



**Monitoring report form for CDM programme of activities
(Version 05.0)**

MONITORING REPORT			
Title of the PoA	Omega Wind Power Plants Programme of Activities		
UNFCCC reference number of the PoA	7156		
Version numbers of the PoA-DD applicable to this monitoring report	4		
Version number of this monitoring report	3.2		
Completion date of this monitoring report	15/01/2022		
Monitoring period number	First monitoring period		
Duration of this monitoring period	01/01/2016 – 31/12/2020		
Monitoring report number for this monitoring period	1.0		
Coordinating/managing entity	Omega Energia Renovável S.A.		
Host Parties	Host Party of the PoA	Is this the host Party of a CPA covered in this monitoring report? (yes/no)	
	Brazil	yes	
Applied methodologies and standardized baselines	ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources (version 12.3.0).		
Sectoral scopes	Scope 1 – energy industries (renewable / non-renewable sources)		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by all CPAs covered in this monitoring report in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0	1,386,386 tCO ₂	0
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the CPA-DDs for the CPAs covered in this monitoring report	1,917,737 tCO ₂		

PART I Monitoring of programme of activities (PoA)

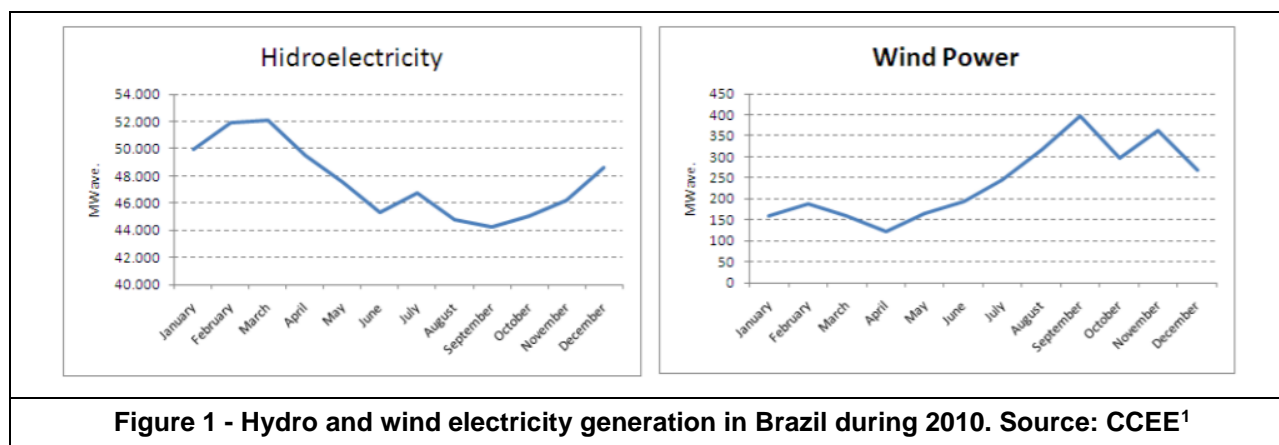
SECTION A. Description of PoA

A.1. General description of PoA

The primary objective of Omega Wind Power Plants Programme Activities is to help meet Brazil's rising demand for energy due to economic growth and to improve the supply of electricity, while contributing to environmental, social and economic sustainability by increasing the share of renewable energy consumption for Brazil (and for the region of Latin America and the Caribbean).

This Programme of Activities is a voluntary coordinated action by the managing entity Omega Energia Renovável S.A., consisting of the implementation of renewable energy projects in Brazil. The hub of this PoA is the construction of Wind Power Plants (from the Portuguese Centrais Geradoras Eólicas - CGEs) connected to the Brazilian Interconnected System (from the Portuguese Sistema Interligado Nacional – SIN).

This cleaner source of electricity provides an important contribution to environmental sustainability by reducing carbon dioxide emissions that otherwise would have occurred in the absence of the project. The project activity reduces emissions of greenhouse gas (GHG) by avoiding electricity generation by fossil fuel sources (and CO₂ emissions), which would have been generated (and emitted) in the absence of the project.



Taking into account the different sources of electricity generation in Brazil during 2010, it can be noted that the electricity generated by the operational wind power plants is significantly complementary to that of hydroelectricity. Therefore, despite the size of the Brazilian electric system, based mostly on hydro power plants, this PoA does have a relevant positive impact given electricity generated by wind power is complementary to that generated by hydropower plants.

¹ CCEE – Câmara de Comercialização de Energia Elétrica. Relatório de Informações ao Público. URL : http://www.ccee.org.br/StaticFile/Arquivo/biblioteca_virtual/Relatorios_Publico/Anual/Relatorio_anual_2010_REV1.pdf (accessed on 18th July, 2011).

The project contributes to sustainable development since it meets the present needs without compromising the ability of future generations to meet their own needs, as defined by the Brundtland Commission (1987). The Commission was created in order to address the concerns regarding the accelerated deterioration of the human environment and natural resources and their impacts on economic and social development. In other words, the implementation of wind power plants ensures renewable energy generation, complements hydroelectricity generation, avoids negative social and environmental impact caused by the construction and operation of new fossil fuel thermo power plants, and drives regional economies, increasing quality of life in local communities.

A.1.1. Corresponding generic component project activities (CPAs)

Title and reference number of the corresponding generic CPA	Version of the PoA-DD	Sectoral scopes	Applied methodologies and standardized baselines ²
Title: “[PLANT NAME] Wind Power Plant CPA”	PoA-DD v. 4.0, 10/04/2012	1: Energy industries (renewable - / non-renewable sources)	<ul style="list-style-type: none"> • ACM0002: Grid-connected electricity generation from renewable sources, (v. 12.3.0) • TOOL07 - Tool to calculate the emission factor for an electricity system (v.2.2.1); • TOOL01 - Tool for the demonstration and assessment of additionality (v.6.0.0); • TOOL02 - Combined tool to identify the baseline scenario and demonstrate additionality (v.3.0.1); • TOOL03 - Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (v.2)

A.1.2. CPAs included in the PoA

Title and UNFCCC reference number of the CPA	Version of the PoA-DD	Title and reference number of the corresponding generic CPA	Crediting period type and duration	Covered in this monitoring report? (yes/no)

² Registered CDM-PoA-DD (URL: <https://bit.ly/3me3UGy>, access on 17-Dec-21) and UNFCCC CDM website (URL: <https://cdm.unfccc.int/methodologies/PAmethodologies/approved>, access on 17-Dec-21)

Delta 3 Wind Power Plant CPA - 7156-P1-0002-CP1	Version 4.0	"[PLANT NAME] Wind Power Plant CPA"	Renewable 01/06/2017 – 31/05/2024	Yes
Muritiba Wind Power Plant CPA - 7156-P1-0001-CP1	Version 4.0	"[PLANT NAME] Wind Power Plant CPA"	Renewable 01/01/2016 – 31/12/2022	No

A.2. Coordinating/managing entity

Omega Energia Renovável S.A.

