsar Saghir, Meloussa and Khmis Anjra. The PL is located within the Provinces of Fas Anjra and Tetouan and crosses though the Communes of Sadina, Khmis Anjra, and Souk kdim.

General Project Location:



GPS Coordinates:

WTG label	WTG type	Hub Height	Latitude	Longitude
V01	V90-3.0 MW	80	35^0 46’ 37.0668”	-5^0 36’ 9.612”
V02	V90-3.0 MW	80	35^0 46’ 30.864”	-5^0 36’ 8.334”
V03	V90-3.0 MW	80	35^0 46’ 15.9528”	-5^0 36’ 3.308”
V04	V90-3.0 MW	80	35^0 46’ 9.9048”	-5^0 36’ 3.748”
V05	V90-3.0 MW	80	35^0 46’ 4.2096”	-5^0 36’ 7.625”
V06	V90-3.0 MW	80	35^0 46’ 19.902”	-5^0 35’ 29.116”
V07	V90-3.0 MW	80	35^0 46’ 20.604”	-5^0 35’ 14.528”
V08	V90-3.0 MW	80	35^0 46’ 28.3908”	-5^0 35’ 14.579”
V09	V90-3.0 MW	80	35^0 46’ 35.472”	-5^0 35’ 15.727”
V10	V90-3.0 MW	80	35^0 46’ 42.9096”	-5^0 35’ 15.45”
V11	V90-3.0 MW	80	35^0 46’ 17.202”	-5^0 34’ 48.655”
V12	V90-3.0 MW	80	35^0 46’ 8.1444”	-5^0 35’ 16.033”
V13	V90-3.0 MW	80	35^0 46’ 9.1956”	-5^0 34’ 52.777”
V14	V90-3.0 MW	80	35^0 46’ 0.678”	-5^0 34’ 46.132”
V15	V90-3.0 MW	80	35^0 45’ 54.1944”	-5^0 34’ 39.792”
V16	V90-3.0 MW	80	35^0 45’ 46.728”	-5^0 34’ 36.883”

V17	V90-3.0 MW	80	35^0 45’ 39.6108’’	-5^0 34’ 34.342’’
V18	V90-3.0 MW	80	35^0 45’ 32.49’’	-5^0 34’ 30.49’’
V19	V90-3.0 MW	80	35^0 45’ 27.1548’’	-5^0 34’ 26.616’’
V20	V90-3.0 MW	80	35^0 45’ 21.132’’	-5^0 34’ 19.855’’
V21	V90-3.0 MW	80	35^0 45’ 15.21’’	-5^0 34’ 16.122’’
V22	V90-3.0 MW	80	35^0 45’ 7.7796’’	-5^0 34’ 13.134’’
V23	V90-3.0 MW	80	35^0 45’ 0.828’’	-5^0 34’ 10.445’’
V24	V90-3.0 MW	80	35^0 44’ 55.482’’	-5^0 34’ 4.022’’
V25	V90-3.0 MW	80	35^0 44’ 49.8408’’	-5^0 33’ 59.144’’
V26	V90-3.0 MW	80	35^0 44’ 44.5848’’	-5^0 33’ 53.003’’
N27	V90-3.0 MW	80	35^0 43’ 18.7716’’	-5^0 33’ 22’’
N28	V90-3.0 MW	80	35^0 43’ 24.9312’’	-5^0 33’ 38.948’’
V29	V90-3.0 MW	80	35^0 44’ 23.7012’’	-5^0 33’ 47.837’’
N30	V90-3.0 MW	80	35^0 44’ 27.0132’’	-5^0 33’ 56.858’’
V31	V90-3.0 MW	80	35^0 44’ 18.5604’’	-5^0 33’ 53.165’’
V32	V90-3.0 MW	80	35^0 44’ 12.5232’’	-5^0 33’ 50.105’’
V33	V90-3.0 MW	80	35^0 44’ 6.342’’	-5^0 33’ 49.388’’
V34	V90-3.0 MW	80	35^0 44’ 0.7476’’	-5^0 34’ 2.183’’
V35	V90-3.0 MW	80	35^0 43’ 52.7088’’	-5^0 33’ 58.702’’
V36	V90-3.0 MW	80	35^0 43’ 46.4592’’	-5^0 33’ 58.183’’
V37	V90-3.0 MW	80	35^0 43’ 39.882’’	-5^0 33’ 56.182’’
N38	V90-3.0 MW	80	35^0 43’ 34.6692’’	-5^0 33’ 51.001’’
N39	V90-3.0 MW	80	35^0 43’ 29.5608’’	-5^0 33’ 45.544’’
V40	V90-3.0 MW	80	35^0 43’ 20.6436’’	-5^0 33’ 33.16’’

A.3. Reference of applied methodology

CDM Methodology: ACM0002 version 12.3- consolidated baseline methodology for grid-connected electricity generation from renewable sources.

The following Tools have been applied:
The tool for the Demonstration and Assessment of Additionality (version 06.1.0)
The tool to calculate the emission factor for an electricity system (version 02.2.1)

As required by the approved methodology ACM0002 (Version 12.3), the project will be demonstrated using the latest version of the tool for the demonstration and assessment.

A.4. Crediting period of project

GS registration date: 14/06/2018

GS Crediting period start date: 01/05/2014
GS Crediting period end date: 30/04/2021
Duration of crediting period: 7 years (1st crediting period, renewable)

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

The project has been completed on 29/06/2018, which means the construction work has ended and the project has been completed, including punch list items, final clean up, demobilization, and submittal of final documentation, in accordance with the contract documents.

The 40 wind turbines have been installed and under operation. The timeline showing project milestone is provided as below:

1. Construction Start date: 16 July 2016
2. Commissioning date of the First turbine: 26 December 2017
3. Preliminary Review approved by GS: 01/01/2018
4. Project Completion: 29 June 2018
5. Commissioning of the Last turbine: 29 June 2018
6. Construction End date: 30 June 2018
7. GS Registration date: 17/09/2018
8. Design Review approval by GS: 23/05/2019
9. Issuance of 1st monitoring period (01/05/2014-30/06/2018) under CDM: 26/07/2019
10. Transition Review (Previous GS version to GS4GG): 30/06/2020
11. Transition Review (GS-CDM to GS-VER): 13/12/2022

The project have an installed capacity of 120 MW and it is expected to generate around 296,100 MWh per year. The 40 wind turbines installed have a nominal unit capacity of 3 MW. The wind turbines used in the project activity have been supplied by the Danish manufacturer VESTAS6 as there are no local suppliers in Morocco. Therefore, the project activity is suppose a technology transfer from an Annex I country to Morocco. The main technical characteristics of the project's turbines are summarized below: – 40 V90-3MW turbines; – Hub height of 80 m; – Rotor diameter of 90 m; – Blade length of 44 m. Blades are made out of a glass fibre/carbon spar with glass fibre airfoil shells; – Turbines benefit from the latest Supervisory Control and Data Acquisition (SCADA) system for modern wind power plants: VestasOnline® Business.

