



Monitoring report form for CDM project activity
(Version 07.0)

Complete this form in accordance with the instructions attached at the end of this form.

MONITORING REPORT

Title of the project activity	Oaxaca III Wind Energy Project	
UNFCCC reference number of the project activity	5676	
Version number of the PDD applicable to this monitoring report	02	
Version number of this monitoring report	01	
Completion date of this monitoring report	26/03/2020	
Monitoring period number	Third monitoring period	
Duration of this monitoring period	01/09/2017 - 30/11/2019	
Monitoring report number for this monitoring period	Not applicable	
Project participants	CE Oaxaca Tres S. de R.L. de C.V. Acciona Green Energy Developments S.L.	
Host Party	Mexico	
Applied methodologies and standardized baselines	ACM0002 version 12.1.0 – Consolidated methodology for grid-connected electricity generation from renewable sources.	
Sectoral scopes	Sectoral Scope 1- Energy industries (renewable-/nonrenewable sources).	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	0	414,715
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	521,281	

SECTION A. Description of project activity

A.1. General description of project activity

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The objective of the project activity is the construction of a wind farm; the renewable energy is provided to the Mexican grid system and therefore results in the greenhouse gas (GHG) emissions reduction because in the absence of the project activity the power would have been generated by the Mexican grid system which depends mainly upon fossil fuels usage.

The Oaxaca III Wind Energy Project has a capacity of 102 MW, comprising 68 turbines generators, each with a capacity of 1.5 MW. The project was expected to generate approximately 399,228 MWh per year. This electricity is sold to the CFE.

- Brief description of the installed technology and equipment

Item	Oaxaca III Wind Energy Project
Unit	Acciona
Model	AW-1500
Individual capacity (MW)	1.5 MW
Number of turbines	68
Total Capacity	102 MW

A fixed crediting period of 10 years has been selected for the project, which lasts from March 9 2012 to March 8 2022.

The project has been registered with UNFCCC as a CDM project activity under article 12 of the Kyoto protocol. Submission of monitoring report and subsequent verification has been required mandatory by UNFCCC for issuance of Certified Emission Reductions (CERs) credits.

The monitoring period covered under the report is extending from *September 1st, 2017 to November 30th, 2019* including both days.

At the end of the first verification period **714,411 MWh** of electricity were produced and sent to the grid. Therefore, the total amount of reduced emissions is **414,715 tCO₂e**.

A.2. Location of project activity

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The project is located in Juchitán de Zaragoza Municipality, windy region, in the Isthmus of Tehuantepec, state of Oaxaca, Mexico.

The project activity is established between the following coordinates 94° 50' 17.80"W and 16° 34' 23.66" N and 94° 49' 4.90" W and 16° 31' 58.97" N (decimal coordinates: 16.57323858 latitude and -94.83827748 longitude; and 16.53304681 latitude and -94.81802829 longitude).