SECTION B. Implementation of PoA

B.1. Description of implemented PoA

The "Coordinating and Managing Entity" (CME) of this PoA is "Omega Energia Renovável S.A." The CME will be responsible for all the CDM related matters. However, the CME has commissioned Ecopart Assessoria em Negócios Empresariais Ltda. (a CDM Consultancy also listed as Project Participant of the proposed PoA) to assist the CME in the development, validation, approval, and verification of CPAs related to the proposed PoA. The CPA implementer (project developer) is responsible for the technical aspects of the power plant and its operation (construction, operation, maintenance and monitoring).

The descriptions of the operational and management arrangements established by the CME are detailed below:

(i) A record keeping system for each CPA under the PoA

The CME has commissioned Ecopart Assessoria em Negócios Empresariais (hereinafter referred to as Ecopart) to implement a record keeping system for the inclusion of CPAs in the proposed PoA, which considers the following information: (a) inclusion date in the PoA, (b) name of the CPA, (c) CDM reference number, (d) name of the project activities involved in the CPA, (e) crediting period (starting and ending dates), (f) name of the plant, (g) location (municipality, state and GPS coordinates), (h) technical description of the project, and (i) Reference to ANEEL Ordinances issued in favour of the plant.

This record keeping system will be updated by Ecopart every time a CPA is included in the proposed PoA. It is important to mention that during the process of CPA inclusion, improvements in the PoA management system can be proposed.

(ii) A system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA

Besides the record keeping system presented in item (i) above, for the inclusion of CPAs in the proposed PoA, the CME has also commissioned Ecopart to implement a database to avoid

double accounting at the time of the inclusion of a new CPA. This database considers the information presented at the UNFCCC's website regarding Brazilian registered CDM Programme Activities as well as Brazilian CDM Project Activities, Since only wind power plants will be included in the proposed PoA, only Brazilian registered CDM projects from scope 1 – energy industries (renewable / non-renewable sources) and which apply ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” and AMS-I.D “Grid connected renewable electricity generation” are considered.

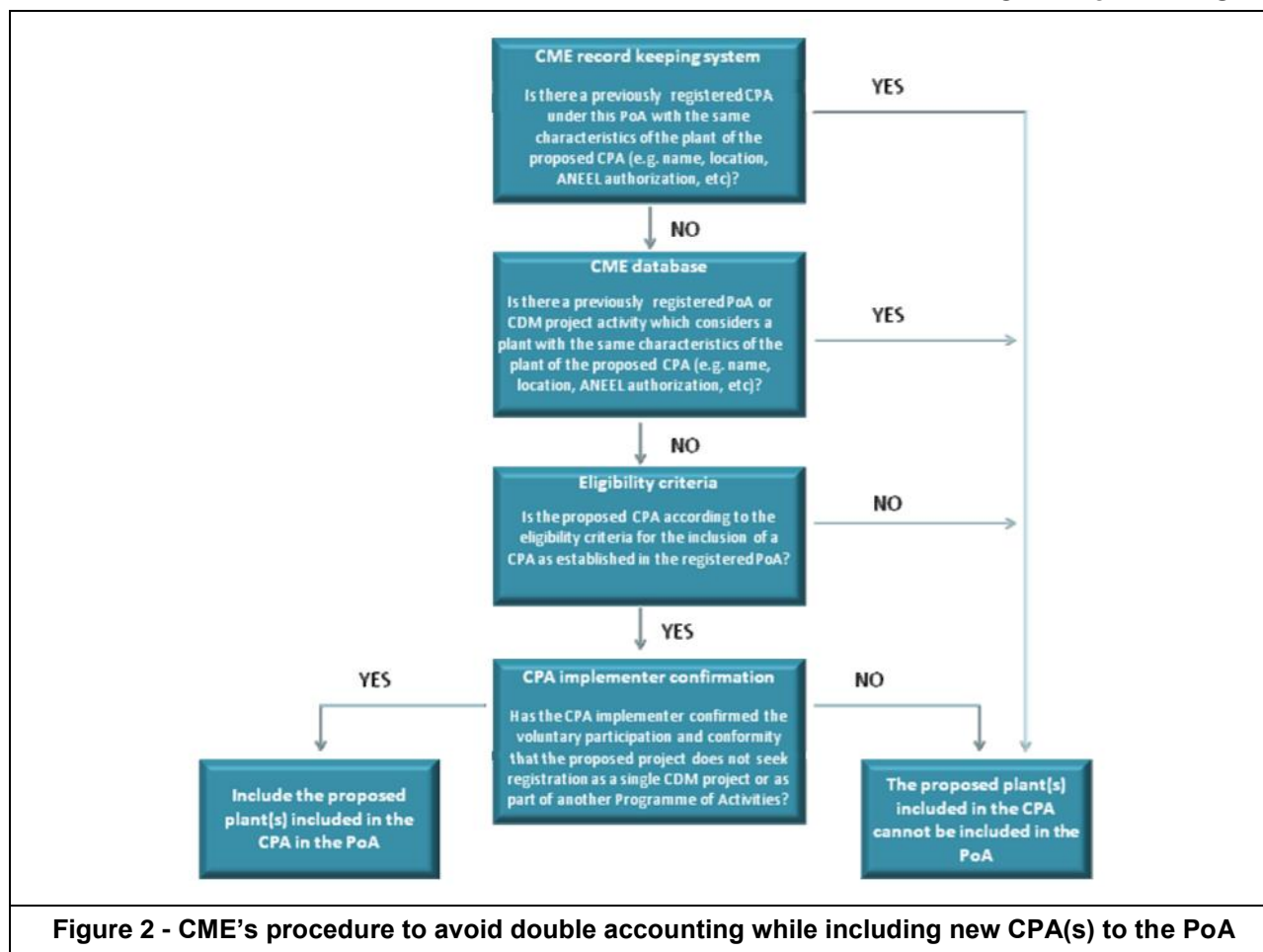
The CME's database presented will be updated by the CME every time a new CPA is submitted for analysis of its inclusion in the PoA according to the information available at the UNFCCC's website. It is important to mention that during this update, improvements in the PoA management system can be proposed.

At the time of the receipt of a proposal to include a CPA under this PoA, the CME will proceed as described below:

- (a) The CME will provide Ecopart with the technical documentation of the proposed project activity being considered as an eligible CPA to be included in the PoA;
- (b) Ecopart will check if the proposed project activity is already registered as a CPA under this PoA by analyzing its own record keeping system of registered CPAs;
- (c) Ecopart will check if the proposed project is already registered under CDM by analyzing the database of registered CDM Project Activities and CDM Programme of Activities in Brazil;
- (d) The CME, assisted by Ecopart, will check if the proposed project is in accordance with the eligibility criteria for the inclusion of a CPA in the PoA as established in PoA's section A.4.2.2;
- (e) The CME will establish a relationship with the CPA implementer (through a letter of intent or contract);
- (f) The CME will request the signature of the CPA implementer for two declarations:
 - Declaration of voluntary participation: confirmation of awareness and agreement with the implied conditions and responsibilities related to this PoA;
 - Declaration of conformity: confirmation that the proposed project does not seek registration as a single CDM project or as part of another Programme of Activities.

Therefore, it is the CME's responsibility to ensure that no double accounting will occur together with confirmation from the CPA implementers. The system/procedure presented above will be conducted by competent personnel and will be peer-reviewed.

The CME's procedure for the inclusion of new CPAs in this PoA is summarized in Figure 2.