The main technical characteristics of the project's turbines are summarized below:

- 40 no. of V90-3MW turbines;
- Hub height of 80 m;
- Rotor diameter of 90 m;

- Blade length of 44 m. Blades are made out of a glass fibre/carbon spar with glass fibre airfoil shells;
- Turbines benefit from the latest Supervisory Control and Data Acquisition (SCADA) system for modern wind power plants: VestasOnline® Business.

The actual electricity generated during the monitoring period is 786,004.37 MWh and the achieved emission reductions are 382,154 tCO_2.
However The emission reductions has been kept to upper bound of sensitivity analysis range (+10%) for the monitoring period as per as per 2.1.3 (b) & . 2.1.4 of Rule Clarification: Assessment Approach for Reporting Higher Ex-post Emission Reductions.

Therefor the electricity generated during the monitoring period is 651,420 MWh and the achieved emission reductions are 316,720 tCO_2.

The project developer will not claim VERs for the same vintage in another standard than GS. Further the project has not or will not issue both a CER and a GSVER for the same vintage from this project, which is registered under GS4GG.

B.1.1 Forward Action Requests

Not Applicable

B.2. Post-Design Certification changes
Not Applicable

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline
Not Applicable
B.2.2. Corrections
Not Applicable
B.2.3. Changes to start date of crediting period
Not Applicable

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

The following revisions have been carried out in the Transition Annex (revision from version 04 to version 05), which is being submitted for approval along with this verification:

The following SDGs have been removed from the Transition Annex as PP do not want to claim SDG impacts related to the following SDGs:
1. Omission of SDG 4 (Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all)
2. Omission of the SDG 5 (Achieve gender equality and empower all women and girls)
3. Omission of the SDG 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation)

The above deviation has been sought due to the fact that the instant project has come up in an isolated area with negligible population. Owing to the above fact, the applicability of the above SDGs becomes infructuous and therefore the change is therefore sought on the above three parameters. Hence PP do not want to claim the SDG impact benefits (even if arises) from the above three SDGs.

Further other SDGs (SDG3, SDG7, SDG8, SDG13) are already monitored, hence the GS requirement of monitoring minimum of 3 SDGs is still being met by the project activity. Further the description of the parameters related to the SDG 03, SDG 08 has been revised in the latest version 05 of Transition Annex. This revision represents correct description of parameters based on the actual scenario of project activity at the project site. Hence this change in monitoring plan does not affect the project in any way and the project still meets all the GS requirements.

The version 04 of Transition Annex (Section A.3) only provides the ex-ante parameter table related to "EF_{CM}", however the version 05 of Transition Annex (Section A.3) also includes the ex-ante parameter table of "EF_{OM}" and "EF_{BM}" based on which "EF_{CM}" has been calculated. Hence more clarity has been provided with respect to the calculations of "EF_{CM}" in the latest version of Transition Annex.

Further the applied methodology does not provide any requirements to monitor the parameters related to the above removed parameters (SDG4, SDG5, SDG9) and this revision is also in conformance to the monitoring plan as recommended by the applied methodology. Hence the proposed changes are in line with the requirements of the applied methodology, feasible and implementable within the project design - data management and quality assurance and quality control procedures, are sufficient to ensure that GHG emission reductions achieved by/resulting from the project activity can be reported and verified.

B.2.5. Changes to project design of approved project

Not Applicable

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

a) The aim of the monitoring plan
Monitoring is a key procedure to verify the real and measurable emission reductions from the project activity. To guarantee the project's real, measurable and long-term GHG emission reductions, the monitoring plan is established.

b) Data to be monitored
One main parameter will be subject to an ex-post monitoring which is the net electricity supplied to the power grid.

The baseline emission factor is fixed on ex-ante calculation and thus doesn't need to be monitored every year as per the latest version of the "Tool to calculate the emission factor for an electricity system" (Version 2.2.1).

According to the baseline study, the key parameter of the emissions' reductions evaluation is the net electricity supplied to the grid by the wind farm. The recommended monitoring methodology is based on a specific and continuous measure of the net electricity supplied to the grid that will be derived from the following equation:

EG = E1+E2

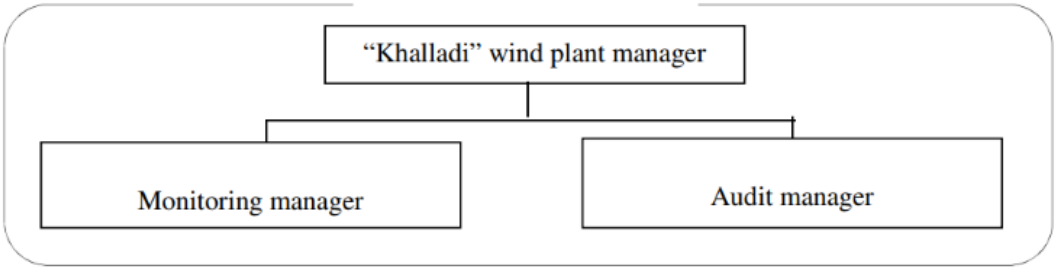
Where:

EG = Total net generated electricity exported to the grid
E1 = Net electricity supplied to the national grid through line 1
E2 = Net electricity supplied to the national grid through line 2

c) Monitoring management organization
The monitoring structure consists in a staff familiar with computers and data processing. Staff members will be designated for data collection and management and monthly monitoring reports will be established.

The responsible entity for monitoring is the "Khalladi" wind plant manager.