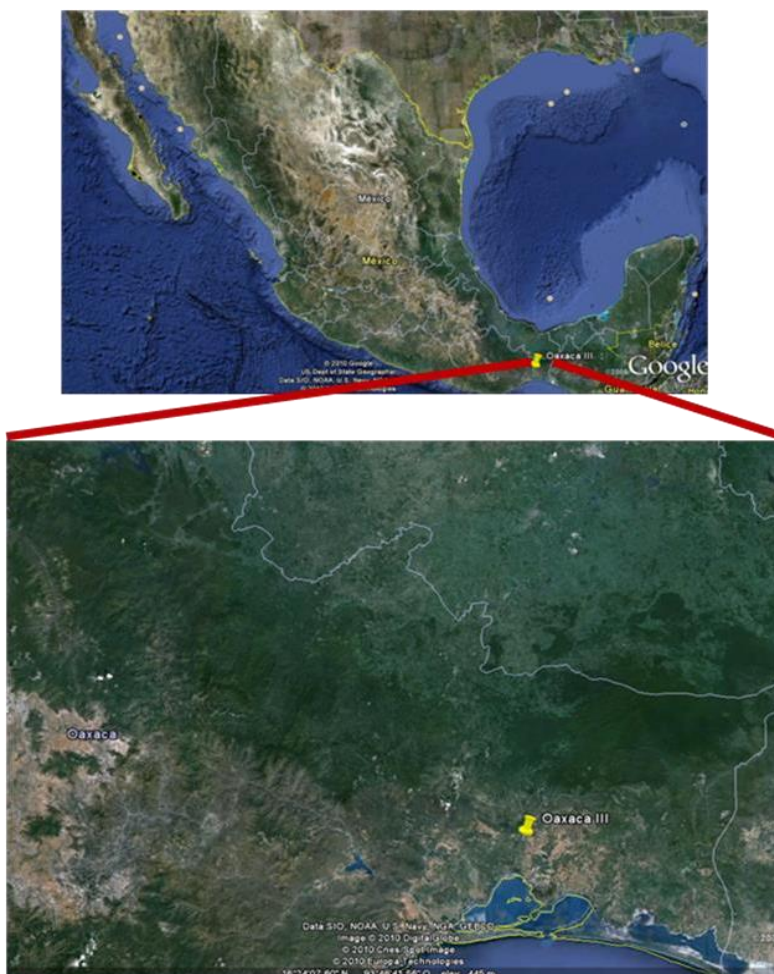


Figure 1. Localization of the project activity.

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Mexico (host Party)	CE Oaxaca Tres S. de R.L. de C.V. (Private entity) Acciona Green Energy Development S.L. (Private entity)	No

A.4. References to applied methodologies and standardized baselines

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For this project, the baseline and monitoring methodology applied is the following: Consolidated methodology for grid-connected electricity generation from renewable sources (ACM0002 ver. 12.1.0).

This methodology also refers to the approved versions of the following tools

- Tool to calculate the emission factor for an electricity system (ver 0.02.2.1)
- Tool for the demonstration and assessment of additionality (ver. 05.2)
- Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion (ver.02)

A.5. Crediting period type and duration

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A fixed crediting period of 10 years has been selected for the project. The project activity crediting period covers from March 09 2012 to March 08 2022, including both days.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The project start date is the date when CE Oaxaca Tres S. de R.L. de C.V. won the CFE tender by the award of contract. This was on March, 8th 2010.

The operation of the 102 MW started on 30/01/2012 and the project activity is expected to have a minimum lifetime of 20 years from starting date; this is, until the year 2032.

The general characteristics of the project activity are resume in the next table:

Total Power	102 MW
Rated Power per turbine	1.5 MW
Cut in-cut-out wind	4 / 25 m/s
No. of turbines	68
Equivalent annual operating hours	3,914
Annual Production	399,228 MWh
Capacity factor	44.68%
Transmission line length	23.2 km
Transmission line Voltage	230 kV

Table 1. Power plant characteristics

AW – 1500 is a wind turbine fabricated by Acciona, a company with 20 years' experience of leadership in the sector, with 8,913 MW of renewable installed capacity, of which more than 7,000 MW installed correspond to wind power.

The AW-1500 is a 1500 kW power-rated horizontal shaft wind turbine, with three blades, variable speed, 12 kV rated voltage and frequency of 60 Hz.; Certified by Germanischer Lloyd (GL) for a wide range of wind types. The turbine is cover made of fiberglass-reinforced polyester that protect of weather inclemency.

The wind turbine has control software for monitoring and automatically managing the operation. A double-fed asynchronous generator of IGBT's (PMW) improves voltage and frequency stability, supplies reactive power to the grid when required and operates the power factor in inductive or capacitive power as required.

The line to be connected to the Federal Electricity Commission ("Comisión Federal de Electricidad", CFE) transformer will be a 230 kV and 23.2 km long line, running from the wind farm control house to the CFE transformer located in the Ixtepec substation.