In summary, whenever a new CPA is identified, the information recorded in the CME's recording keeping system regarding its own projects and CME's database related to registered CDM Project Activities and CDM Programme Activities will be consulted. Thus, information of the wind power plant considered in the new CPA must be compared against the CPAs already added to this proposed PoA and already registered CDM Project Activities and CDM Programme of Activities. If it is confirmed that there are no other project(s) previously added to this PoA or registered under CDM similar to the proposed project(s), the CME will proceed following items (c), (d) and (e) described above. The new CPA shall be included only after pass in the system/procedure presented above.

The system/procedure presented above will ensure that all project(s) included in the CPAs considered in this PoA will be uniquely defined, thereby avoiding double counting of the emission reductions in this PoA.

(iii) The provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA

To ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the proposed PoA, the CPA operator/implementer has to sign a declaration of voluntary participation, stating that it has agreed with the implied conditions and responsibilities.

Additionally:

- No sampling approach was applied for monitoring of Delta III WPP CPA.
- Installed technologies, technical processes and equipment for the Delta III WPP CPA are described in section C.1.

All CPAs included in this PoA comprehend renewable electricity generated by the installation of wind power plants but only Delta III WPP CPA is currently implemented.

B.2. Post-registration changes to PoA

B.2.1. Corrections

Not applicable.

B.2.2. Inclusion of monitoring plan

Not applicable.

B.2.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

Not applicable.

B.2.4. Changes to programme design

Not applicable.

B.2.5. Changes specific to afforestation or reforestation activities

Not applicable.

PART II Monitoring of CPAs

SECTION C. Implementation of CPA

By the time of preparation of the first version of the monitoring report (October 2021), two CPAs are included in the PoA (Figure 3).

Your location: Home > Project Search 20:37 04 Oct 21

PoA 7156 : Omega Wind Power Plants Programme of Activities

[<< view PoA](#)

CDM programme activities (CPAs) Displaying 1-2 of 2

Ref	Title	Inclusion date	Crediting start date	Crediting end date	Host Party	Exclusion date
7156-P1-0002-CP1	Delta 3 Wind Power Plant CPA	19 Apr 17	01 Jun 17	31 May 24	Brazil	
7156-P1-0001-CP1	Muritiba Wind Power Plant CPA	31 Aug 12	01 Jan 16	31 Dec 22	Brazil	

Figure 3 – CPAs included in PoA 7156

C.1. Description of implemented CPA

Because the first included CPA (Muritiba Wind Power Plant) is not implemented, this monitoring report covers only the operation of the second included CPA (Delta 3 Wind Power Plant).

The project sponsor of each CPA will proceed with the necessary monitoring measures as established in the procedures from ONS; ANEEL and CCEE. All data collected as part of the monitoring will be archived electronically and kept for 2 years after the end of the last crediting period.

ONS is the entity responsible for coordinating and controlling the operation of generation and transmission facilities in the Brazilian Interconnected System (SIN) under supervision and regulation of ANEEL which is the regulatory agency providing favourable conditions for the electric power market to develop a balance between the agents and the benefit of society. CCEE is a not-for-profit, private, civil organization company that is in charge of carrying out the wholesale transactions and commercialization of electric power within the SIN, for both Regulated and Free Contracting Environments and for the spot market³.

The total electricity exported to the grid will be monitored following the procedures and requirements established by ONS which defines the technical characteristics and precision class (0.2% of maximum permissible error) of the electricity meters to be used. In addition, ONS sub-module 2.14⁴ also determined class D energy meters (0.2% accuracy class) and ONS sub-module 6.16⁵ establishes five years as the periodicity for electricity meter calibrations.

Electricity generated by each wind power plant will be measured by two energy meters (principal and backup) located at the respective substation, as specified by CCEE. Before operation start-up, CCEE demands that these meters are individually registered within their system and calibrated by an entity accredited by the Brazilian Calibration Network (from the Portuguese Rede Brasileira de Calibração - RBC) credential. Further, energy information will be controlled in real time by CCEE. Once the measurement points are physically defined and the invoice

³ URL: <https://www.ccee.org.br/web/guest/ccee>

⁴ ONS. Grid Procedures – Module 2: Criteria and requirements/Submodule 2.14 Minimum requirements for metering and billing system (from the Portuguese Módulo 2: Critérios e requisitos / Submódulo 2.14: Requisitos mínimos para o Sistema de Medição para Faturamento).

⁵ ONS. Grid Procedures – Module 6: Operation Assessment/Submodule 6.16 Installation of the measurement for billing (from the Portuguese Módulo 6: avaliação da operação / Submódulo 6.16: Manutenção do Sistema de Medição para Faturamento).

measurement system and the communication infrastructure are installed, the measurement points will be registered in the SCDE (System of Energy Data collection) managed by CCEE.

As mentioned before, CCEE makes feasible and regulates the electricity energy commercialization in Brazil. In a process called Accounting Commensuration Aggregation (from the Portuguese, *Agregação Contábil da Medição*) CCEE compares the energy generation reported by every seller connected to the national grid with the consumption registered during the month under consideration. After the adjustments due to energy losses occurring in the transmission system are made, CCEE issues several official reports certifying the amount of energy generated by each seller.

Moreover, to confirm CCEE’s information, every month the company auditing CCEE’s reports randomly selects a sample of sellers that have to provide detailed information of their Power Purchase Agreement(s) and energy generation during the month being analyzed. Then the auditors analyse the information, check whether CCEE’s calculation is correct and issue an opinion. The independent auditors’ statements confirming CCEE’s information are available at CCEE’s website.

The final results of electricity generation are published at CCEE’s website and are publicly available. Hence, CCEE’s information - which is an official and publicly available source – is going to be used to cross-check information monitored by the project participant.

The company that owns the wind farm will be responsible for data collection and archiving as well as the calibration and maintenance of the monitoring equipment, for dealing with possible monitoring data adjustments and uncertainties, reviewing of reported results/data, internal auditing of GHG project compliance with operational requirements and corrective actions. Additionally, it is responsible for the project management, and for organising and training of the staff in the appropriate monitoring, measurement and reporting techniques.

It is important to mention that ANEEL can visit the plant to inspect the operation and maintenance of the facilities at any time.

The proposed CPA includes project activities that use wind turbines, a device which extracts kinetic energy from the wind⁶ to convert to mechanical useful energy⁷. According to WWEA (2011), wind turbines that generate electricity and feed it directly to the grid usually have two or three rotor blades, a horizontal axis, a nacelle with a rotor hub, gears, and a generator, all of which can be turned into and out of the wind. The rotor is positioned in front of the tower in the direction the wind is blowing (windward as opposed to leeward).

The Delta 3 Wind Power Plant CPA consists of the implementation of 8 (eight) wind power sites, named at the time of CPA inclusion as, Ventos Maranhenses 01, Ventos Maranhenses 02, Ventos Maranhenses 03, Ventos Maranhenses 04, Ventos Maranhenses 05, Ventos do Norte 13, Ventos do Norte 15 and Ventos do Norte 18, with 27.60 MW installed capacity each, totalling 220.80 MW installed capacity. There will be 96 turbines at the plant all manufactured by GE. The technical characteristics of this model of turbine are described in Table 1 below.