The GS monitoring team to be implemented by the project participant will be structured as follows:



The responsibilities of the GS Monitoring team members are the following:

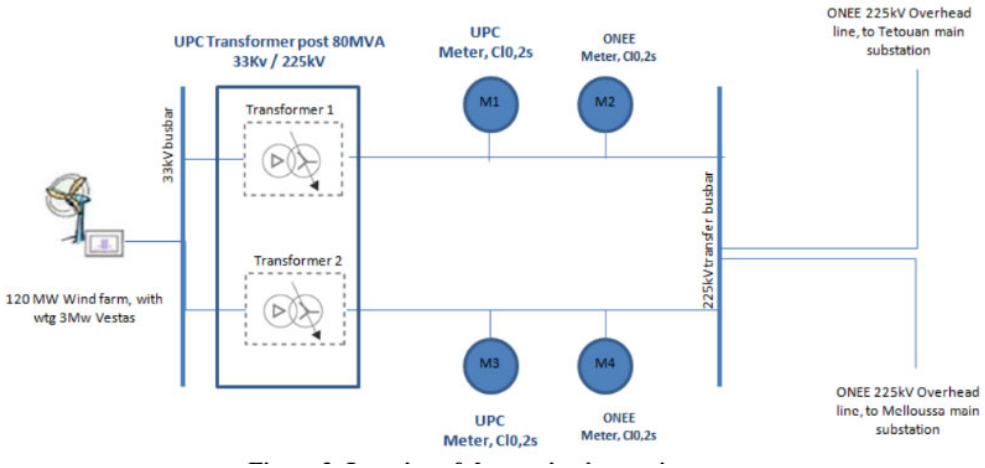
- Wind plant manager: manage the work of GS Monitoring team and take charge of all relevant matters with the monitoring activity
- Monitoring manager: monitor, collect and archive the data according to the monitoring plan
- Audit manager: audit the work of Monitoring manager and execute the QC/QA (Quality Control/Quality Assurance) procedures according to the monitoring plan

d) Monitoring management organization

"Khalladi" wind farm uses electrical transformers located at the turbines' base to boost the electricity generated at low voltage 690V to medium voltage of 33 kV. All transformers are linked by 33 kV underground lines to the two 33/225 kV step-up transformers located in the project substation. The energy produced is then transferred over two aerial 225 kV lines around 23 km to two ONE substations located in the west of Tetouan city and in Melloussa.

Two highly accurate bidirectional electricity meters for each step-up transformer are used: a main meter and a back-up meter installed at each of the 33/225 kV step up transformer allowing to monitor the net electricity supplied to the grid.

The accuracy of the above mentioned electric meters is 0.2s. The installation and metering is in accordance with to the International Electro technical Commission (IEC) and ONEE standard. The following diagram shows the positions of the meters that are used to monitor the electricity generated and the net electricity exported to the national grid. On each of the 225KV side of the two transformers on the Project site there are two main electricity PP meters (M1 and M3, class 0.2s) and two additional ONEE meters are also placed on the two electricity lines (M2 and M4, class 0.2s).



The four electricity meters are bidirectional measuring the net electricity export to the national grid (gross electricity export to the grid minus the electricity imports for the use of the wind farm auxiliaries).

The electricity meters are installed and sealed by the Office National d'Electricité et de l'Eau Potable (ONEE),which is the public utility that has the monopoly of the national electricity grid development and management. It serves as the basis of the electricity supply and electricity imports accounting. The bidirectional ONEE electricity meters are being checked and calibrated regularly by ONEE according to its official maintenance and calibration procedure. The electricity meters are property of ONEE. Meters undergo testing and calibration carried out by ONEE at least once per-year.

The PP meters may be inspected at any reasonable time by ONEE on the project participant's request. If, during any test, the accuracy of the meters fails to meet the standards specified by the International Electrotechnical Commission, ONEE shall repair or recalibrate the meters and if it is necessary to replace a meter.

If the error of the main meter is out of the permissible limits or if the main meter have malfunction, the data of the backup meter will be referenced.
Meters are jointly inspected, sealed or calibrated on behalf of the parties concerned and shall not be interfered with by either party (such removing, replacing, disassembling, sealing, seal-breaking, accident treatment and etc.), except in the presence of the other party or its accredited representatives.

ONEE whom is responsible of calibration, have done the electricity meter in KWF for year 2017, 2019 and 2021 as shown below:

	Meter 1	Meter 2	Meter 3	Meter 4
Number	02826265	02826266	02826267	02826268
Make	Elster	Elster	Elster	Elster
Model	A1800	A1800	A1800	A1800
Accuracy Class	0.2s	0.2s	0.2s	0.2s
Calibration Frequency	Annual	Annual	Annual	Annual
Calibration Date	25/11/2017 20/04/2019 06/05/2021	25/11/2017 20/04/2019 06/05/2021	25/11/2017 20/04/2019 06/05/2021	25/11/2017 20/04/2019 06/05/2021
Type	Main Meter	Check Meter	Main Meter	Check Meter

There was a delay in the calibration for the period from "November 2018 – April 2019" and "April 2020 – June 2020". The delayed calibration was carried out and no error was found in the electricity meters. Hence the paragraph 366-371 of the "CDM Validation and Verification Standard for project activities, version 03" has been followed which is relevant to the present case. Hence for the period where the meter was not calibrated, Correction factor has been applied for the gap period according to the accuracy class of the energy meters. Please refer tab "Electricity exports and imports" of ER sheet for detailed calculation.

e) Data collection and management

The double meter readings of the net supplied electricity to the grid is transmitted electronically to PP monitoring computer and recorded every 24h. The daily meter readings data is processed and stored electronically in a computer system with regular backup copy on a digital basis complemented by printed versions of the monthly electricity exports.

An internal monitoring audit will be undertaken at the crediting period start up and routinely afterward as needed. Following the internal audit, the electronic data would be used in a spreadsheet procedure in order to calculate emissions reductions. The original data, the calculation procedures and the resulting emission reductions is verified internally before the establishment of the monitoring report and the DOE verification.

f) Training and monitoring procedures

The project participant entrusts the professional engineers and experts to train all the relative staff. The training contains CDM knowledge, operational regulations, quality control (QC) standard flow, data monitoring requirements and data management regulations etc.

The monitoring procedure is defined in a monitoring manual that include, in particular: (i) staff organization with job descriptions, (ii) instructions for data transfer and record handling protocols, and (iii) calibration checking procedures for the measuring equipment. This manual will be updated regularly according to the latest applicable EB monitoring recommendations and the recurrent corrective actions undertaken.
A constant internal audit are being conducted at the project, to ensure a constant monitoring system is in place and ensure improvements are done correctly if needed. Type of audits operational audit, financial audit, HSE audit and administrative audits. some of the observation which were find during the audit; risk management update, more traffic signs to be installed on site, housekeeping, and finally share the status of the observation report closure, inspections and overdue actions. Following these audits, corrective actions will be decided, if necessary. In addition to periodic meetings, additional technical meetings among the technical team of the wind farm will be held, if necessary, in order to define the monitoring corrective actions to be carried out. Any corrective actions taken will be documented in case of equipment or system malfunction or breakdown.
Regular site audits will be made to ensure that the monitoring and operational procedures are being observed in accordance with the monitoring plan.