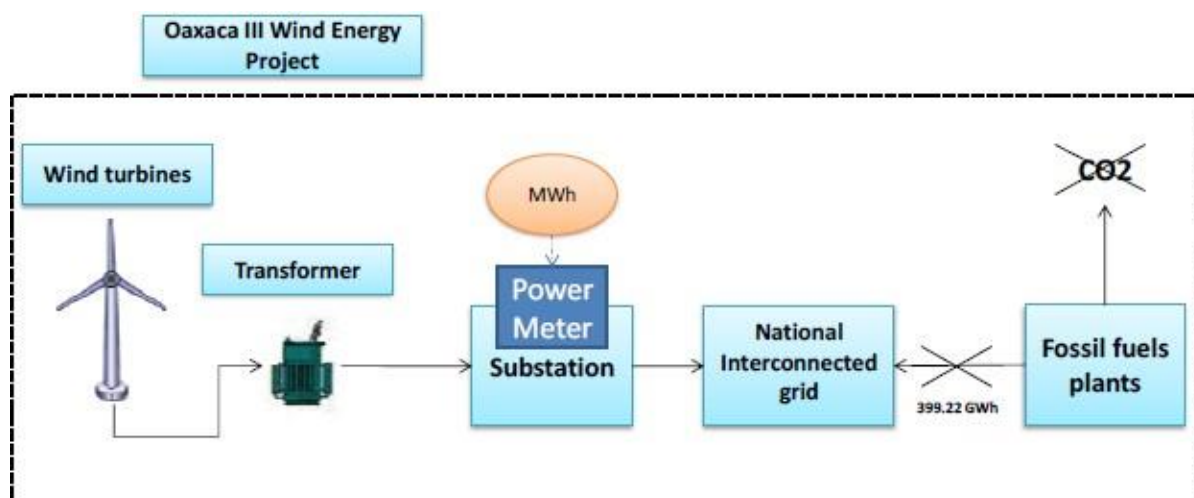


Figure 2. Project Boundary

Relevant dates for the project activity

Date	Event
08/03/2010	Date when CE Oaxaca Tres S. de R.L. de C.V. won the CFE tender by the award of contract.
08/04/2012	Date when CE Oaxaca Tres S. de R.L. de C.V. signed the PPA with CFE.
13/05/2010	Date when the Regulatory Energy Commission (CRE) gave the Independent Production permit.
15/07/2010	Start of the construction of Oaxaca III Wind Energy Project.
30/01/2012	Commissioning date of the project activity Oaxaca III Wind Energy Project .
09/03/2012	CDM Registration date of the project activity .

Events or situations which may impact on the applicability of the methodology

To date it has not happened any situation or event that affects or impacts the applicability of the methodology.

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

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N/A

B.2.2. Corrections

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N/A

B.2.3. Changes to the start date of the crediting period

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N/A

B.2.4. Inclusion of monitoring plan

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N/A

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

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N/A

B.2.6. Changes to project design

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N/A

B.2.7. Changes specific to afforestation or reforestation project activity

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N/A

SECTION C. Description of monitoring system

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The monitoring consists mainly in using a power meter equipment to record the energy generated by the wind farm. All relevant data is collected continuously and stored during the whole crediting period.

The monitoring of the power generation from the project is done through monthly invoices which are sent at the beginning of each month by CFE. This data registers the energy generated by the project activity that is measured from the power meter located in the wind farm.