Table 1 – Project’s equipment technical description

TURBINES	
Model	GE116 / 80

⁶ BURTON, T.; SHARPE, D.; JENKINS, N.; BOSSANYI, E. Wind Energy Handbook, Wiley: 2001.

⁷ SØRENSEN, B. Renewable Energy. Academic Press, 2004 - 3rd edition.

Nominal Power (MW)	2.3
--------------------	-----

The whole CPA became operational in November 2017 and is located in the municipalities of Barreirinhas and Paulino Neves, State of Maranhão, Northeast of Brazil.

During implementation of the CPA, the sites changed their names (Table 2).

Table 2 - Change of Wind Power Plant names

At the time of CPA inclusion	Today	Operation start
Ventos Maranhenses 01	EOL Delta 3 I	Sep 2017
Ventos Maranhenses 02	EOL Delta 3 II	Jul 2017
Ventos Maranhenses 03	EOL Delta 3 III	Sep 2017
Ventos Maranhenses 04	EOL Delta 3 IV	Sep 2017
Ventos do Norte 15	EOL Delta 3 V	Jul 2017
Ventos do Norte 13	EOL Delta 3 VI	Jul 2017
Ventos do Norte 18	EOL Delta 3 VII	Jul 2017
Ventos Maranhenses 05	EOL Delta 3 VIII	Nov 2017

The project reduces emissions of greenhouse gases (GHG), i.e. CO₂, by displacing electricity generation from the mix of fossil fuel sources connected to the Brazilian Interconnected Grid, which would be generated (and emitted) in its absence.

C.2. Location of CPA

As describe in section C.1, all project sites are located in Brazil (host Party), State of Maranhão, cities of Barreirinhas and Paulino Neves (no specific street address and number, see geographin coordinates in Figure 4 for unique identification of each wind power plant of the CPA)

Figure 4 shows the the geographic coordinates of the 8 project sites.


	Wind Power Plant	Geographic Coordinates	
		Latitude (South)	Longitude (West)
	Ventos Maranhenses 01	2° 39' 10.144"	42° 39' 39.001"
	Ventos Maranhenses 02	2° 38' 2.588"	42° 40' 32.230"
	Ventos Maranhenses 03	2° 38' 9.050"	42° 40' 7.301"
	Ventos Maranhenses 04	2° 37' 27.413"	42° 40' 51.484"
	Ventos Maranhenses 05	2° 37' 20.899"	42° 39' 56.453"
	Ventos do Norte 13	2° 39' 46.075"	42° 39' 24.275"
	Ventos do Norte 15	2° 39' 28.877"	42° 39' 33.044"
	Ventos do Norte 18	2° 38' 37.387"	42° 39' 11.816"

Figure 4 - Location of the Project Activity - Delta 3 Wind Power Plant

C.3. Post-registration changes to CPAs

Not applicable.

C.3.1. Temporary deviations from the monitoring plans in the included CPA-DDs, applied methodologies, standardized baselines or other methodological regulatory documents

Not applicable.

C.3.2. Corrections

Not applicable.

C.3.3. Changes to the start date of the crediting period

Not applicable.

C.3.4. Inclusion of monitoring plan

Not applicable.

C.3.5. Permanent changes to the included monitoring plans, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

Not applicable.

C.3.6. Changes to project design

Not applicable.

C.3.7. Changes specific to afforestation or reforestation CPA

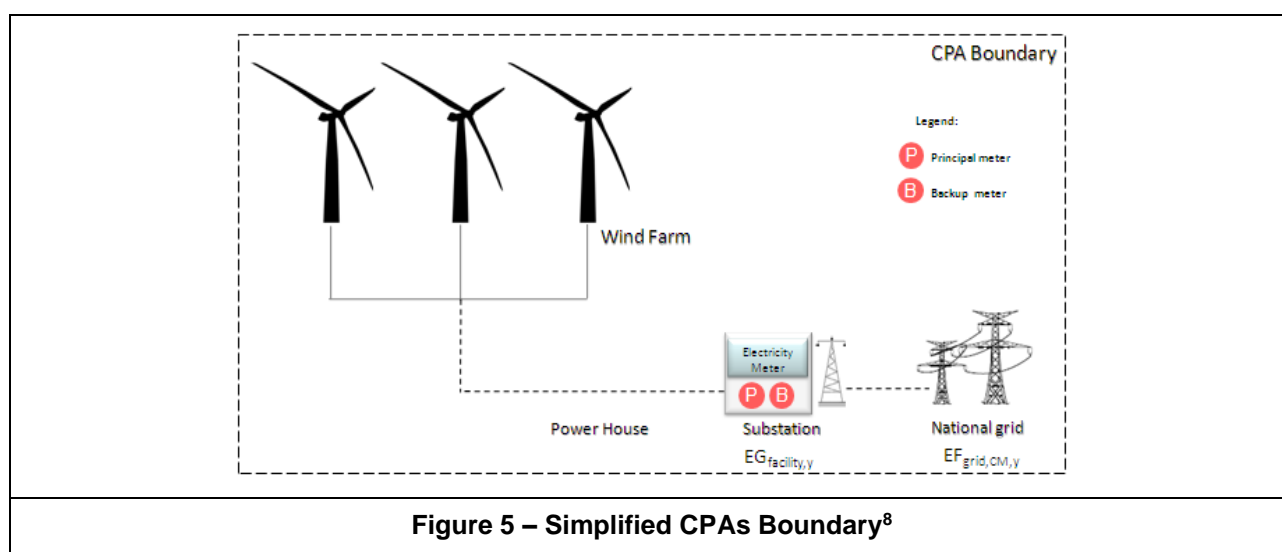
Not applicable.

SECTION D. Description of monitoring system of CPAs

The monitoring plan was implemented per CPA, following the description provided in the registered PoA-DD.

The monitoring plan defines that the project implementer of each CPA should periodically submit the monitoring data to the CME.

The verification was carried out by the CME in conformity registered PoA documents and covering the operation of the single operating CPA (Delta 3 Wind Power Plant).



⁸ Line diagram supplied to the DOE as separate files during the verification process.

As described in the registered PoA-DD and CPA-DD, the monitoring of electricity generation by wind power plants follows the procedures established by the National Electric System Operator (from the Portuguese Operador Nacional do Sistema Elétrico – ONS), ANEEL and CCEE.

Each wind power plant is individually identified in the system of those entities. This procedure ensures that no double accounting occurs and that the status of verification can be determined anytime for the CPA.

Once the monitoring data will be crosschecked with publicly available consolidated information from CCEE, no double counting is possible.

Also, since no sampling methods are used and the registered CPAs is individually monitored, the status of verification can be determined anytime.

SECTION E. Data and parameters

E.1. Data and parameters fixed ex ante

Not applicable.