SECTION D. DATA AND PARAMETERS

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

Data/parameter	FCi,m,y
Unit	T
Description	Amount of fossil fuel type i consumed by power plant / unit m feeding the grid, in year y
Source of data	ONEE official data
Value(s) applied	See Annex 1 of the MR
Choice of data or Measurement methods and procedures	See Annex 1 of the MR

Purpose of data	Calculation of grid emission factor/Baseline emissions
Additional comment	The above value is fixed and it is same for the entire crediting period

Data/parameter	EGm,y
Unit	MWh
Description	Net electricity generated by power plant/unit m in year y
Source of data	ONEE official data
Value(s) applied	See Annex 1 of the MR
Choice of data or Measurement methods and procedures	See Annex 1 of the MR
Purpose of data	Calculation of grid emission factor/Baseline emissions
Additional comment	The above value is fixed and it is same for the entire crediting period

Data/parameter	NCVi
Unit	GJ/t
Description	Net calorific value (energy content) per mass or volume unit of fuel i
Source of data	Specific NCVs power plant values when available Official Statistical book Annuaire des Statistiques - 2007 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See Annex 1 of the MR

Choice of data or Measurement methods and procedures	According to the Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1), values provided by the fuel supplier of the power plants in invoices shall be used if data is collected from power plant operators. Otherwise the national average default value shall be used if values are reliable and documented in regional or national energy statistics / energy balances. If not, and only then, IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories shall be used.
Purpose of data	Calculation of grid emission factor/Baseline emissions
Additional comment	The above value is fixed and it is same for the entire crediting period

Data/parameter	EF_{CM}
Unit	tCO2eq/MWh
Description	Combined Margin emission factor
Source of data	ONEE official data.
Value(s) applied	0.4862
Choice of data or Measurement methods and procedures	Using Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1).
Purpose of data	Baseline Emission calculation
Additional comment	The above value is fixed and it is same for the entire crediting period

Data/parameter	EF_{OM}

Unit	tCO2eq/MWh
Description	Operating Margin emission factor
Source of data	ONEE official data.
Value(s) applied	0.6059
Choice of data or Measurement methods and procedures	Using Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1).
Purpose of data	Baseline Emission calculation
Additional comment	The above value is fixed and it is same for the entire crediting period

Data/parameter	EF_{BM}
Unit	tCO2eq/MWh
Description	Build Margin emission factor
Source of data	ONEE official data.
Value(s) applied	0.1271
Choice of data or Measurement methods and procedures	Using Tool to Calculate the Emission Factor for an Electricity System (version 02.2.1).
Purpose of data	Baseline Emission calculation
Additional comment	The above value is fixed and it is same for the entire crediting period

D.2 Data and parameters monitored

SDG 13: Climate Action

Target: 13.2: Integrate climate change measures into national policies, strategies and planning

Indicator: 13.2.2: Total greenhouse gas emissions per year

Data / Parameter	ERy
Unit	tCO2
Description	GHG Emission Reduction
Source of data	ER sheet
Value(s) applied	316,720
Measurement methods and procedures	Calculated
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Baseline Emission Calculation
Additional comment	-

SDG 7: Affordable and Clean Energy

Target: 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix

Indicator: 7.2.1: Renewable energy share in the total final energy consumption

Data / Parameter	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the Project activity to the grid
Source of data	Joint Meter reading

Value(s) applied	651,420 MWh
Measurement methods and procedures	Measured
Monitoring frequency	Data measured continuously basis and recorded on a daily/monthly basis
QA/QC procedures	It is also cross checked with invoices
Purpose of data	To monitor the quantity of electricity supplied to the grid and baseline emission calculation
Additional comment	NA

SDG 3: Ensure Healthy Lives and promote well being for all at all the ages

Targets: 3.8: Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

Indicators: 3.8.1 Coverage of essential health services

Data / Parameter	Number of CSR activities
Unit	Number
Description	Number of people benefiting from CSR program
Source of data	CSR documents
Value(s) applied	2 CSR activities - Awareness campaign on the Dental Health was organized (under Dental Unit Mobile Program): The objective was to improve the dental health and decrease in dentist doctor expenses. The activity was undertaken in September & October 2019.

	- Realizing the Program on Infrastructure improvement: The objective was to increase the accessibility (school transport, ambulance, potable drinking water), well being of the family (specially for women), schooling of children. The activity was undertaken in year 2019 & 2020.
Measurement methods and procedures	CSR team manages all the records of CSR activities and keep the track of ongoing activities.
Monitoring frequency	Annual
QA/QC procedures	N/A
Purpose of data	To demonstrate positive impact on the local communities
Additional comment	NA

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Targets: 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value

Indicators:8.5.2 Unemployment rate, by sex, age and persons with disabilities

Data / Parameter	Number of Jobs created, Number of trainings conducted
Unit	Number
Description	Number of Jobs created, Number of trainings conducted
Source of data	List of personnel by APK, Training Certificate & Attendance Sheet
Value(s) applied	10 Jobs and 1 Training each in year 2018, 2019, 2020 The following trainings were conducted:

	- Year 2018: Training on Emergency Evacuation on 26/09/2018, 13/12/2018. - Year 2019: Training on General Rules for Hygiene and Security was provided on 10/03/2019, 16/07/2019, 07/11/2019, 25/11/2019, 09/12/2019, 12/12/2019. - Year 2020: Training on Health and Safety provided in year 2020.
Measurement methods and procedures	Maintaining the Payroll system
Monitoring frequency	Annual
QA/QC procedures	N/A
Purpose of data	Economic Growth
Additional comment	NA

D.3. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
GHG Emission reduction	316,720 tCO_2	35,354 tCO_2
Amount of Clean electricity supplied (MWh)	651,420 MWh	94,019 MWh
Number of Jobs created, Number of trainings conducted	10 Jobs, 1 training	N/A
Number of CSR activities	2	N/A

D.4. Implementation of sampling plan

Not Applicable

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

Baseline Estimate of SDG 13:

The baseline estimate is calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

where:

EGPJ,y = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh). The electricity supplied to the grid during the monitoring period is "786,004.37 MWh".

EFgrid,CM,y = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the "Tool to calculate the emission factor for an electricity system" (tCO2/MWh). The value of 0.4862 tCO2eq/MWh has been used in the emission reduction calculations.