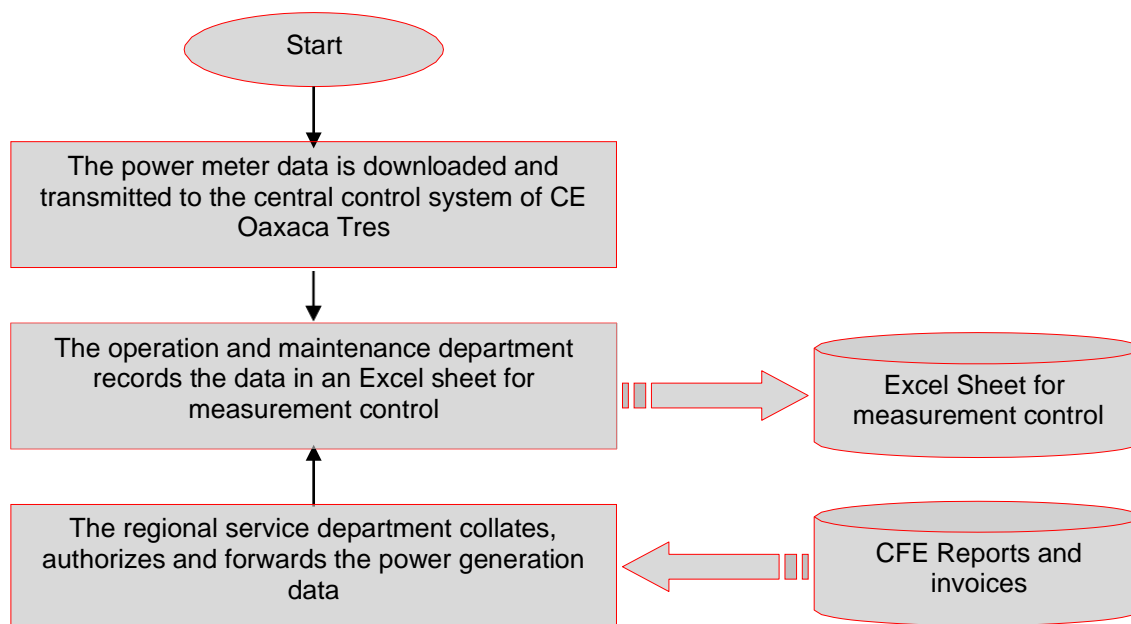


Figure 3. Diagram of Generated Electricity Monitoring System

The information related to the power meters equipment calibration is included in the following table:

Calibration Certificate

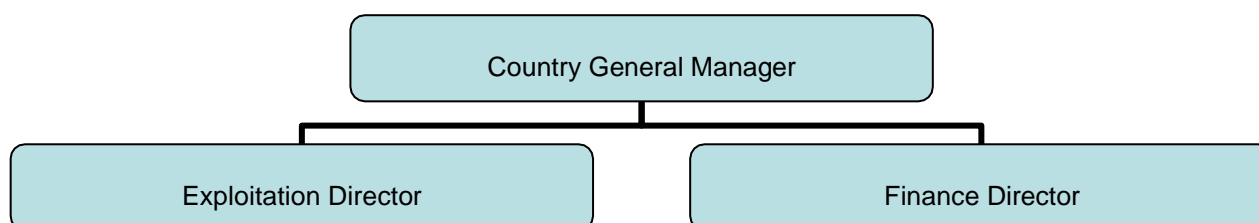
Equipment code	Equipment	Calibration Entity ¹	Calibration Certificates	Calibration Frequency	Calibration Dates
MT-1011A461-01	Main power meter Ixtepec Substation	LAPEM	20171330	Yearly	27/06/2017
			20181547	Yearly	12/06/2018
			20191291	Yearly	28/05/2019
MT-1011A562-01	Backup power meter Ixtepec Substation	LAPEM	20171331	Yearly	27/06/2017
			20181548	Yearly	12/06/2018
			20191293	Yearly	28/05/2019

The information is transmitted every 5 minutes to CFE central units.

In case the main meter(s) is found to be operating outside the permissible limits, the main meter will be either replaced or calibrated immediately. Whenever a main meter goes defective, the consumption recorded by the backup meter will be referred.

a) Roles and Responsibilities:

Organizational structure is as follows:



Responsible	Responsibility and competences
Country General Manager	Responsible for overseeing the CDM process
Exploitation Director	Responsible for monitoring, recording, reporting and archiving measured data.
	Responsible for checking data with the receipt of sales.
	Responsible for corrective and preventive actions
Finance Director	Responsible for performing the emission reduction calculations based on methodology and preparing the Monitoring Report as appropriate.
	Responsible for internal audit

¹ CFE hired the Company LAPEM (Laboratorio de Pruebas de Equipos y Materiales); all the calibration certificates are delivered to the DOE.

Measuring and cross-check procedure.

Measuring. The person(s) responsible obtains the electricity generation information from the meters installed in the Ixtepec substation on a monthly basis, and reports them in the spreadsheet designed for measurement control and stores the data electronically.

Calculation of energy generation to be monitored. Oaxaca III Wind Farm has two CFE certified meters (1 main, 1 backup) in Ixtepec Substation; the meters in Ixtepec Substation are property of CFE.

Cross-check of net electricity supplied to the grid with receipt of sales: Net electricity supplied to the grid measured at the substation is cross-checked with receipts of sales.

If there is a mismatch, the person(s) responsible will solve it with CFE, explaining the discrepancy detected the origin of deviations and the corrective actions taken and file the evidence.

Quality control (QC) procedures and quality assurance procedures (QA).

1. Monitoring equipment

- a) Monitoring equipment is set up as per Mexican law and/or PPA.
- b) Monitoring equipment is authorized through a certificated formal process.
- c) After set up monitoring equipment is calibrated by CFE periodically as determined by the Mexican Law and/or PPA, and checked as necessary by CFE for accuracy.

2. Corrective and preventive actions are followed and properly documented.

Monthly hourly readings for main and check meters are stored in Excel sheets. Corrective and preventive actions have been made as per provision in CDM manual.

Internal audit will be done periodically as decided by management.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	EF _{grid,CM,y}
Unit	tCO ₂ /MWh
Description	Baseline Emission factor of the Mexican Grid (calculated ex-ante)
Source of data	Registered PDD
Value(s) applied	0.5805 tCO ₂ /MWh
Choice of data or measurement methods and procedures	The data are used for Baseline emission calculations The value was calculated as per the "Tool to calculate the emission factor for an electricity system ver.02.2.1"
Purpose of data/parameter	Calculation Baseline Emissions
Additional comments	NA

D.2. Data and parameters monitored

Data/Parameter	EG _{facility,y}
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant to the grid in year y

Measured/calculated/default	Measured
Source of data	Energy Meters Installed in Ixtepec Substation
Value(s) of monitored parameter	714,411 MWh
Monitoring equipment	Main power meter and Backup power meter in Ixtepec Potencial Substation Type: Bidirectional Accuracy class: 0.2% Basic Serial number: MT-1011A461-01/ MT-1011A562-01 Calibration frequency: Annually Calibration dates: 27 June 2017, 12 June 2018, 28 May 2019, Validity: 28 May 2020
Measuring/reading/recording frequency	Measurement equipment: Power meters Measuring: Continuous, with report every 5 minutes Recording: Monthly
Calculation method (if applicable)	N/A
QA/QC procedures	This data is directly used for calculation of emissions reduction. The metering equipment is properly calibrated and checked periodically for accuracy, to ensure that any error resulting from such equipment does not exceed +0.2% of full-scale rating. To guarantee QA/QC it is double checked by receipt of electricity sales.
Purpose of data/parameter	Calculation Baseline Emissions
Additional comments	

D.3. Implementation of sampling plan

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N/A

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

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Baseline emissions are CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due the project activity. In order to obtain those emissions it is necessary to calculate and emission factor *ex-ante*, which is the result from an Operative Margin and a Build Margin emission factor. As it is explained in the PDD, the results for these margins are obtained using the following formulas.

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_j GEN_{j,y}}$$

Where:

$EF_{OM,y}$ = Operative margin CO₂ emissions factor in year *y* (tCO₂/MWh)

$F_{i,j,y}$ = Consumption of fuel *i* (in TJ) by fuel sources *j* in year *y*.

$COEF_{i,j,y}$ = CO₂ emission coefficient of fuel *i* in tCO₂/TJ.

$GEN_{j,y}$ = Electricity in MWh delivered to the grid by the *j* source.

j = Refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_m GEN_{m,y}}$$

Where:

- $EF_{BM,y}$ = Build margin CO₂ emissions factor in year y (tCO₂/MWh)
 $F_{i,m,y}$ = Consumption of fuel i (in TJ) by fuel sources m in year y.
 $COEF_{i,m,y}$ = CO₂ emission coefficient of fuel i in tCO₂/TJ.
 $GEN_{j,y}$ = Electricity in MWh delivered to the grid by the j source.
m = Refers to the power units included in the build margin.

Once determined these coefficients, the emission factor can be calculated using the formula:

$$EF_{grid,CM,y} = w_{OM} \times EF_{OM,y} + w_{BM} \times EF_{BM,y}$$

The values used for w_{OM} and w_{BM} are indicated by the methodology for wind farm projects.

The emission factor for the grid is finally calculated and there is no need to update it during the project crediting period. The grid emission factor value obtained was 0.5805 tCO₂/MWh.

To conclude this section, using the value mentioned before it is possible to calculate the baseline emissions in one year.

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

Where:

- BE_y = Baseline emissions in year y (tCO₂)
 $EG_{facility,y}$ = Net electricity generated and delivered to the grid as a result of the implementation of the CDM project activity in year y (MWh).
 $EF_{grid,CM,y}$ = Emission factor for the grid (tCO₂/MWh)

Emission Reductions Oaxaca III Wind Energy Project			
PERIOD	EG _{facility,y}	Receipt of Sales	Minimum Value
September-17	753	753	753
October-17	29,758	29,758	29,758
November-17	35,396	35,396	35,396
December-17	50,858	50,858	50,858
January-18	42,982	42,982	42,982
February-18	29,809	29,809	29,809
March-18	27,968	27,968	27,968
April-18	26,223	26,223	26,223
May-18	13,894	13,894	13,894
June-18	7,159	7,159	7,159
July-18	38,969	38,969	38,969
August-18	31,509	31,509	31,509
September-18	20,041	20,041	20,041
October-18	27,359	27,359	27,359
November-18	30,023	30,023	30,023
December-18	38,515	38,515	38,515
January-19	49,765	49,765	49,765
February-19	20,435	20,435	20,435
March-19	37,555	37,555	37,555
April-19	21,103	21,103	21,103
May-19	6,346	6,347	6,346
June-19	12,027	12,027	12,027
July-19	29,850	29,850	29,850
August-19	12,867	12,867	12,867
September-19	18,280	18,280	18,280
October-19	16,093	16,093	16,093
November-19	38,875	38,875	38,875
TOTAL			714,411
EG _{facility,y}	714,411	MWh	
EF _{grid,CM,y}	0.5805	tCO ₂ /MWh	
Baseline emissions	414,715	tCO ₂	
Reductions from 31/12/2012		tCO ₂	
Reductions from 1/1/2013	414,715	tCO ₂	

$$BE_y = (714,411 \text{ MWh}) \times (0.5805 \text{ tCO}_2/\text{MWh}) = 414,715 \text{ tCO}_2$$

E.2. Calculation of project emissions or actual net removals

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Oaxaca III Wind Energy Project is a renewable source of electricity generation and doesn't involve the use of fossil fuel for the energy production. Consequently, there are not emissions related to the activity of the project.

$$PE_y = 0 \text{ tCO}_2e$$

E.3. Calculation of leakage emissions

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For this kind of projects, the main emissions potentially giving rise to leakage are emissions due to activities such power plant construction and upstream emissions from fossil fuel (e.g. extraction, processing, and transportation). As a result these emissions sources are neglected and a zero emission leakage is considered for the project.

$$LE_y = 0 \text{ tCO}_2e$$

E.4. Calculation of emission reductions or net anthropogenic removals

Using the values obtained before, the total amount of reduced emissions is calculated as follows:

$$ER_y = BE_y$$

Where:

ER_y = Reduced emissions in year y (tCO₂e)

BE_y = Baseline emissions in year y (tCO₂)

	Baseline GHG emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)		
				Before 01/01/2013	From 01/01/2013	Total amount
Total	414,715	0	0	0	414,715	414,715

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the PDD (t CO ₂ e)
414,715	521,281

E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”

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The amount estimated ex ante for this monitoring period in the PDD is calculated regarding the total days of the period, in this case 821 days. The total estimated reduction in the PDD per annum is 231,751 tCO₂e. This number is divided by 365 days in order to have the estimated reduction per day. By multiplying the result of the operation above by the days of the period, we get the amount estimated ex ante for this monitoring period, which is 521,281 tCO₂e.

E.6. Remarks on increase in achieved emission reductions

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The actual emission reductions achieved during the current monitoring period is below the total estimated in the registered PDD. The main reasons from the variations are directly to the wind conditions during the monitoring period that reduces the electricity generation. The emission reductions of this monitoring period are 20.44% lower than the emission reductions that appear in the registered PDD.

E.7. Remarks on scale of small-scale project activity

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N/A

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, 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).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		