E.2. Data and parameters monitored

Data/Parameter	<i>EG_{facility,y}</i>
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year <i>y</i>
Measured/calculated/default	Measured
Source of data	Project Activity
Value(s) of monitored parameter	Large amount of data, please refer to the CERs calculation spreadsheets.

			serial #	type	acc. class	cal. frequency	last calibration*		
Monitoring equipment	Delta 3 I	circ 1	main	MW-1607A906-02	Schneider ION8650	0.2	5-year	24-Aug-16	
			backup	MW-1607A973-02	Schneider ION8650	0.2	5-year	24-Aug-16	
	Delta 3 I	circ 2	main	MW-1607A866-02	Schneider ION8650	0.2	5-year	24-Aug-16	
			backup	MW-1607A971-02	Schneider ION8650	0.2	5-year	24-Aug-16	
	Delta 3 II	circ 1	main	MW-1607A888-02	Schneider ION8650	0.2	5-year	24-Aug-16	
			backup	MW-1606A904-02	Schneider ION8650	0.2	5-year	5-Aug-16	
		Delta 3 II	circ 2	main	MW-1607A985-02	Schneider ION8650	0.2	5-year	24-Aug-16
				backup	MW-1307A978-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 III	circ 1	main	MW-1607A908-02	Schneider ION8650	0.2	5-year	24-Aug-16	
			backup	MW-1606A831-02	Schneider ION8650	0.2	5-year	5-Aug-16	
		Delta 3 III	circ 2	main	MW-1607A803-02	Schneider ION8650	0.2	5-year	24-Aug-16
				backup	MW-1606A986-02	Schneider ION8650	0.2	5-year	5-Aug-16
	Delta 3 IV	circ 1	main	MW-1606A894-02	Schneider ION8650	0.2	5-year	5-Aug-16	
			backup	MW-1607A995-02	Schneider ION8650	0.2	5-year	24-Aug-16	
		Delta 3 IV	circ 2	main	MW-1606A886-02	Schneider ION8650	0.2	5-year	5-Aug-16
				backup	MW-1707A907-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 V	circ 1	main	MW-1607A905-02	Schneider ION8650	0.2	5-year	24-Aug-16	
			backup	MW-1606A707-02	Schneider ION8650	0.2	5-year	5-Aug-16	
		Delta 3 V	circ 2	main	MW-1607A987-02	Schneider ION8650	0.2	5-year	24-Aug-16
				backup	MW-1607A992-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 VI	circ 1	main	MW-1606A903-02	Schneider ION8650	0.2	5-year	5-Aug-16	
			backup	MW-1607A807-02	Schneider ION8650	0.2	5-year	24-Aug-16	
		Delta 3 VI	circ 2	main	MW-1607A903-02	Schneider ION8650	0.2	5-year	24-Aug-16
				backup	MW-1606A910-02	Schneider ION8650	0.2	5-year	5-Aug-16
	Delta 3 VII	circ 1	main	MW-1606A985-02	Schneider ION8650	0.2	5-year	5-Aug-16	
			backup	MW-1606A902-02	Schneider ION8650	0.2	5-year	5-Aug-16	
		Delta 3 VII	circ 2	main	MW-1606A975-02	Schneider ION8650	0.2	5-year	5-Aug-16
				backup	MW-1606A994-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 VIII	circ 1	main	MW-1606A828-02	Schneider ION8650	0.2	5-year	5-Aug-16	
			backup	MW-1606B066-02	Schneider ION8650	0.2	5-year	5-Aug-16	
		Delta 3 VIII	circ 2	main	MW-1607A899-02	Schneider ION8650	0.2	5-year	24-Aug-16
				backup	MW-1607A989-02	Schneider ION8650	0.2	5-year	24-Aug-16
	SE Miranda		main	MW-1606A834-02	Schneider ION8650	0.2	5-year	4-Aug-16	
			backup	MJ-1601A650-05	Schneider ION8650	0.2	5-year	22-Mar-16	
	* calibration report approval date								
	Measuring/reading/recording frequency	Continuously monitored, hourly and monthly reported (separated for each plant).							
	Calculation method (if applicable)	-							

<p>QA/QC procedures</p>	<p>Energy metering QA/QC procedures are explained in the registered PoA-DD, section E.7.2 and, summarized in the next paragraphs.</p> <p>Measurements of the electricity generated and provided to the grid will be electronically monitored and remotely acquired by CCEE using on-site metering equipment.</p> <p>Generation activities continuously monitor the electricity supplied to the grid ($EG_{facility}$) by following up and automatically storing at CCEE servers from the (main and backup) metering devices.</p> <p>Data is collected by the System of Energy Data Collection (Sistema de Coleta de Dados de Energia – SCDE) of CCEE, remotely and automatically through remote access to the meters at the project site. The collected is processed at SCDE for electricity accounting by CCEE and are available to all energy market participants and, therefore, is the official data source.</p> <p>The eight wind power plants have two transmission circuits (1 and 2), each with two meters (main and backup), total of 34 meters for the CPA, all remotely accessed by CCEE.</p> <p>Regarding the class of accuracy of energy meters, they will meet all relevant metrological requirements prescribed in Metrological Technical Regulation for Class 0.2 of energy meters, approved by INMETRO.</p> <p>Calibration of energy meters is regulated by ONS and shall be conducted by a qualified organization in compliance with national standards and industrial regulations to ensure accuracy. ONS Grid Procedures (Sub-module 12.3) establishes calibration frequency and other maintenance procedures.</p> <p>Hourly net electricity generation supplied by the project to the grid (metered by the PPs, downloaded from SCDE, not publicly available) will be counterchecked with the publicly available monthly electricity (also available at CCEE). Minor differences (due to rounding) between both may exist, in such case, the smallest figure is used.</p>
<p>Purpose of data/parameter</p>	<p>Baseline emissions.</p>
<p>Additional comments</p>	<p>Since Delta 3 Wind Power Plant consists of greenfield wind power plants, this parameter corresponds to $EG_{P,J,y}$ used to determine baseline emissions.</p>

<p>Data/Parameter</p>	<p>$EG_{P,J,h}$</p>
<p>Unit</p>	<p>MWh</p>
<p>Description</p>	<p>Electricity displaced by the project activity in hour h of the year y</p>

Measured/calculated/default	Measured							
Source of data	Project Activity							
Value(s) of monitored parameter	Large amount of data, please refer to the CERs calculation spreadsheets.							
Monitoring equipment			serial #	type	acc. class	cal. frequency	last calibration*	
	Delta 3 I	circ 1	main	MW-1607A906-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1607A973-02	Schneider ION8650	0.2	5-year	24-Aug-16
		circ 2	main	MW-1607A866-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1607A971-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 II	circ 1	main	MW-1607A888-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1606A904-02	Schneider ION8650	0.2	5-year	5-Aug-16
		circ 2	main	MW-1607A985-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1307A978-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 III	circ 1	main	MW-1607A908-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1606A831-02	Schneider ION8650	0.2	5-year	5-Aug-16
		circ 2	main	MW-1607A803-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1606A986-02	Schneider ION8650	0.2	5-year	5-Aug-16
	Delta 3 IV	circ 1	main	MW-1606A894-02	Schneider ION8650	0.2	5-year	5-Aug-16
			backup	MW-1607A995-02	Schneider ION8650	0.2	5-year	24-Aug-16
		circ 2	main	MW-1606A886-02	Schneider ION8650	0.2	5-year	5-Aug-16
			backup	MW-1707A907-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 V	circ 1	main	MW-1607A905-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1606A707-02	Schneider ION8650	0.2	5-year	5-Aug-16
		circ 2	main	MW-1607A987-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1607A992-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 VI	circ 1	main	MW-1606A903-02	Schneider ION8650	0.2	5-year	5-Aug-16
			backup	MW-1607A807-02	Schneider ION8650	0.2	5-year	24-Aug-16
		circ 2	main	MW-1607A903-02	Schneider ION8650	0.2	5-year	24-Aug-16
			backup	MW-1606A910-02	Schneider ION8650	0.2	5-year	5-Aug-16
	Delta 3 VII	circ 1	main	MW-1606A985-02	Schneider ION8650	0.2	5-year	5-Aug-16
			backup	MW-1606A902-02	Schneider ION8650	0.2	5-year	5-Aug-16
		circ 2	main	MW-1606A975-02	Schneider ION8650	0.2	5-year	5-Aug-16
			backup	MW-1606A994-02	Schneider ION8650	0.2	5-year	24-Aug-16
	Delta 3 VIII	circ 1	main	MW-1606A828-02	Schneider ION8650	0.2	5-year	5-Aug-16
			backup	MW-1606B066-02	Schneider ION8650	0.2	5-year	5-Aug-16
		circ 2	main	MW-1607A899-02	Schneider ION8650	0.2	5-year	24-Aug-16
backup			MW-1607A989-02	Schneider ION8650	0.2	5-year	24-Aug-16	
SE Miranda		main	MW-1606A834-02	Schneider ION8650	0.2	5-year	4-Aug-16	
		backup	MJ-1601A650-05	Schneider ION8650	0.2	5-year	22-Mar-16	
* calibration report approval date								
Measuring/reading/recording frequency	Continuously monitored, hourly and monthly reported (separated for each plant).							
Calculation method (if applicable)	-							

QA/QC procedures	<p>Energy metering QA/QC procedures are explained in the registered PoA-DD, section E.7.2 and, summarized in the next paragraphs.</p> <p>Measurements of the electricity generated and provided to the grid will be electronically monitored and remotely acquired by CCEE using on-site metering equipment.</p> <p>Generation activities continuously monitor the electricity supplied to the grid ($EG_{facility}$) by following up and automatically storing at CCEE servers from the (main and backup) metering devices.</p> <p>Data is collected by the System of Energy Data Collection (Sistema de Coleta de Dados de Energia – SCDE) of CCEE, remotely and automatically through remote access to the meters at the project site. The collected is processed at SCDE for electricity accounting by CCEE and are available to all energy market participants and, therefore, is the official data source.</p> <p>The eight wind power plants have two transmission circuits (1 and 2), each with two meters (main and backup), total of 34 meters for the CPA, all remotely accessed by CCEE.</p> <p>Regarding the class of accuracy of energy meters, they will meet all relevant metrological requirements prescribed in Metrological Technical Regulation for Class 0.2 of energy meters, approved by INMETRO.</p> <p>Calibration of energy meters is regulated by ONS and shall be conducted by a qualified organization in compliance with national standards and industrial regulations to ensure accuracy. ONS Grid Procedures (Sub-module 12.3) establishes calibration frequency and other maintenance procedures.</p> <p>Hourly net electricity generation supplied by the project to the grid (metered by the PPs, downloaded from SCDE, not publicly available) will be counterchecked with the publicly available monthly electricity (also available at CCEE). Minor differences (due to rounding) between both may exist, in such case, the smallest figure is used.</p>
Purpose of data/parameter	Baseline emissions.
Additional comments	-

Data/Parameter	$EF_{EL,DD,h}$
Unit	tCO ₂ /MWh
Description	CO ₂ emission factor for power units in the top of the dispatch order in hour h in year y

Measured/calculated/default	Calculated
Source of data	Brazilian DNA
Value(s) of monitored parameter	Large amount of data, please refer to the CERs calculation spreadsheet.
Monitoring equipment	-
Measuring/reading/recording frequency	Calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.
Calculation method (if applicable)	-
QA/QC procedures	Official source of information (i.e., Brazilian DNA ⁹) is used.
Purpose of data/parameter	Baseline emissions.
Additional comments	-

Data/Parameter	$EF_{grid,BM,y}$		
Unit	tCO ₂ /MWh		
Description	Build margin CO ₂ emission factor in year y		
Measured/calculated/default	Calculated		
Source of data	Brazilian DNA		
Value(s) of monitored parameter		2017	0.0028
		2018	0.1370
		2019	0.1020
		2020	0.0979
Monitoring equipment	-		
Measuring/reading/recording frequency	Calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.		

⁹ URL: <https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/cgcl/clima/paginas/metodo-da-analise-de-despacho> (accessed on 15/01/2022).

Calculation method (if applicable)	-
QA/QC procedures	Official source of information (i.e., Brazilian DNA ⁹) is used.
Purpose of data/parameter	Baseline emissions.
Additional comments	-

Data/Parameter	$EF_{grid,CM,y}$
Unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.
Measured/calculated/default	Calculated
Source of data	Brazilian DNA
Value(s) of monitored parameter	Large amount of data, please refer to the CERs calculation spreadsheet (data summarized in Table 5, section F.1).
Monitoring equipment	-
Measuring/reading/recording frequency	Calculated annually applying the numbers published by the Brazilian DNA and following the steps provided in the “ <i>Tool to calculate the emission factor for an electricity system</i> ”.
Calculation method (if applicable)	-
QA/QC procedures	Official source of information (i.e., Brazilian DNA ⁹) is used.
Purpose of data/parameter	Baseline emissions.
Additional comments	-

E.3. Implementation of sampling plan

Not applicable.

SECTION F. Calculation of emission reductions or net anthropogenic removals

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

Baseline emissions (BE_y)

Baseline emissions are calculated for each CPA as established by the ACM0002 methodology. From the methodology “Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.”

The calculation of the combined margin CO₂ emission factor for grid connected power generation ($EF_{grid,CM,y}$) follows, as recommended by ACM0002, the procedures established in the methodological tool “Tool to calculate the emission factor for an electricity system”. According to this tool Project Participants shall apply six steps in order to calculate the baseline emission factor as further detailed below.

• STEP 1 - Identify the relevant electricity system

According to the tool, “If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. If such delineations are not available, project participants should define the project electricity system and any connected electricity system and justify and document their assumptions in the CDM-PDD”.

Brazilian DNA published Resolution #8, issued on 26th May, 2008, defines the Brazilian Interconnected System as a single system that covers all the five macro-geographical regions of the country (North, Northeast, South, Southeast and Midwest). Hence this figure will be used to calculate the baseline emission factor of the grid.

• STEP 2 – Choose whether to include off-grid power plants in the project electricity system (optional).

Option I of the tool is chosen, which is to include only grid power plants in the calculation.

• STEP 3 - Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or
- (d) Average OM.

The Brazilian DNA made available the operating margin emission factor calculated using option (c) Dispatch data analysis OM.

In accordance with the tool, for the dispatch data analysis, the emission factor shall be updated annually, i.e. the ex-post data vintage is chosen.

• STEP 4 - Calculate the operating margin emission factor according to the selected method

The dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$) is determined based on the grid power units that are actually dispatched at the margin during each hour h where the project is displacing grid electricity. It shall be calculated according to the formulae below:

$$EF_{grid,OM-DD,y} = \frac{\sum_h EG_{PJ,h} \times EF_{EL,DD,h}}{EG_{PJ,y}} \quad \text{Equation 1}$$

Where:

- $EF_{grid,OM-DD,y}$ = Dispatch data analysis operating margin CO2 emission factor in year y (tCO2/MWh);
- $EG_{PJ,h}$ = Electricity displaced by the project activity in hour h of the year y (MWh);
- $EF_{EL,DD,h}$ = CO2 emission factor for power units in the top of the dispatch order in hour h in year y (tCO2/MWh);
- $EG_{PJ,y}$ = Total electricity displaced by the project activity in year y (MWh);
- h = Hours in year y in which the project activity is displacing grid electricity;
- y = Year in which the project activity is displacing grid electricity.

Calculation of hourly CO2 emission factor for grid power units ($EF_{EL,DD,h}$)

The Brazilian DNA made available the calculation of the operating margin emission factor based on option (c) dispatch data analysis. Therefore, the project participants used this figure for the proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to calculate the hourly CO2 emission factor nor to the spreadsheet used. Only final values are available for public consultation. Hence, the project participants are not able to describe which method has been used to calculate the hourly emission factor.

Calculation to determine the set of grid power units n in top of the dispatch

The Brazilian DNA made available the calculation of the operating margin emission factor based on option (c) dispatch data analysis. Therefore, the project participants used this figure for proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to determine the set of power units n nor to the spreadsheet used. Only final values for the hourly emission factor ($EF_{EL,DD,h}$) are available for public consultation. Hence, the project participants are not able to describe which method has been used to determine the set of power units n .

The procedure was used to calculate the OM emission factor for each power unit and the results are presented below:

Table 3 – Operating margin emission factor ($EF_{grid,OM,y}$, tCO₂/MWh)

	Delta 3 I	Delta 3 II	Delta 3 III	Delta 3 IV	Delta 3 V	Delta 3 VI	Delta 3 VII	Delta 3 VIII
2017	0.6039	0.6053	0.6040	0.6054	0.6051	0.6052	0.6054	0.6059
2018	0.4908	0.4882	0.4879	0.4960	0.4922	0.4937	0.4941	0.4841
2019	0.5304	0.5298	0.5303	0.5271	0.5280	0.5278	0.5266	0.5322
2020	0.4856	0.4790	0.4836	0.4744	0.4769	0.4772	0.4769	0.4867

• **STEP 5 - Calculate the build margin (BM) emission factor**

The build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \text{Equation 2}$$

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh);
- $EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);
- $EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (tCO₂/MWh);
- m = Power units included in the build margin;
- Y = Most recent historical year for which electricity generation data is available

Calculation to determine the set of power units m included in the build margin

The Brazilian DNA made available the calculation of the build margin emission. Therefore, the project participants used this figure for proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to determine the set of power units m nor to the spreadsheet used. Only final values are available for public consultation. Hence, the project participants are not able to describe which method has been used to determine the set of power units m .

Calculation of the CO₂ emission factor for each power unit m ($EF_{EL,m,y}$)

The Brazilian DNA made available the calculation of the build margin emission. Therefore, the project participants used this figure for proposed project activity.

However, the project participants neither have access to the decisions that the Brazilian DNA took in order to calculate the CO₂ emission factor for each power unit m nor to the spreadsheet

used. Only final values are available for public consultation. Hence, the project participants are not able to describe which method has been used to calculate the CO2 emission factor for each power unit m.

The Brazilian DNA made available the calculation of the build margin emission. Therefore, the project participants used this figure for proposed project activity. The build margin values used are presented below:

Table 4 – Build margin emission factor ($EF_{grid,BM,y}$, tCO₂/MWh)

2017	0.0028
2018	0.1370
2019	0.1020
2020	0.0979

STEP 6 – Calculate the combined margin (CM) emissions factor EF_y

The combined margin calculation is based on method a) provided by the tool, as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \cdot w_{OM} + EF_{grid,BM,y} \cdot w_{BM} \quad \text{Equation 3}$$

Where,

- $EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO₂/MWh);
- $EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (tCO₂/MWh);
- w_{OM} = Weighting of operating margin emissions factor (%);
- w_{BM} = Weighting of build margin emissions factor (%).

According to the tool, for wind power generation project activities, as is the case of a typical CPA to be added to the PoA, weights are $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

(EF sample calculation) Applying the results presented above we obtain, for example, for Delta 3 I, in 2017:

$$EF_{Delta\ 3\ I-grid,CM,2017} = 0.6039 \cdot 0.75 + 0.028 \cdot 0.25 = 0.4536\ tCO_2/MWh$$

Table 5 displays the combined margin emission factor calculation for all wind power plants and years (detailed calculations available in the CERs calculation spreadsheets).

Table 5 – Combined margin emission factor ($EF_{grid,CM,y}$, tCO₂/MWh)

	Delta 3 I	Delta 3 II	Delta 3 III	Delta 3 IV	Delta 3 V	Delta 3 VI	Delta 3 VII	Delta 3 VIII
2017	0.4536	0.4547	0.4537	0.4547	0.4546	0.4546	0.4548	0.4551

2018	0.4023	0.4004	0.4001	0.4062	0.4034	0.4045	0.4048	0.3973
2019	0.4233	0.4228	0.4232	0.4209	0.4215	0.4214	0.4205	0.4246
2020	0.3887	0.3837	0.3872	0.3803	0.3822	0.3824	0.3822	0.3895

The proposed CPA corresponds to a greenfield wind power plant. Therefore, the baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{Equation 4}$$

Where,

- BE_y = Baseline emissions in year y (tCO₂);
- $EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CPA in year y (MWh);
- $EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y (tCO₂/MWh).

For this kind of project, $EG_{PJ,y}$ is determined as follows.

$$EG_{PJ,y} = EG_{facility,y} \quad \text{Equation 5}$$

Where,

- $EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh).

(Baseline emissions sample calculation) Applying the above for for Delta 3 I in 2017, with 66,765 MWh supplied to the grid:

$$BE_{Delta\ 3\ I,2017} = EG_{Delta\ 3\ I,2017} \times EF_{Delta\ 3\ I-grid,CM,2017}$$

$$BE_{Delta\ 3\ I,2017} = 66,765 \times 0.4536 = 30,287\ tCO_2$$

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

According to ACM0002, for most renewable power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad \text{Equation 6}$$

Where,

- PE_y = Project emissions in year y (tCO₂e);
- $PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO₂);
- $PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO₂e);
- $PE_{HP,y}$ = Project emissions from reservoirs of hydro power plants in year y (tCO₂e/yr).

Emissions from fossil fuel combustion ($PE_{FF,y}$)

According to the methodology, only geothermal and solar thermal projects have to account for emissions from the consumption of fossil fuels.

Therefore, in the case of the proposed CPA, $PE_{FF,y} = 0$ tCO₂e.

Emissions from the operation of geothermal power plants due to the release of non-condensable gases ($PE_{GP,y}$)

Considering that the CPA to be considered in the context of the PoA consists of the construction of a wind power plant, there are no emissions related to non-condensable gases from the operation of geothermal power plants.

Therefore, $PE_{GP,y} = 0$ tCO₂e

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

New hydroelectric power projects resulting in new reservoirs, shall account for CH₄ and CO₂ emissions from reservoirs. Considering that a typical CPA shall consist of the construction of a new wind power plant, there are no emissions from water reservoirs.

Therefore, $PE_{HP,y} = 0$ tCO₂e.

And, from the above, $PE_y = 0$ tCO₂e.

F.3. Calculation of leakage emissions

According to the methodology, “no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, and transport). These emissions sources are neglected”.

Therefore, leakage emissions (LE_y) related to the implementation of the proposed project activity are 0 tCO₂.

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

CPA UNFCCC reference number	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 until 31/12/2020	From 01/01/2021	Total amount
7156-P1-0002-CP1	1,386,386	0	0	0	1,386,386	0	1,386,386
Total	1,386,386	0	0	0	1,386,386	0	1,386,386

F.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the included CPA-DDs

CPA UNFCCC reference number	Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante for this monitoring period in the CPA-DD (t CO ₂ e)
7156-P1-0002-CP1	1,386,386	1,917,737
Total	1,386,386	1,917,737

The amount achieved during this monitoring period is 72.3% of the amount estimated ex-ante in the CPA-DD.

The yearly power generation breakdown each plant is in Table 6.

Table 6 – Estimated and monitored yearly average generation in the monitoring period

Wind Power Plant	Installed capacity (MW)		Capacity factor (%)		Generation (MWh/year)	
	estimated	monitored	estimated	monitored	estimated	monitored
EOL Delta 3 I	27.6	27.6	54.4	47.9	131,643	115,790
EOL Delta 3 II	27.6	27.6	56.6	57.1	137,035	138,091
EOL Delta 3 III	27.6	27.6	59.8	47.8	144,673	115,484
EOL Delta 3 IV	27.6	27.6	64.9	56.2	156,974	135,923
EOL Delta 3 V	27.6	27.6	54.6	53.8	132,130	130,005

EOL Delta 3 VI	27.6	27.6	60.5	54.0	146,455	130,680
EOL Delta 3 VII	27.6	27.6	60.5	57.4	146,313	138,763
EOL Delta 3 VIII	27.6	27.6	54.4	40.1	131,643	96,928
Total	220.8	220.8	-		1,126,866	1,001,664

Two main factors explain the difference between the estimated yearly ex-ante (1,917,737) and the actual monitored (1,386,386) CERs generation:

1. The higher ex-ante estimated yearly average power generation (1,126,866 MWh) and the actual achieved (1,001,664 MWh, i.e., 88.9% of the estimated) generation. Ex-ante estimated yearly generation was in the whole period and for all but one of the plants (Delta 3 II) higher than the monitored yearly average generation (Table 7). The reason for the smaller generation is the smaller wind resources throughout the monitoring period. Figure 6, applicable to the project site, clearly displays a cycle of unfavourable wind resources, starting in 2018 and persisting up to the end of the present monitoring period in 2020, mainly due to higher than historic average temperatures in the Atlantic Ocean.

Table 7 – Yearly ex ante estimated and yearly average monitored generation

Wind Power Plant	Generation		
	Estimated (MWh)	Monitored (MWh)	Monitored (share of estimated)
EOL Delta 3 I	131,643	115,790	88.0%
EOL Delta 3 II	137,035	138,091	100.8%
EOL Delta 3 III	144,673	115,484	79.8%
EOL Delta 3 IV	156,974	135,923	86.6%
EOL Delta 3 V	132,130	130,005	98.4%
EOL Delta 3 VI	146,455	130,680	89.2%
EOL Delta 3 VII	146,313	138,763	94.8%
EOL Delta 3 VIII	131,643	131,643	73.6%
Total	1,126,363	1,001,664	88.9%

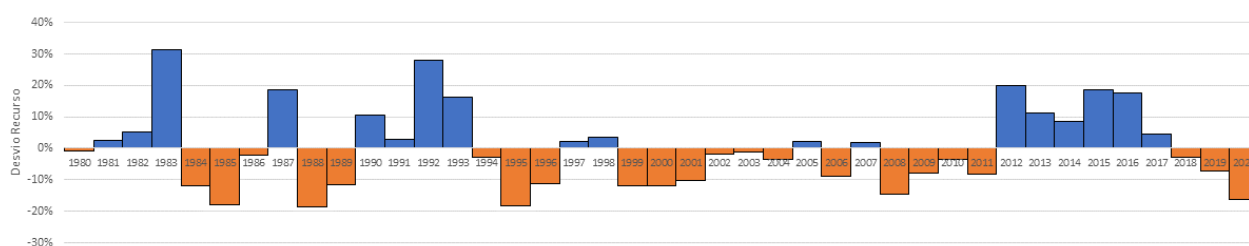


Figure 6 – Deviation in wind resources in the CPA’s location¹⁰

2. The ex ante emission factors used to estimate the yearly CERs generation ($EF_{grid,CM,y} = 0.4823 \text{ tCO}_2/\text{MWh}$) is higher than the monitored in almost all the monitored period for all wind power plants through the monitoring period (Table 8).

Table 8 – Differences between monitored and ex-ante estimated $EF_{grid,CM,y}$

	Delta 3 I	Delta 3 II	Delta 3 III	Delta 3 IV	Delta 3 V	Delta 3 VI	Delta 3 VII	Delta 3 VIII
2017	-6.0%	-5.7%	-5.9%	-5.7%	-5.7%	-5.7%	-5.7%	-5.6%
2018	-16.6%	-17.0%	-17.0%	-15.8%	-16.4%	-16.1%	-16.1%	-17.6%
2019	-12.2%	-12.3%	-12.3%	-12.7%	-12.6%	-12.6%	-12.8%	-12.0%
2020	-19.4%	-20.4%	-19.7%	-21.1%	-20.8%	-20.7%	-20.8%	-19.2%

F.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the CPA-DD”

The value 1,917,737 is the sum of the estimated ERs for the crediting period (2017 to 2020), information extracted from the table in section D.6.4 of the registered CPA-DD. Information is included in sheet CapFac of the compiled results and reproduced in Table 9.

Table 9 – Amount estimated ex-ante for this monitoring period

Section D.6.4, registered CPA-DD	
Year	ER (tCO ₂ e)
2017	253,169
2018	554,856
2019	554,856
2020	554,856
total	1,917,737

F.6. Remarks on increase in achieved emission reductions

Not applicable, as the achieved emission reduction are below the ex-ante estimated figures for the monitoring period.

¹⁰ Source: European Centre for Medium-Range Weather Forecasts (ECMWF Reanalysis v5, ERA5, URL: <https://www.ecmwf.int/en/forecasts/dataset/ecmwf-reanalysis-v5>).

F.7. Remarks on scale of small-scale CPAs

Not applicable.

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
05.0	8 October 2021	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 03.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN).
04.0	6 April 2021	Revision to: <ul style="list-style-type: none"> • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for programmes of activities” (CDM-EB93-A07-STAN); • Add a section on remarks on the observance of the scale limit of small-scale CPAs during the crediting periods; • Add "changes specific to afforestation or reforestation activities/CPA" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R PoAs between two commitment periods; • Make structural and editorial improvements.
02.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the “CDM project standard for programmes of activities (CDM-EB93-A07-STAN); • Make editorial improvements.
01.0	1 April 2015	Initial publication.

Decision Class: Regulatory
 Document Type: Form
 Business Function: Issuance
 Keywords: monitoring report, programme of activities