As the electricity is generated with the help of fossil fuels in the baseline scenario, hence the GHG emissions were being generated in the baseline scenario. The Baseline GHG Estimate is calculated as follows:
651,420 MWh x 0.4862 tCO2eq/MWh = 316,720 tCO_2 (rounddown)

The vintage wise baseline emissions detail are as follows:

Year	Baseline emissions (tCO_2)
Year 2018	79,180
Year 2019	158,360
Year 2020	79,180
Total	316,720

Baseline Estimate for SDG 07:
There was no wind power generation in the baseline scenario. Hence the Baseline Estimate for SDG 07 is zero.

Baseline Estimate for SDG 08:
There were no jobs creation and trainings due to wind power generation in the baseline scenario. Hence the Baseline Estimate for SDG 08 is zero.

Baseline Estimate for SDG 03:
There were no CSR activities due to wind power generation in the baseline scenario. Hence the Baseline Estimate for SDG 03 is zero.

E.2. Calculation of project value or estimation of project situation of each SDG Impact

Project Estimate of SDG 13:

As the project involves renewable power generation (wind power generation), hence there are no GHG emissions associated due to generation of wind power generation. Hence the Project value for SDG 13 is zero.
The vintage wise project emissions detail are as follows:

Year	Project emissions (tCO_2)
Year 2018	0
Year 2019	0
Year 2020	0

Project Estimate for SDG 07:

The project involves wind power generation in the project scenario. Hence the Project Estimate for SDG 07 is 651,420 MWh.

Project Estimate for SDG 08:
There were 10 jobs created and 1 training conducted in the project scenario.

Project Estimate for SDG 03:
There were 2 CSR activities carried out in the project activity.

E.3. Calculation of leakage

The project activity is a renewable energy project, and no fossil fuel is burnt within the project boundary due to the project activity and hence no leakage emissions are considered. This is inline with the registered CDM PDD/Transition Annex.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	GHG Emission reduction	316,720 tCO_2	0	316,720 tCO_2
7	Amount of Clean electricity supplied (MWh)	0	651,420MWh	651,420 MWh
8	Number of Jobs created, Number of trainings conducted	0	10 Jobs & 1 training each in year 2018, 2019, 2020	10 Jobs & 1 training each in year 2018, 2019, 2020
3	Number of CSR activities conducted	0	2	2

The vintage wise emission reductions detail are as follows:

Year	Emission Reductions (tCO_2)
Year 2018	79,180
Year 2019	158,360
Year 2020	79,180
Total	316,720

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[2] achieved during this monitoring period
13	287,920 tCO2e	316,720 tCO2e
8	10 Jobs & 1 Training	10 Jobs & 1 Training each in year 2018, 2019, 2020
7	592,200 MWh	651,420 MWh
3	2 CSR activities	2 CSR activities

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

SDG 13:
As per the PDD, the annual estimated ex-ante emission reductions are 143,960 tCO2e per year.
Hence the emission reductions corresponding to the monitoring period (01/07/2018 – 30/06/2020) arrives as 143,960 tCO2e x 2 = 287,920 tCO2e.

SDG 07:
As per the PDD, the annual estimated power generation are 296,100 MWh per year.
Hence the power generation corresponding to the monitoring period (01/07/2018 – 30/06/2020) arrives as 296,100 MWh x 2 = 592,200 MWh.

SDG 08:
The ex-ante values for SDG 08 are 10 Jobs & 1 Training as per the Transition Annex.

SDG 03:
There are no ex-ante estimates for SDG 03 in the registered PDD. The ex-ante values for SDG 03 as per the Transition Annex are 2 CSR activities.

[2] Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

SDG 07 & SDG 13:

As it's a wind project, the generation capacity depends on the availability of wind. Hence natural reasons based on the weather could achieve an increase or an increase in the estimated value of the PDD.

The amount achieved in this monitoring period is 382,154 tCO2e but the emission reductions considered is 316,720 as per upper bound of sensitivity analysis range (+10%) for the monitoring period reference to 2.1.3 (b) & . 2.1.4 of Rule Clarification: Assessment Approach for Reporting Higher Ex-post Emission Reductions.

The amount estimated ex ante for the monitoring period is 287,920 tCO_2. The reason for increase is as follows:

- Natural reason, as the availability of wind was high during the monitoring period, which led the turbines to generate more electricity. Since the emission reductions are directly linked to the electricity generation, hence there was increase in the achieved emission reductions as compared to the estimated value as per the registered PDD.

Further PP would like to clarify that this increase does not have any impact on the additionality of the project, which is explained as follows:

Total actual generation during the monitoring period (July 2018-June 2020): 7,86,004.37 MWh

Ex-ante estimated generation as per the registered PDD for 2 years: 2,96,100 x 2 = 5,92,200 MWh

Percentage increase in the actual generation as compared to ex-ante generation: (786004.37 – 592200)/(592200) x 100 = 32.72%

As per the registered PDD, the IRR crosses benchmark at 38.80% increase in electricity generation. Hence the increased generation during the monitoring period

(32.72%) is within 38.80% and hence still meets the additionality requirements. Hence the project is still additional in line with the registered PDD.

SDG 03, SDG 08:

The achieved values for the SDG03, SDG08 are less than estimates as per the Transition Annex, hence no further discussions required.

SECTION F. SAFEGUARDS REPORTING

The project transitioned to the Gold Standard for Global Goals (GS4GG) Standard in 2020. A detailed safeguarding principles assessment has been conducted back then.

PP has reviewed the different safeguarding principles and comes to the conclusion that this situation has not changed for this specific Monitoring Period. Therefore, the Safeguarding Principles Assessment of the GS4GG Transition Annex and its conclusion is still valid at this point in time.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

The following continuous input/grievance mechanism was already in place for the project activity.

Method	Chosen Method for Grievance Mechanism
Continuous Input / Grievance Expression Process Book (mandatory)	Grievance Register to be maintained at office of PP and O&M site office at Project location.
GS Contact (mandatory)	help@goldstandard.org
Other	

There has been no comment received to the project during this monitoring period.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

No stakeholder mitigations were agreed to be monitored.

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

No legal contest or dispute has been emerged within the project during this monitoring period.

Annex-1

Table A1: Morocco's Grid Capacity, electricity generation and consumptions for 2008-2010

Power Stations	Installed capacity in MW			Fuel Consumption in tonnes except for natural gas in 1000 Nm3			Net electricity generation in MWh			Fuel	Starting year	Last refrofit date
	2008	2009	2010	2008	2009	2010	2008	2009	2010			
Thermal Power stations												
Mohammedia												
Sub-total fuel oil	300	300	300.00	423,863	386,920	422,610	1,684,874	1,485,168	1,633,684	Fuel oil	1986	
Sub-total imported coal	300	300	300.00	351,227	223,427	144,500	823,853	490,904	323,992	Imported coal	1987	
Jerada	165	165	165.00				815,132	600,803	695,064		1971/1972	
Sub-total fuel oil				2,097	1,823	1,672				fuel oil		
Sub-total imported coal				393,870	289,033	420,536				imported coal		
Sub-total anthracite				0	37,544	0				anthracite		
Sub-total petroleum coke				72,165	40,382	0				petroleum coke		
Jorf Lasfar JLEC	1,320	1,320	1,320	3,658,979	3,526,183	3,632,455	10,022,801	9,771,604	9,847,176	Imported coal		
Unit 1	330	330	330								1994	
Unit 2	330	330	330								1994	
Unit 3	330	330	330								2000	
Unit 4	330	330	330								2000	
Kenitra	300	300	300	467,962	329,469	406,879	1,637,969	1,166,485	1,440,049	Fuel oil	1978/1979	
Tahaddart	380	380	380	484,139	482,208	373,268	2,867,981	2,842,551	2,153,708	Natural gas	2005	
Ain Beni Mathar	-	470	470		63,168	209,975		209,852	810,321	Natural gas + solar	05/2009	

Power Stations	Installed capacity in MW			Fuel Consumption in tonnes except for natural gas in 1000 Nm3			Net electricity generation in MWh			Fuel	Starting year	Last refrofit date
	2008	2009	2010	2008	2009	2010	2008	2009	2010			
Thermal Gas Turbines												
Mohammedia (100 MW)	-	300	300									
Fuel oil					49,967	176,397		143,769	577,060	Fuel oil	2009	
Gasoil					1,630	2,392						
Mohammedia (33MW)	99	99	99								1991/92	2008
Fuel oil				31,914	8,769	28,654	85,691	167,354	650,158	Fuel oil		
Gasoil				643	196	154				Gasoil		
Tit Mellil	198	198	198								1993/94	
Fuel oil				99,496	26,284	50,205	276,833	75,027	140,527	Fuel oil		
Gasoil				1,217	59	29				Gasoil		
Tetouan 33	99	99	99								1994/1995	
Fuel oil				33,844	14,971	18,664	93,820	42,006	52,238	Fuel oil		
Gasoil				504	120	125				Gasoil		
Agadir	40	40	40								1974/1977	
Fuel oil				7,857	429	12,002	18,497	1,144	32,431	Fuel oil		
Gasoil				122	40	1,224				Gasoil		
Tanger	40	40	40								1975/1977	
Fuel oil				2,133	1,915	17,992	5,292	5,038	41,085	Fuel oil		
Gasoil				85	78	320				Gasoil		
Tétouan 20	40	40	40								1975/1977	
Fuel oil				4,861	1,234	4,258	11,684	3,152	9,555	Fuel oil		
Gasoil				217	86	22				Gasoil		
Laayoune	21	21	21								1988/1989	
Fuel oil				1,778	768	3,249	8,311	3,542	14,576	Fuel oil		
Gasoil				214	119	691				Gasoil		
TAG Laayoune	99	99	99								2007	
Fuel oil				18,340	62,609	73,443	246,841	193,887	244,997	Fuel oil		
Gasoil				68,906	10,161	24,537				Gasoil		
Dakhla	21	21	37.5								2002 & 06/2010	
Fuel oil				8,221	11,119	13,318	45,523	49,607	59,288	Fuel oil		
Gasoil												
Diesel power stations												
Tan Tan	-	116.7	116.7								3/19/2009	
Fuel oil					73,322	49,898	-	354,373	261,352	Fuel oil		
Gasoil					156	3,153						
Small Diesel units	20	20	20	2,852	566	143	3,460	2,014	464			
Sub Total Thermal	3,442	4,329	4,346				18,648,562	17,608,280	18,987,725			

Power Stations	Installed capacity in MW			Fuel Consumption in tonnes except for natural gas in 1000 Nm3			Net electricity generation in MWh			Fuel	Starting year	Last refrofit date
	2008	2009	2010	2008	2009	2010	2008	2009	2010			
Hydro power stations												
Afourer	93.60	93.6	93.6				227,759	401,900	373,300		1955	
Bine El Ouidane	135.00	135.0	135.0				94,197	293,100	295,500		1953/1954/1955	
Al Massira	128.00	128.0	128.0				10,066	87,100	270,100		1980	
Step Afourer	464.00	464.0	464.0				443,657	383,800	163,000		2004 & 2005	
Imfout	31.20	31.2	31.2				12,649	14,100	65,000		1947 & 1949	
Daourat	17.00	17.0	17.0				2,190	2,300	28,700		1950	
Sidi Said Maachou	20.80	20.8	20.8				0	0	0		1929	
Kasba Zidania	7.10	7.1	7.1				160	0	0		1935 & 1936	
Mohamed El Khamis	23.20	23.2	23.2				69,718	101,100	109,100		1967	
Bou Areg	6.40	6.4	6.4				8,245	10,000	12,600		1969	
Hassan 1er	67.00	67.0	67.0				57,514	115,600	151,100		1991	
Ahmed El Hansali	92.00	92.0	92.0				38,063	185,200	309,900		2003	
Moulay Youssef	24.00	24.0	24.0				18,704	62,700	44,300		1974	
Mansour Eddahbi	10.00	10.0	10.0				18,378	35,700	35,700		1973	
El Kansera	14.40	14.4	14.4				10,375	33,700	44,700		1935 & 1939	
Idriss 1	40.60	40.6	40.6				29,994	160,100	221,200		1978	
Al Wahda	240.00	240.0	240.0				97,490	599,100	947,500		1997 & 1998	
Allal El Fassi	240.00	240.0	240.0				162,740	297,400	281,300		1994	
Oued El Makhazine	36.00	36.0	36.0				13,793	84,600	115,100		1979	
Lalla Takerkoust	12.00	12.0	12.0				6,497	20,400	29,200		1938	
Lau	14.10	14.1	14.1				20,173	27,600	17,400		1934 & 1942	
Taurart	2.00	2.0	2.0				5,391	1,100	0		1951	
Ait messaoud	6.40	6.4	6.4				10,626	30,400	29,100		2003	
Fes Amont	1.20	1.2	1.2				0	0	0		1925	
Fes Aval	1.90	1.9	1.9				0	0	0		1934	
Sefrou	0.60	0.6	0.6				261	200	100		1994	
Taza	0.60	0.6	0.6				1,168	1,500	1,300		1929	
Meknes	0.60	0.6	0.6				0	0	0		1925	
Tanafnit	-	18.0	18.0				-	3,600	79,800		01/08/2009 & 09/11/2009	
El Borj	-	-	22.0				-	-	5,600		26/11/2010	
Sub Total Hydro	1729.70	1747.70	1769.70				1,359,808	2,952,300	3,630,600			

Power Stations	Installed capacity in MW			Fuel Consumption in tonnes except for natural gas in 1000 Nm3			Net electricity generation in MWh			Fuel	Starting year	Last refrofit date
	2008	2009	2010	2008	2009	2010	2008	2009	2010			
Wind power												
CED	50.4	50.4	50.4				152,630	157,826	165,574		2000	
Koudia El Baida (ONE)	3.5	3.5	3.5				0	0	0		2000	
Essaouira Wind Farm	60.776	60.776	60.776				145,644	123,157	127,688		3/11/2007	
Tangier Wind Farm	-	140.250	140.250				0	110,253	365,553		4/7/2009	
Sub Total Wind	**114.7**	**254.9**	**254.9**				**298,274**	**391,236**	**658,815**			
Imports												
Import Algeria							49,400	35,700	36,900			
Import Spain							4,211,900	4,586,900	3,902,500			
Sub Total imports							**4,261,300**	**4,622,600**	**3,939,400**			
Transfer from National industrial plants												
National tranfers from industrial clients							39,900	126,100	151,840			
Sub Total national transfers							**39,900**	**126,100**	**151,840**			
Others												
(STEP Pumping* + Compensators+ Auxiliaries)**							-604,160	-541,600	-260,330			
Sub Total Others							**-604,160**	**-541,600**	**-260,330**			
Grand total	**5,287**	**6,332**	**6,370**				**24,003,684**	**25,158,916**	**27,108,050**			

* STEP pumping is a technique used by ONE to use pumping to store electricty by pumping water in low demand period and generating it at high demand periods

** Consumption of power plants auxiliaries supplied in very high and high voltages, of synchronous compensators supplied in high voltage and of STEP pumping /

Source: ONE statistical reports 2008-2009-2010 (See pages 2/2 of reports, table of Energie appelée)

Low cost must run contribution

Power type	2006		2007		2008		2009		2010	
	MWh	%	MWh	%	MWh	%	MWh	%	MWh	%
total hydro*	982,800	4.7%	901,800	4.0%	916,151	3.8%	2,568,500	10.2%	3,467,600	12.8%
total wind	183,200	0.9%	278,900	1.2%	298,274	1.2%	391,236	1.6%	658,815	2.4%
Subtotal low cost must run	1,166,000	5.52%	1,180,700	5.22%	1,214,425	5.06%	2,959,736	11.76%	4,126,415	15.22%
Net total electricity generated&imported	21,104,600		22,608,100		24,003,684		25,158,916		27,108,050	
total exluding low cost must run	19,938,600		21,427,400		22,789,259		22,199,180		22,981,635	

Source of the 2006 and 2007 data: Ministry of Energy, Mines, Water and Environment: http://www.mem.gov.ma/Chiffres_cle/ChiffreEnergie08-32.htm

* Total hydro figures are excluding STEP generation

Table A2: Calculation of the Operating Margin Emission Factor

OM Factor 2008-2009-2010

Power Stations	Fuel Consumption in tonnes*			Fuel	Emissions tCO2			Emission factor
	2008	2009	2010		2008	2009	2010	t CO2/t fuel
Thermal Power stations								
Mohammedia								
Sub-total fuel oil	423,863	386,920	422,610	Fuel oil	1,273,666	1,162,656	1,269,901	3.005
Sub-total imported coal	351,227	223,427	144,500	Imported coal	776,507	493,961	319,466	2.211
Jerada								
Sub-total fuel oil	2,097	1,823	1,672	fuel oil	6,301	5,478	5,024	3.005
Sub-total imported coal	393,870	289,033	420,536	imported coal	826,506	606,514	882,463	2.098
Sub-total anthracite		37,544		anthracite		83,237		2.217
Sub-total petroleum coke	72,165	40,382	0	petroleum coke	192,865	107,923	0	2.673
Jorf Lasfar	3,658,979	3,526,183	3,632,455	Imported coal	7,952,307	7,663,693	7,894,661	2.173
Kenitra	467,962	329,469	406,879	Fuel oil	1,406,179	990,021	1,222,631	3.005
Tahaddart	484,139	482,208	373,268	Natural gas	884,906	881,944	682,749	
Ait Beni Mathar	0	63,168	209,975			115,532	384,067	

Power Stations	Fuel Consumption in tonnes*			Fuel	Emissions tCO2			Emission factor
	2008	2009	2010		2008	2009	2010	t CO2/t fuel
Thermal Gas Turbines								
Mohammedia (100 MW)								
Fuel oil	0	49,967	176,397			150,146	530,055	3.005
Gasoil	0	1,630	2,392			4,899	7,189	3.006
Mohammedia (33 MW)								
Fuel oil	31,914	8,769	28,654	Fuel oil	95,898	26,350	86,102	3.005
Gasoil	643	196	154	Gasoil	1,933	589	463	3.006
Tit Mellil								
Fuel oil	99,496	26,284	50,205	Fuel oil	298,976	78,981	150,861	3.005
Gasoil	1,217	59	29	Gasoil	3,658	177	87	3.006
Tetouan 33								
Fuel oil	33,844	14,971	18,664	Fuel oil	101,698	44,986	56,083	3.005
Gasoil	504	120	125	Gasoil	1,515	361	376	3.006
Agadir								
Fuel oil	7,857	429	12,002	Fuel oil	23,609	1,289	36,065	3.005
Gasoil	122	40	1,224	Gasoil	367	120	3,679	3.006
Tanger								
Fuel oil	2,133	1,915	17,992	Fuel oil	6,409	5,754	54,064	3.005
Gasoil	85	78	320	Gasoil	255	234	962	3.006
Tétouan 20								
Fuel oil	4,861	1,234	4,258	Fuel oil	14,607	3,708	12,795	3.005
Gasoil	217	86	22	Gasoil	652	258	66	3.006
Laayoune								
Fuel oil	1,778	768	3,249	Fuel oil	5,343	2,308	9,763	3.005
Gasoil	214	119	691	Gasoil	643	358	2,077	3.006
TAG Laayoune								
Fuel oil	18,340	62,609	73,443	Fuel oil	55,110	188,134	220,689	3.005
Gasoil	68,906	10,161	24,537	Gasoil	207,107	30,541	73,749	3.006
Dakhla								
Fuel oil	8,221	11,119	13,318	Fuel oil	24,703	33,411	40,019	3.005
Gasoil								
Diesel power stations								
Tan Tan								
Fuel oil		73,322	49,898	Fuel oil		220,325	149,939	3.005
Gasoil		156	3,153	Gasoil		469	9,477	3.006
Small Diesel units	2,852	566	143	Gasoil	8,572	1,701	430	3.006
Grand total					**14,170,292**	**12,906,061**	**14,105,952**	

* Except for Tahaddart where the Fuel consumption is expressed in 1000 Nm3

Build Margin Emission Factor 2010

The power plant capacity additions in the electricity system that comprise 20% of the system generation and that have been built most recently

	Plant name	Technology	year operation	Fuel	MWh in 2010	% total Production	Accumalted %	Emissions tCO2	Emission factor tCO2/MWh
1	El Borj	Small hydro	2010	Hydro	5,600	0.02%	0.02%	0	
2	Tanafnit	Small hydro	2009	Hydro	79,800	0.29%	0.32%	0	
3	Ait Beni Mathar	Combined Cycle (assumed all Natural gas)	2009	Natural gas + solar	810,321	2.99%	3.30%	49,939	
4	Tan Tan	Diesel - combined cycle	2009	Fuel oil	261,352	0.96%	4.27%	31,275	
5	Dakhla	Gas turbine - combined cycle	2002&2010	Fuel oil	59,288	0.22%	4.49%	7,869	
		AEGSET-5-units			1,216,361		4.5%		
6	Mohammedia	Diesel - combined cycle	2009	Fuel oil	577,060	2.13%	6.62%	105587	
7	TAG Laayoune	Gas turbine - combined cycle	2007	Gasoil/Fuel oil	244,997	0.90%	7.52%	43788	
8	Tahaddart	Combined Cycle	2005	Nautral Gas	2,153,708	7.94%	15.46%	88776	
9	Ahmed Hansali	Small hydro	2003	Small hydro	309,900	1.14%	16.61%	0	
10	Ait Messoud	Small hydro	2003	Small hydro	29,100	0.11%	16.72%	0	
11	Jorf Lasfar JLEC *	Steam power - ultra supercritical	2000	Imported coal	2,561,363	9.45%	26.16%	636824	
		AEGSET-≥20%			7,092,489		26.16%		
12	Tangier	Wind	2009		365,553	1.35%	18.06%	0	
13	Essaouira	Wind	2007		127,688	0.47%	18.53%	0	
		AEGSET-sample-CDM			5,024,367		18.53%		
		SETsample-CDM->10yrs			7,585,730		27.98%		
		Total			7,585,730	27.98%		964,058	0.1271
	Total electricity supplied to the grid in 2010				27,108,050	100%			
	SETsample-CDM->10yrs				7,585,730	27.98%	Selected		

* For the Jorf power plant: only the most recent unit build in 2000 has been considered.

Table A3: Calculation of the Build Margin Emission Factor

Table A4: Calculation of Combined Margin Emission Factor

	Unit	Per year	
Operating Margin Emissions Factor in 2008	tCO2/MWh	0.6218	
Operating Margin Emissions Factor in 2009	tCO2/MWh	0.5814	
Operating Margin Emissions Factor in 2010	tCO2/MWh	0.6138	
Operating Margin Emissions Factor average 2006-2008	**tCO2/MWh**	**0.6059**	
Build Margin Emissions Factor	**tCO2/MWh**	**0.1271**	
Baseline Emissions Factor Wind and solar	**tCO2/MWh**	**0.4862**	**= 0.75 x EF(OM) + 0.25 x EF (BM)**
Baseline Emissions Factor for other projects	**tCO2/MWh**	**0.3665**	**= 0.5 x EF(OM) + 0.5 x EF (BM)**

Table A5: Fuel data base

BM calculation using Step 4(a) of the Tool

Fuel Type	Reference IPCC	Emission factor	
		t CO2/TJ	t CO2/t
Natural Gas	Natural gas	54.30	0.326
Local coal	Anthracite	94.6	0.681
Heavy fuel oil	Residual fuel oil	75.5	0.591
Gasoil	Gasoil/Diesel	72.6	0.568
Reference		2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2-Chapter 1 Table 1.4	

Annex 1: Default efficiency factors for power plants

Default Efficiency Values (%)	Default Efficiency Values (%) **
Natural Gas – Combined Cycle	60
Coal – ultra super critical	50
Heavy fuel oil – combined cycle	46
Gasoil – combined cycle	46

** Default Efficiency Values used are the most conservative listed per each fuel type Appendix 1 of the Guidance Notes

Specific Fuel Data Base*

Power plant	Fuel type	Net Calorific Value		Emission factor	
		Mcal/t	GJ/t	tCO2/tJ	t CO2/t
JLEC	Coal	5,800	24.28	89,500	2.173
Mohammedia	Coal	5,900	24.70	89,500	2.211
Jerada	Coal	5,600	23.45	89,500	2.098
	Petcoke	7,700	32.24	82,900	2.673

*Figures in this table are based on the figures used by ONE for the Tangier wind power projet registered on the 07/06/2011 (project reference 4876, See Appendix 1 - 4876 - CER Sheet)

Conversion factor from NM3 to Tons
0.73
source: ONE

Fuel data base

Fuel Type	Reference IPCC	Net Calorific Value	Net Calorific Value	Emission factor	
		kcal/kg	GJ/t	t CO2/TJ	t CO2/t
Natural Gas	Natural gas			54.30	
Local coal	Anthracite	5,600	23.44	94.6	2.217
Heavy fuel oil	Residual fuel oil		39.80	75.5	3.005
Gasoil	Gasoil/Diesel		41.40	72.6	3.006
Reference		Réf. Annuaire statistique 2008-2009-2010	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2-Chapter 1 Table 1.2	2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 2-Chapter 1 Table 1.4	

	Year	NCV GJ/1000 NM3
NCV of natural gas used in Tahaddart power plant	2008	33.6610
	2009	33.6827
	2010	33.6853

Source: Energie Electrique de Tahaddart

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption