Project design document form
(Version 11.0)

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

BASIC INFORMATION	
Title of the project activity	Los Cocos Wind Farm Project
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	11
Completion date of the PDD	24/07/2020
Project participants	Empresa Generadora de Electricidad HAINA (EGE HAINA)
Host Party	Dominican Republic
Applied methodologies and standardized baselines	ACM0002 - Grid-connected electricity generation from renewable sources - Version 20.0
Sectoral scopes	Sector scope (1): Energy industries
Estimated amount of annual average GHG emission reductions	36,457 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The proposed project activity aims to install and operate a 25.2 MW grid-connected wind farm located between the towns of Juancho and Los Cocos, in the south-western province of Pedernales in the Dominican Republic. The project developer is Empresa Generadora de Electricidad HAINA (EGE HAINA).

The project activity involves the installation and operation of 14 wind turbines, each with a capacity of 1.8 MW. The total installed capacity of the proposed project activity is 25.2 MW with an expected electricity generation of 57,600 MWh per year[1]. The electricity generated by the project activity will be supplied to the National Interconnected Electricity System (SENI[2]), displacing approximately 36,457 tonnes of CO_2 emissions per year from electricity generation at fossil fuel fired power plants. The total GHG emission reductions for the chosen crediting period are approximately 255,198 tCO_2.

In addition, the proposed project activity comprises the civil and electrical infrastructure required within the wind farm site, as well as 56 km of overhead power line connecting the project to the national power grid (SENI). The civil works comprise all access and site roads, footways, drainage, assembly platforms, lay-down area, site facilities, tower foundations, electrical sub-station civil works, cable trenches, and a meteorological tower. The works also include the installation of a substation with a control building for interconnection with the electrical transmission grid, with 138/34.5 kV power transformers, 138 kV circuit breakers, 34.5 kV switchgears and control and protection systems; and a local grid within the wind farm site. In addition, an advanced monitoring and control system will be installed to monitor and control the electricity output from the wind farm.

The construction of the wind farm was developed by COBRA Energy, a Spanish company, with significant experience in the electricity sector and an important participation in the wind industry. COBRA carries out large energy projects on a turnkey basis which often require ongoing maintenance or operations management. These projects are primarily wind farms and industrial plants. COBRA will be working through its subsidiary Urbaenergía, S.L. y Energía y Recursos Ambientales Internacional, S.L. Unión Temporal de Empresas Ley 18/1982 *(UTE Los Cocos*).

Wind energy operations do not generate air or water emissions and do not produce hazardous waste. Nor do they deplete natural resources such as coal, oil, or gas, or cause environmental damage through resource extraction and transportation, or require significant amounts of water during operation.

Caribbean countries are highly dependent on oil and gas for their energy needs. The largest countries in the region are heavily dependent on imported crude oil and derivates as their main source of primary energy, and the trend has intensified in recent years. The region's dependence on oil reflects its inability to diversify its energy sources. For this reason, Caribbean countries have not realized their potential for solar, wind, hydropower, and geothermal energy use.[3] Dominican Republic is not the exception. The main energy source in the Dominican Republic is imported oil and its derivatives. They contribute 75% of the total primary energy supply. Energy proceeding

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[1] See Energy production assessment of Los Cocos I and II Wind Farms, document - Los Cocos I -II 20130322 vientos.pdf page 6.

[2] Sistema Eléctrico Nacional Interconectado (SENI) de la Republica Dominicana

[3] Source: Inter-American Development Bank (IADB). "*Prospects for the Oil-Importing Countries of the Caribbean*" Ramon Espinasa, Oil and Gas Specialist - Energy Division - Infrastructure and Environment Department - IADB. September 2008. http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=1640644\

from national production represents only 16% of the supply and basically comes from firewood (7%), bagasse (4%) and hydro (3%)[4].

The development of wind energy in the Dominican Republic is fundamental for the diversification and sustainability of the energy sector and the reduction of greenhouse gas emissions. In the Dominican Republic, the SENI is composed mainly of fossil fuel fired power plants with little renewable electricity generation. Thus, the project will reduce the country's fossil fuel imports and diversify the sources of electricity generation, an important achievement for the transition away from fossil fuel electricity generation and for the reduction on the dependence on foreign energy sources.

Therefore, the proposed project will contribute to sustainable development through the following aspects:

- Reducing the imports of fossil fuels, and in consequence, strengthening Dominican Republic's energy security and self-sufficiency, by taking advantage of its natural and renewable wind resource.
- Reducing GHG emissions generated from fossil fuel consumption in power plants connected to the grid;
- Creating employment opportunities in the nearby area where the project is located, during the assembly and installation of wind turbines and for operation of the proposed project;
- The project will contribute to promoting, developing and strengthening the renewable energy sector in the Dominican Republic, especially wind power which has a high potential for development in the country (as explained in section B.4).
- The project will contribute to technology and know-how transfer to the Dominican Republic. The project activity will install state-of-the-art technology that will provide clean and safe power generation; moreover, the installation and operation of these turbines will bring to the region new knowledge and experience for the benefit of local workers while requiring for specialized labour.

A.2. Location of project activity

The project is located in the province of Pedernales, between the communities of Juancho and Los Cocos in the south-west of the Dominican Republic.

[4] Source: *Energy-policy Framework Conditions for Electricity Markets and Renewable Energies. 16 Country Analyses.* German Technical Assistance Agency (GTZ). Environment and Infrastructure Division. Eschborn, November 2009. GTZ, TERNA Wind Energy Programme Internet: http://www.gtz.de

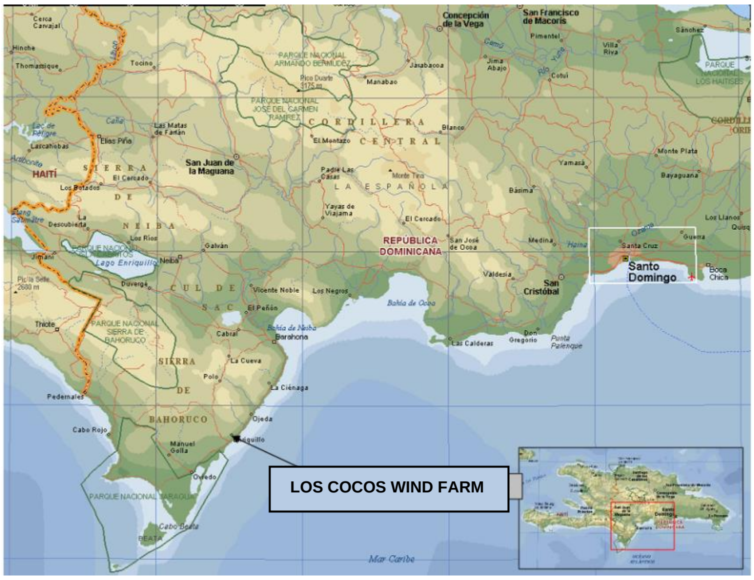

Figure 1. Location of the project activity

Figure 2. Location of the project activity 2

The project site is located between the towns of Juancho and Los Cocos, in the province of Pedernales, approximately 40 km southwest of the province of Barahona, and east of Haiti. The site is confined within parcel 512 of the Cadastral District #3 in the Municipality of Oviedo, in the Province Pedernales, respectively[5].

The Pedernales peninsula is referred to as one of the windiest parts of the Dominican Republic. Only one road along the coast of the Caribbean Sea connects the peninsula to Barahona and the rest of the country, and the project site is located along that road, connecting Barahona and Oviedo. The main economic activity of the province is agriculture, with production of food crops and livestock. Fishing is also an important activity.

The proposed wind farm lies on a ridge of elevation between 10 m and 100 m. The site consists mainly of irrigated farmlands relatively close to the coastline. The area where the turbines will be located is a flat terrain surrounded in the south by the ocean and in the east by a mountain range.

[5] Source: Convenio Cooperación PRODEVAJ-CEPM-EGE Haina (Legalizado).pdf

Figure 3. Pictures of the wind farm location

Figure 4. Aerial picture of the wind farm location

The climate in the project site area is tropical but dry, unlike most of the Dominican Republic, where high humidity and abundant rainfall dominate. Temperature variations across the seasons are relatively small from 20^0 C to 33^0 C.

Each wind turbine is located at the following geographical coordinates:

Table 1. List of wind turbines geographical coordinates[6]

Wind Turbine Number	Wind Turbine Type	UTM Easting	UTM Northing
1	V90	256860.9170	1978577.2990
2	V90	257038.6900	1978333.5240
3	V90	257205.4960	1978102.1300
4	V90	257385.8500	1977 855.9820
5	V90	257560.3610	1977616.0410
6	V90	257712.1360	1977402.7040
7	V90	257889.7490	1977163.0230
8	V90	258053.3530	1976892.8760
9	V90	256494.2640	1977919.3100

[6] Source: C__DOC__P_E__LOS_COCOS_Y_QUILVIO_CABRERA_PLANOS_DEL_PROYECTO_PLANTA_DE_VIALES_PLATAFORMAS_Y_CIMENTACIONES__ASBUILT-0911-2011-0.pdf. These are the "as built" locations. The first 14 items in the source reference correspond to this project, the remaining five to Quilvio Cabrera Wind Farm Project, a separate CDM project currently at validation.

Wind Turbine Number	Wind Turbine Type	UTM Easting	UTM Northing
10	V90	256663.9090	1977684.4360
11	V90	256837.7650	1977448.0220
12	V90	257007.8760	1977209.3240
13	V90	257180.0810	1976 976.0950
14	V90	257347.6600	1976747.0950

A.3. Technologies/measures

Valid wind data have been recorded at the project site started in February 2002. Data were collected on-site over a 36-month period between 2002 and 2005, using three 30-meter masts located across the project site. The measurements were analysed and presented in annual wind assessment reports. The 3-year technical feasibility study which included site selection and wind resource monitoring and evaluation was carried out by the Danish research centre, RISØ[7].

Additionally, between 2008 and 2009, EGE HAINA carried out another assessment of the wind regime at the potential wind farm site, with two new masts installed at the end of 2008, at 78 meters height and 30 meters height. The analysis undertaken by Garrad Hassan relied on wind data recorded at the project site since February 2002[8]. Two layouts of 5 Vestas V82, 1.6 MW, at a hub height of 70 meters and 14 Vestas V90, 1.8MW, at a hub height of 80 meters have been analysed in conjunction with the results of the wind analysis to predict the long-term energy output of the proposed wind farm.

The selected layout for the development of the wind farm consists of 2 rows of 8 and 6 wind turbines in a northwest-southeast direction, described as “Layout 9c1 V3” and shown in Figure 5.1 in the cited Garrad Hassan report[9]. The layout is shown in Figure 5. Based on a third-party wind energy assessment from December 2009, the nominal generation output of Los Cocos Wind Farm is expected to be approximately 74,200 MWh per year[10], resulting in a net capacity factor of 33.6%[11]. It is important to note that for the second crediting period the nominal generation output of Los Cocos Wind Farm is expected to be approximately 57,600 MWh per year, this change is due to the slipstream effect produced by Los Cocos II Wind Farm, which was constructed next to Los Cocos Wind Farm**.**

[7] Source: Wind resource assessment report. *Risø-I-2374 (EN)* (6. 050701 Riso. Site Inspection.pdf); *Risø-I-2411 (EN)* (7. 051101 Riso. 18 cases.pdf); *Risø-I-2445 (EN)* (8. 060201 Riso.Site4.pdf); *Risø-I-2530 (EN)* (Risoe-I-2530 site4-12graphs-final.pdf)

[8] Source*: Assessment of the energy production of the proposed Juancho-Los Cocos wind farm*. Garrad Hassan, December 23rd 2009. (25. 091223 Garrad Hassan.pdf)

[9] *Op. cit.* (same as above), the layout is shown in p. 48 of the report.

[10] Assessment of the energy production of the proposed Juancho-Los Cocos wind farm. Garrad Hassan, December 23rd 2009. (“*25. 091223 Garrad Hassan.pdf”*), p. 20 top, layout "9c1 v3"

[11] Net capacity factor = 74,200 MWh / (14 x 1.8 MW x 8,760 hrs) = 33.6%.

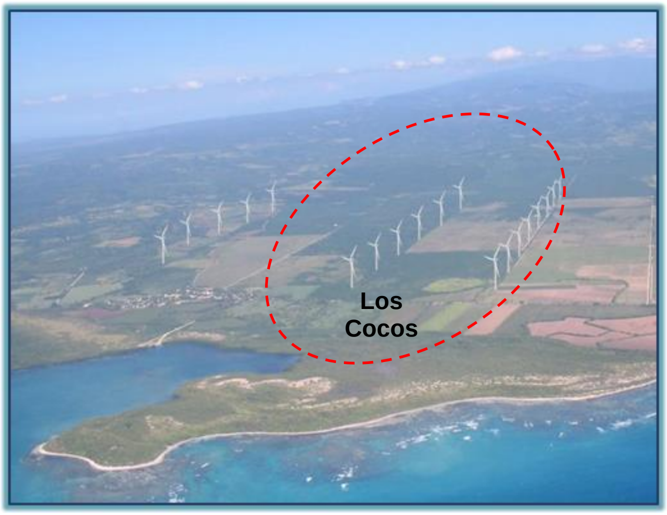

Figure 5. Illustration of the layout of Los Cocos wind farm

The wind turbines selected for the development of Los Cocos Wind Farm project are 14 Vestas V90 1.8 MW, designed to deliver optimal yield at medium-wind sites (IEC IIA). Figure 6 shows the power output of the 1.8 MW turbines at different wind speeds.

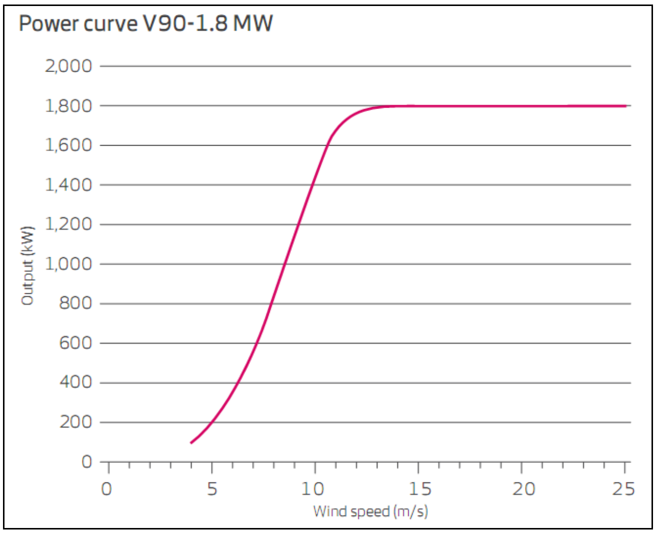

Figure 6. Vestas V90 – 1.8MW Power curve. Source: Vestas V90 1.8 MW Brochure. (Product_BrochureV90_1_8MW_US[1].pdf)

The V90-1.8 MW turbine features a rugged 6-gear yaw system, a 60 Hz 6-pole generator and a transformer, which is integrated with the nacelle to minimize power losses. The V90-1.8 MW is equipped with VCUS™ (Vestas Converter Unity System), which ensures a constant and consistent output to the grid, energy optimization, low-noise operation and reduced load on the gearbox and other key components. It is also designed for safe and convenient maintenance. The environmentally friendly CoolerTop™ cools the water used in the turbine's cooling system by channelling wind into the heat exchanger. This reduces the turbine's own energy consumption and it keeps sound levels low. Vestas is a Danish company with more than 30 years' experience in wind energy, currently a market leader in wind technology.

Table 2. Wind Turbine Technical Specifications

Power regulation	
Power regulation	pitch regulated with variable speed
Operating data	
Rated power	1,800 kW

Cut-in wind speed	4 m/s
Cut-out wind speed	25 m/s
Wind Class	IEC IIA
Operating temperature	standard range (-20°C to 40°C) low temperature option (-30°C to 40°C)
Rotor	
Rotor diameter	90 m
Swept area	6,362 m^2
Rotational Speed Static, Rotor	14.5 rpm
Speed, Dynamic Operational Range	9.3 - 16.6 rpm
Aerodynamic brakes	full feathering
Tower	
Type	tubular steel tower
Hub height	80 m
Generator	
Type	6-pole asynchronous with variable speed
Nominal output	1,800 kW
Operational data	60 Hz 690 V
Gearbox	
Type	1 planetary stage + 2 helical stages

Source: Annex 1.1.0 General Specification V90-1.8 MW VCUS. Document no.: 0004-6205 V01. 2009-07-09. (090706 Annex 1.1.0 - General Specification.pdf)

Table 3. Wind Turbine Main Dimensions

Blade	
Length	44 m
Max. chord	3.512 m
Weight	6,750 kg
Nacelle	
Height for transport	4 m
Height installed	5.4 m
Length	10.4 m
Width	3.4 m
Weight	70 tonnes
Hub	
Max diameter	3.3 m
Max. width	4 m
Length	4.2 m
Weight	18 tonnes
Tower	
80 m Weight	125 tonnes

Source: Annex 1.1.0 General Specification V90-1.8 MW VCUS. Document no.: 0004-6205 V01. 2009-07-09 (090706 Annex 1.1.0 - General Specification.pdf) and Vestas V90 1.8 MW Brochure. (Product_BrochureV90_1_8MW_US[1].pdf)

The manufacturer does not provide specifications on lifetime estimate of its wind turbines. See product specifications in: http://www.vestas.com/en/media/brochures.aspx, which directs you to: http://nozebra.ipapercms.dk/Vestas/Communication/Productbrochure/2MWMk7/

The expected equipment lifetime is 20 years (as also stated in Section C.1.2), which is supported by the following documentation: "DNV Statement of Compliance of Vestas V90-1.8 MW VCUS. Date 06/07/2009. *Annex 1.2 - Statement of Compliance.pdf*"

The wind farm was expected to start operations in June 2011. Local materials were used for much of the construction works. COBRA Energy was in charge of the turnkey design, engineering, supply, transportation, construction, erection, installation, commissioning, testing and completion of the wind farm. Since COBRA Energy is a company with vast experience in wind farm construction and operation, during the construction phase and the commissioning and testing of the plant, know how was transferred to EGE HAINA's staff.

The main monitoring equipment involved in the project activity is shown in Table 4. The first four energy meters correspond to the commercial measurement equipment that reports the generation of the wind farms Los Cocos I, Los Coos II and Quilvio Cabrera (See Figure 9).

Table 4. Monitoring equipment of the project activity. The location of the individual meters is also shown in Figure 9 . More details on the monitoring equipment and parameters can be found in section B.7.1.

Energy meters installed for each parameter*	**Specification**	**Location**
$EG_{SMC,TR01,h}$: Main and backup meter	ION 8650, class 0.2S ID 3275-PEJC-01	Commercial Measurement System (SMC) at the 138/34.5 kV substation
$EG_{SMC,TR02,h}$: Main and backup meter	ION 8650, class 0.2S ID 3275-PEJC-02	Commercial Measurement System (SMC) at the 138/34.5 kV substation
$EG_{SMC,TR03,h}$: Main and backup meter	ION 8650, class 0.2S ID 3275-PEJC-03	Commercial Measurement System (SMC) at the 138/34.5 kV substation
$EG_{SMC,TR04,h}$: Main and backup meter	ION 8650, class 0.2S ID 3275-PEJCE3-T04	Commercial Measurement System (SMC) at the 138/34.5 kV substation
Internal monitoring equipment		
Energy meters installed for each parameter*	**Specification**	**Location**
$EG_{(LCI),L2+L3,,h}$	class 0.2S	Internal measurement system which adds the energy produced by the wind turbines connected to L2 + L3, at the 34.5 kV line of both turbine lines of Los Cocos wind farm (L2 - line with 6 turbines and L3 - line with 8 turbines)
$EG_{(LCII),L5+L6+L8+L9,h}$	class 0.2S	Internal measurement system which adds the energy produced by the wind turbines connected to L5 + L6 + L8 + L9, at the 34.5 kV lines of Los Cocos II wind farm (L5 - line with 6 turbines, L6 - line with 7 turbines, L8 - line with 6 turbines and L9 - line with 7 turbines)
$EG_{(QC),L1,,h}$	class 0.2S	Internal measurement system which adds the energy produced by the wind turbines connected to L1 at the 34.5 kV line of the Quilvio Cabrera wind farm (L1 - line with 5 turbines)

*Explanation of each monitoring parameter, see section B.7.1

A.4. Parties and project participants

Table 5. Project Participants

Parties involved	**Project participants**	**Indicate if the Party involved wishes to be considered as project participant (Yes/No)**
Dominican Republic (Host)	Empresa Generadora de Electricidad HAINA (EGE HAINA)	No

	(private and public entity)	

All required contact details are included in Annex 1.

Host Country

The host country is the Dominican Republic and its Designated National Authority (DNA) is the Oficina Nacional de Mecanismo de Desarrollo Limpio (ONMDL). The ONMDL, established in 2006, is part of the Ministry of the Environment and Natural Resources of the Dominican Republic.

The Government of the Dominican Republic ratified the Kyoto Protocol in February 2002.

The Dominican Republic is a nation on the island of Hispaniola, part of the Greater Antilles archipelago in the Caribbean region. The western third of the island is occupied by Haiti. It is the second largest Caribbean nation (after Cuba), in terms of area.

Figure 7. Dominican Republic

A.5. Public funding of project activity

There is no public funding for the proposed project.

A.6. History of project activity

1. PP hereby confirms that: The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA); The proposed CDM project activity is not a project activity that has been deregistered.

2. PP further declares that: The proposed CDM project activity was not a CPA that has been excluded from a registered CDM PoA; No registered CDM project activity or a CPA under a registered CDM PoA whose crediting period has or has not expired (hereinafter referred to as former project) exists in the same geographical location as the proposed CDM project activity.

A.7. Debundling

Not applicable

SECTION B. Application of methodologies and standardized baselines

B.1. Reference to methodologies and standardized baselines

The project activity is developed under the approved consolidated baseline and monitoring methodology ACM0002 *"Consolidated Methodology: Grid-connected electricity generation from renewable sources"* (version 20.0)[12].

According to the methodology, for the proposed project, the demonstration of additionality shall be assessed by applying the latest version of the:

- *TOOL01 "Tool for the demonstration and assessment of additionality*" (version 06.0.0) [13].

Also, following the ACM0002, version 20.0 guidelines, it is applied for the renewable of the crediting period:

a. TOOL07 "Tool to calculate the emission factor for an electricity system" (version 07.0)[14]
b. TOOL11 "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 03.0.1)[15] is also applied.

B.2. Applicability of methodologies and standardized baselines

The proposed approved methodology *"Consolidated Methodology: Grid-connected electricity generation from renewable sources"* (version 20.0) is applicable to grid-connected renewable power generation project activities that:

(a) Install a Greenfield power plant;
(b) Involve a capacity addition to (an) existing plant(s);
(c) Involve a retrofit of (an) existing operating plants/units;
(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or
(e) Involve a replacement of (an) existing plant(s)/unit(s).

In this case, the project involves option (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity, which in the specific case of the proposed project activity is the installation of a 25.2 MW wind farm.

The following conditions from ACM0002 (version 20.0) make the proposed project activity applicable as a CDM under the methodological framework mentioned:

Applicability Conditions	Project Activity
1. The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The proposed project activity involves renewable energy power generation through the installation and operation of a 25.2 MW grid connected wind power plant. Thus, this condition is met.

[12] See document: https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG
[13] Even though this is not the latest available version of Additionality TOOL01 to date, this version 06 was the one applied in the validation phase for demonstrating additionality. Additionality is not being assessed during the renewal of crediting periods.
See document: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.0.0.pdf
[14] See document: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf
[15] See document: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

Applicability Conditions	Project Activity
2. In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The proposed project activity involves the installation of a Greenfield power plant. Thus, this condition is not applicable.
3. In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased, and the power density is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	This condition is not related to the proposed project activity, since it is not a hydro power plant.
4. In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The proposed project activity does not involve integrated hydro power projects. Thus, this condition is not applicable.
5. The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units.	The proposed project activity does not involve switching from fossil fuels to renewable energy sources at the project site or the installation of biomass fired power plants. Thus, this condition is met.

Applicability Conditions	Project Activity
6. In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The proposed project activity involves the installation of a Greenfield power plant. Thus, this condition is not applicable.
7. The applicability conditions included in the tools apply.	The conditions of the "Tool to calculate the emission factor for an electricity system" are analyzed below.
7.1. This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The proposed project activity supplies electricity to the local grid, avoiding part of the electricity generated by the grid-connected power plants. Thus, this condition is met.
7.2. Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	In this case, the emission factor for the project electricity system is calculated for grid power plants only. Thus, this condition is met.
7.3. The tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	In this case, the project electricity system is located totally in Dominican Republic. Thus, this condition is met.

Thus, the methodology is applicable to the proposed project activity.

B.3. Project boundary, sources and greenhouse gases (GHGs)

The spatial extent of the project boundary includes Los Cocos Wind Farm and all power plants connected physically to the electricity system that the CDM project power plant is connected to. Since there is a single national electricity grid within the Dominican Republic (SENI) to which the wind farm project will be connected, the SENI is included in the project boundary.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 6.

Table 6. Emission sources included in the project boundary

Source		GHG	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the	CO_2	YES	Main source of emissions in the baseline.
		CH_4	NO	Minor emission source.

Source		GHG	Included?	Justification/Explanation
	project activity.	N_2O	NO	Minor emission source.
Project Activity	Emissions from electricity generation	CO_2	NO	According to ACM0002 version 20.0, there are no project emissions from wind farm projects.
		CH_4	NO	
		N_2O	NO	

The geographic and system boundary of the Dominican Republic's National Grid (SENI) can be clearly identified, as shown in Figure 8, and information on the characteristics of the grid is available.

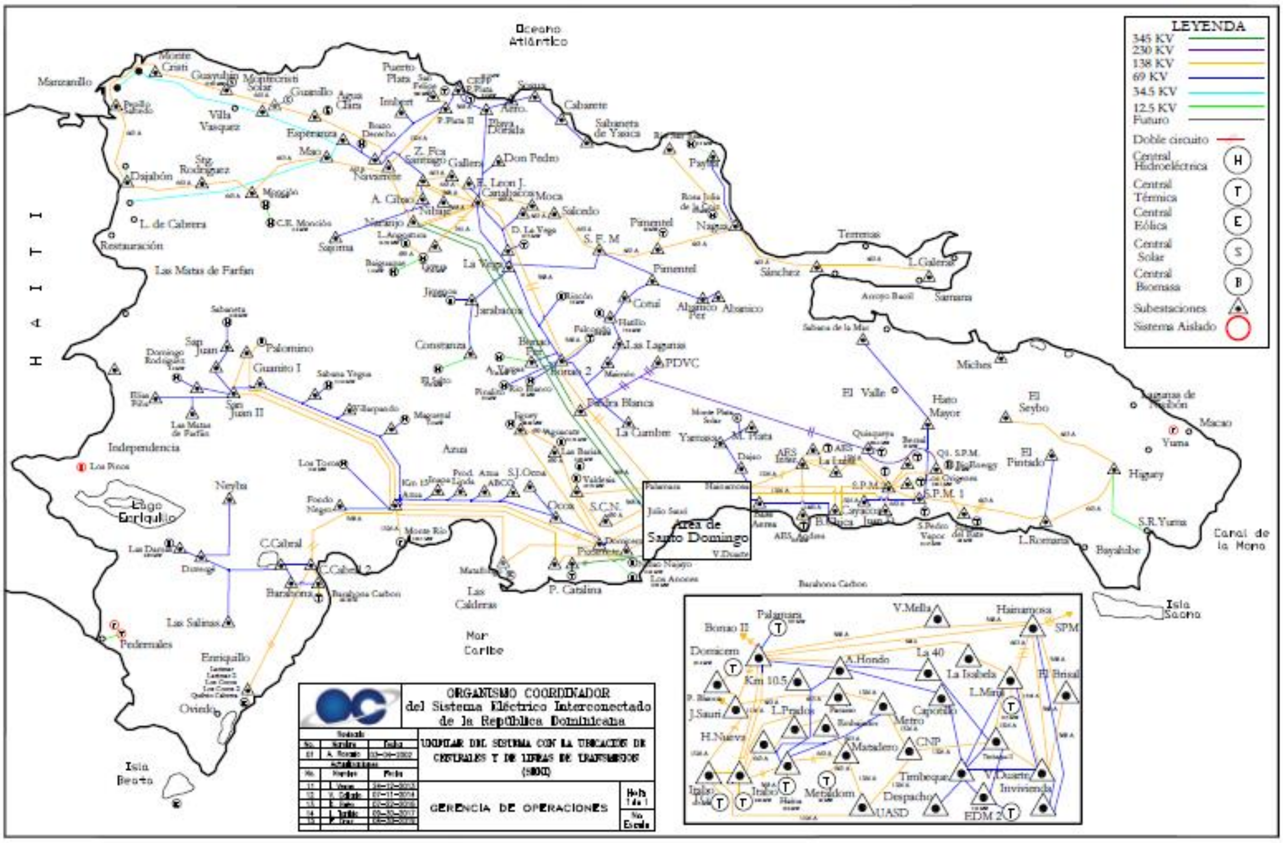

Figure 8. Dominican Republic's national grid (SENI)

Figure **9** shows the schematic diagram of Project activity under consideration and project boundary.

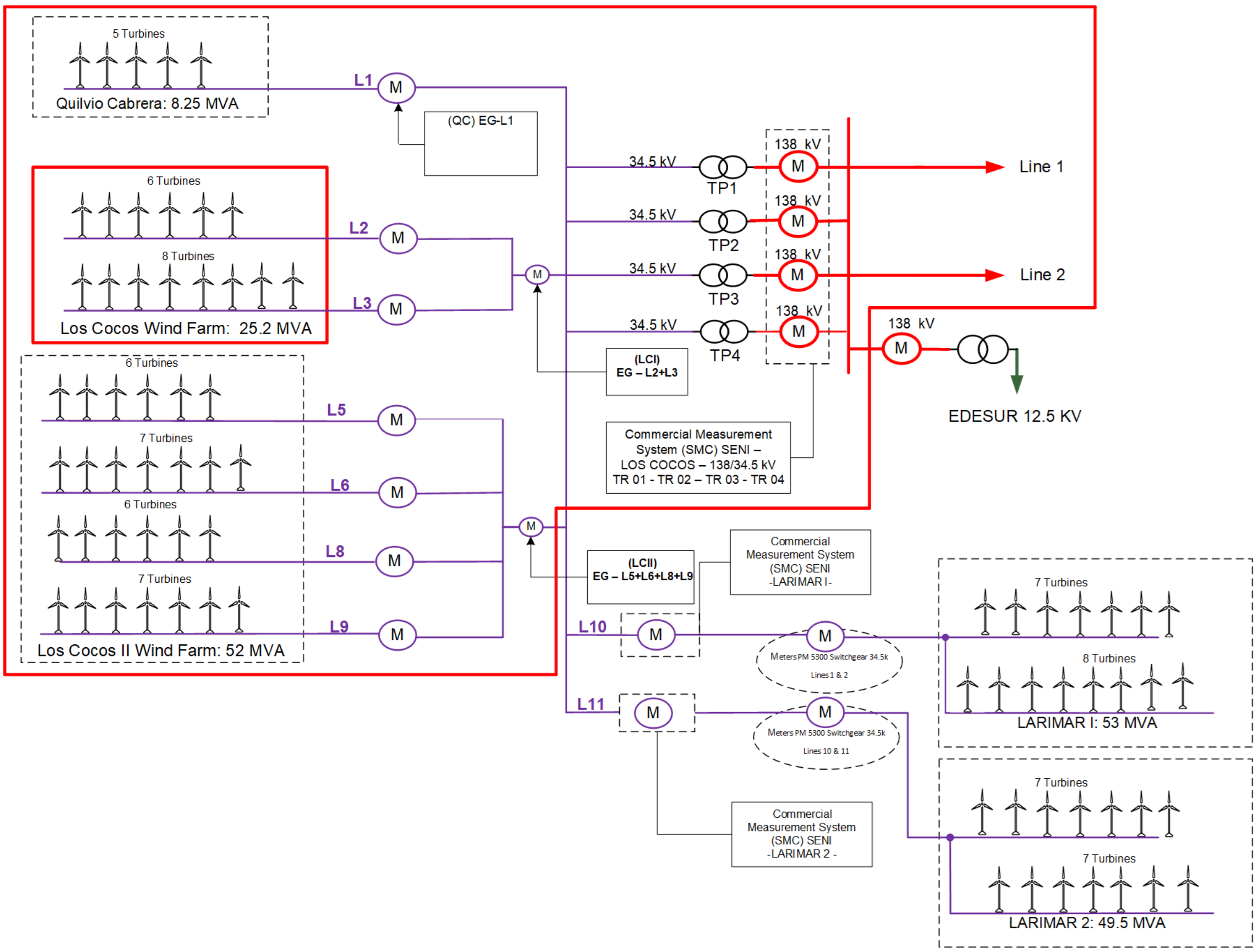

Figure 9. The project boundary for Los Cocos Wind Farm

Los Cocos Wind Farm project includes the project wind turbines as well as the national power grid. The power generated by this project joins the output of Quilvio Cabrera and Los Cocos II Wind Farms; after being transformed to 138 kV for connection to the national grid. The monitoring variables shown are described in Section B.7.1. Commercial measurement points, where electric meters are located, are shown schematically as red circles with an (M) and are recognized as SMCTR01, SMCTR02, SMCTR03 and SMCTR04. Internally each Wind Park summarize its generation lines in (QC), (LCI) and (LCII) respectively. It is important to clarify that even though Larimar Wind Farm is part of the whole Eolic system as can be seen in **Figure 9**, the wind farm generation data reported to the SENI is measured in the commercial measurement points recognized by the OC-SENI on the side of 34.5 kV located in Lines L10 and L11; which allows to manage Larimar independently from the generations of Quilvio Cabrera, Los Cocos and Los Cocos II Wind Farms. Taking this into account the public generation data and economical transactions reports performed by the OC SENI for Larimar Wind Farm (which includes Larimar I and Larimar II), are always presented separated from the rest of the Wind Farm System.

B.4. Establishment and description of baseline scenario

As stated in the approved methodology ACM0002 "*Consolidated Methodology: Grid-connected electricity generation from renewable sources*", version 20.0: If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" (version 7.0).

Therefore, baseline scenario consists of the electricity that would have been generated and delivered to the grid in the absence of the proposed project activity by:

a) Other plants currently connected to the SENI, and

b) New additions to the system

Hence, the baseline scenario is identified as the continuation of the common practice of power generation, i.e. mainly thermal power stations (Fuel oil, natural gas and coal), that emit large quantities of carbon dioxide (CO_2) to the atmosphere.

For the second crediting period, the continued validity of the original baseline has been assessed, following the stepwise procedure, according to the TOOL11 “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (version 03.0.1),

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

For the renewal of the crediting period, no new national and/or sectoral policies are affecting the baseline scenario. In the absence of the project activity, electricity would still have been partly generated by fossil fuel power plants or by the addition of new fossil fuel power plants connected to the grid. Also, considering that renewable energy projects have lower costs in the margin, they are always dispatched, as reported for the first crediting period.

Brief description of the Dominican Republic electricity sector situation

As other Caribbean island states, Dominican Republic has been facing important challenges that restrict its economic growth, such as exposure to volatility in the price of oil, dependence on fuel imports, and uncertainty in the energy supply. Although it is one of the largest and most diverse economies in the Caribbean, it depends on the import of fossil fuels, to satisfy most of its energy requirements. Recognizing this situation, the country has been preparing to face these challenges by increasing it share in renewable energy resources, which can contribute meeting energy demand while perceiving significant socio-economic advantages[16]. In this sense a goal of 25% more renewable electricity use is set for 2025.

In May 2018 the Government created the Renewable Energy Monitoring Committee, composed of the Ministry of Energy and Mines (MEM), the National Energy Commission (CNE), the Dominican Corporation of State Electric Companies (CDEEE) and the Electricity Superintendence (SIE), with the aim of preparing a short and medium term development plan for renewable energy[17].

It is worth noting the importance of investments, made mainly by the private sector, which followed the capitalization process. Thanks to this, the Dominican Republic has one of the most varied electricity generation matrix when compared to other nations in Central America and the

[16] Advantages - a. Generation of direct and indirect jobs b. Avoid external dependency. In this way, transport losses are reduced, and an own energy supply is guaranteed. c. Reduction of rates for electricity, water, and gas services. d. Despite that the initial cost is high, the maintenance of the projects is inexpensive, and they are exempt from country's taxes. e. The land around the projects can be used for other activities like agricultural fields or livestock. f. Less air pollution, which reduces the number of illnesses due to pollution. For more information read - Perspectivas de energías renovables: República Dominicana 2030. See the link –

https://www.cne.gob.do/wp-content/uploads/2018/01/2820172920ESP20REmap20RD202030.pdf

[17] Energía Estratégica publication (2019) - https://www.energiaestrategica.com/exclusivo-republica-dominicana-anuncia-que-lanzara-en-el-primer-trimestre-de-2020-la-subasta-de-energia-eolica-y-solar/

Caribbean, according to the "Report January-June 2019", of the Dominican Association of the Electric Industry (ADIE). The report indicates that over the course of four years the role of fossil fuels has been progressively reduced, giving rise to new sources, achieving a generation matrix made up of: 72% petroleum derivatives; 12% coal; 4% natural gas and 12% hydroelectric[18].

According to ADIE, the participation of renewables continues to increase and states that for the first 6 months of 2019, their injection represented 7% of the energy served to the system with 5% for wind and 1% for biomass and also for sun. As a comparison, in 2018 this contribution was only 5%. As noted above, the private sector is leading the investment of human and economic resources to produce renewable energy in the country. As of 2019, 437 MW of renewable energy consisting of solar, wind and biomass have been operating in the electrical system. By 2020, an additional 195 MW of wind and solar energy is expected to come into operation, according to the executive vice president of ADIE[19].

In this context, EGE Haina, as a private/public entity leading energy generation company in the country, seeks with the development of the wind farm to strengthen the national wind energy matrix to support the energy transition and help the country to meet its renewable participation goals for a sustainable and low emissions development.

Market Actors

The **National Energy Commission (Comisión Nacional de Energía, CNE),** which was established in 2001, is responsible for the formulation of laws and ordinances and the preparation of supply and demand forecasts. Acting under the auspices of the Ministry of Industry & Commerce and the Ministry of Finance, CNE is subordinate to the Minister of Planning and Economy, the Director of the Central Bank, the Ministry of Agriculture, the Ministry of the Environment and the Director of the Telecommunications Institute. This executive body has the legal power to enact regulations for the power sector.

The **Regulatory authority** is the **Superintendencia de Electricidad (SIE),** which was established by decree no. 118-98 on 16 March 1998 and began its work in July 1999. The SIE supervises market regulation, in particular the prices for regulated consumers. SIE's status as a public law body was officially established by the General Electricity Act of 2001.

The **Coordinating Organization (Organismo Coordinador – OC)** is another body that was created by the 2001 General Electricity Act. Its main task is harmonising the operations of the various power producers and network operators with each other on the wholesale market and ensuring that the necessary capacity is made available on the spot market. This institution serves to promote the market's self-regulating capacities. It is not a state body. Its highest authority is a coordinating committee, the members of which include one representative each of the independent power providers, the power producers with private participation, and the transmission and distribution sectors.

Policy compliance

There are two main laws which define the regulatory framework of the electricity generation sector in Dominican Republic in general, and to promote renewable energy. These are briefly described below.

The General Electricity Act (created by the law 125-01 of 2001) modified on 2007 – Law 186-07 General electricity Law, is the result of the recognition of the importance of the private sector in

[18] El dinero Publication https://www.eldinero.com.do/97471/republica-dominicana-amplia-la-matriz-de-generacion-de-energia-renovable/
[19] Diario Libre Publication (2019) - https://www.diariolibre.com/economia/energias-renovables-aportaron-el-7-al-sistema-electrico-nacional-en-primer-semestre-GH13418482

generation, distribution and sale of electricity, pursuing with this the expansion of the sector and greater efficiency in the service, reserving for the State the exclusive regulatory function of the sector.

Whit the Law on Incentives for the Development of Renewable Energy Sources and Special Regimes, No. 57-07 and its modifications, the State begins to promote the implementation of renewable energies, which allow reducing greenhouse gas emissions, as well as reducing the country's dependence on oil derivatives for the generation and diversification of the energy matrix, establishing fiscal incentives to generation through renewable energy sources.

From this moment, they have continued efforts to encourage the development of sustainable energy, as the establishment of the National Development Strategy 2030, through which the State includes in the economic model of long-term development, the promotion of renewable sources for electricity generation, since these provide the double benefit of increasing the country's energy matrix by cleaner sources, and thus promote sustainable development.

Considering what have been described above, it can be said that the project complies with the current laws and regulations of the country dealing with renewable sources of power generation. Specifically, the project activity is not affected by the body of actual main regulations (See Table 7).

Table 7. Policy compliance for second crediting period (yes √ – not X)

Policy	Impact on baseline	Validity during crediting period	Outstanding changes since issuance
Law 57-07 of 2007 – about Renewable energies and its incentives. New Law 115-15 about modification to Law 57-07[20]. (Articles 10.12 and 23 of this law were modified in 2012 not impacting the baseline. Decree 253-12 Eliminate some incentives offered by Law No.57-07)	X	√	√
Law 125 – 01 of 2001 modified on 2007 – Law 186-07 General electricity Law[21]	X	√	√

Since the project was constructed and operated in a highly regulated market that is controlled by a series of public and private actors, compliance with all applicable laws and regulatory requirements is supervised and can be guaranteed.
Therefore, it can be concluded that the fundamental elements of the baseline have not changed since the project was first registered, and the market structure, regulatory framework, and functioning remains the same

Step 1.2: Assess the impact of circumstances

At the time of requesting renewal of the crediting period on the current baseline emissions, no impact of circumstances prevail. It can be concluded that the conditions used to determine the baseline emissions in the previous crediting period are still valid.
Law 57-07 which promotes renewable energy has not modified prices or electricity availability. The enactment of that law has not enhanced the continuation of the baseline scenario at the time of validation.

[20] See document – (2015) Ley 115-15 sobre modificación a 57-07.pdf
[21] See document – (2007) Ley No. 186-07 modifica Ley 125-01.pdf

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested

Since the baseline scenario identified at the validation is the continuation of the current practice, i.e. the electricity would be supplied by the power grid in the absence of the project activity, and the baseline did not consider the use of any existing equipment by the project, because in the absence of the project activity the energy generated would have been generated by the operation of grid-connected power plants and by the addition of new generation sources to the grid, this step is not applicable.

Step 1.4: Assessment of the validity of the data and parameters

Relevant data and parameters, as the build and operating margin emission factors for the combined margin emission factor calculation, were updated for the second crediting period according to the TOOL07 - Tool to calculate the emission factor for an electricity system - version 7.0. This update includes Grid Emission Factor and all input values used in its calculation (fossil fuel emission factors, efficiencies etc). Application of Steps 1.1, 1.2, 1.3 and 1.4 above confirmed that the current baseline remains valid for the second crediting period; even though, some data and fixed parameters needed to be updated due to changes presented above. In this context step 2 is assessed below.

Step 2: Update the current baseline and the data and parameters
Step 2.1: Update the current baseline

Baseline emissions for the second crediting period have been updated in accordance with the stated above in step 1.4., without reassessing the current baseline, based on the latest approved version of the methodology ACM0002 (version 20.0). This update was applied in the context of the sectoral policies and circumstances that are applicable at the time of requesting for renewal of the crediting period, which have not changed as to affect the project dispatch.

Step 2.2: Update the data and parameters
As said in step 1.4, the parameters regarding the grid emission factor calculation have been updated for this second crediting period using TOOL07 - Tool to calculate the emission factor for an electricity system - version 7.0. The build margin emission factor was updated for the second crediting period applying the ex-ante option, and the same way, the operating margin emission factor was reevaluated applying the ex-post option – Dispatch Analysis OM calculation. More details can be seen in section B.6 and B.7 (updated monitoring parameters)

B.5. Demonstration of additionality

It is important to clarify that the sensitivity analysis data has been maintained in accordance with the data available during the validation process, and the additionality was not evaluated during the renovation of the project.

A wind power project activity in the general area of the proposed project was first conceived in 2004, by an electricity company named Consorcio Energético Punta Cana – Macao (CEPM). Between 2002 and 2006 CEPM carried out wind studies in 6 different sites of Dominican Republic. The wind studies revealed that one of the sites with adequate wind potential to develop a wind farm was a location between the communities of Juancho and Los Cocos, in Pedernales province. Thus, CEPM intended to build a 100 MW wind farm: Juancho - Los Cocos Wind Farm, in the mentioned site. In 2004 CEPM obtained the necessary environmental and operational permits to install and operate a wind farm project. With the intention of obtaining CDM revenues, in 2006, CEPM started the process in order to seek CDM registration for the installation of a 100 MW wind farm project at the project site. By the end of 2006 the validation process started and the PDD was

placed in the UNFCCC site for public comments between January and February of 2007[22]. By May 2007 the Renewable Electricity Law was published in the country, and Juancho-Los Cocos wind farm project obtained the Letter of Approval in November 2007. However, in 2008 the project experienced technical modifications which postponed its due execution, and thus, CEPM had to cancel the validation process[23].

In September 2008, EGE HAINA, a party related to CEPM[24], started to evaluate the possibility of taking over the implementation of the wind farm and continuing with the CDM cycle process. As a result of that decision, in September 2008,[25] the EGE HAINA Board of Directors voted in favor of approving the investment in the Juancho Los Cocos project, mentioning the benefits of carbon credits, and recognizing the steps-contract with CDM consultant and CDM DOE for the validation-already taken by CEPM in obtaining carbon credits for the CDM project Juancho-Los Cocos. Shortly thereafter, EGE HAINA, made a partial deposit of €10,642,558[26]-20% of total purchase price-for the purchase of 25 Vestas V80 wind turbines, each with a capacity of 2 MW, for the project "Juancho-Los Cocos. In October 2008, CEPM and EGE HAINA signed a lease agreement for the common land use for the two companies. At that moment, EGE HAINA had the intention to develop the first phase of Juancho-Los Cocos 100 MW wind farm.

In May 2008, the *Law on Incentives for the Development of Renewable Energy Sources and Special Regimes, No. 57-07*[27] came into force.[28] This law grants tax incentives to wind farms with a capacity of up to 50 MW. Since the environmental license for "Juancho-Los Cocos" wind farm, obtained in 2004[29], corresponded to a wind farm exceeding 50 MW, EGE HAINA and CEPM decided to reduce the size of the Juancho Los Cocos wind farm in order to benefit from the tax incentives. Thus, Juancho Los Cocos Wind Farm Project evolved into Los Cocos Wind Farm (current CDM project activity), a smaller version of Juancho-Los Cocos Wind Farm. Most of the wind studies, land agreements, licenses which were requested for "Juancho-Los Cocos Wind Farm" are applicable and still in use/force for "Los Cocos Wind Farm". The events listed in the table below show that there is early and serious consideration of the CDM.

For EGE HAINA, CDM benefits of the proposed project activity were considered from the very beginning. The investment analysis performed to obtain the approval of the project by the Board considered CDM revenues, and carbon credits were considered through the development of the project. EGE HAINA intended to continue with the validation process which was being developed for Juancho - Los Cocos Wind Farm and obtain CDM revenues, so in December 2009 EGE HAINA signed a new Professional Services Agreement with MGM Innova for the revision of the PDD, continuation of the validation and support during the registration process[30]. However, after analyzing the CDM project with the CDM consultant, it was decided that the most conservative approach was to start a new Global Stakeholder Process, mainly because the project participants had changed, and the project experienced important technical modifications. At the time of developing this CDM-PDD, there was uncertainty on how to define the starting date of the proposed project activity. A reasonable option was to consider that real action for the development

[22] Source: http://cdm.unfccc.int/Projects/Validation/DB/5N8UXX9QLCP557KL4X8H3VRJ77QLRK/view.html
[23] 32.101022 Tuv Sud-CEPM Letter.pdf
[24] At the moment of validation EGE HAINA and CEPM were related parties. Both companies had shareholders in common. CEPM's President was the Director of HAINA's Board of Directors and CEPM's CEO was General Manager of EGE HAINA. Thus, the two companies shared resources and certain services.
[25] 20. 080901 Presentacion Consejo HAINA.pdf
[26] 18. 080912 Vestas letter.pdf and 19. 080916 Payment VESTAS.pdf
[27] Source: *Ley No. 57-07 de Incentivo a Las Energías Renovables y Regímenes especiales (07 de Mayo del 2007*). http://www.sie.gov.do/archivos/leyes/Ley%20de%20Incentivo%20a%20las%20Energias%20Renovables%20y%20Sus%20Regimenes%20Especiales.pdf
[28] Source: *Reglamento de Aplicación de la Ley No. 57-07, de Incentivo al Desarrollo de Fuentes Renovables de Energía y de sus Regímenes Especiales, aprobado por Decreto No. 202-08. Publicado en la G. O. No. 10469, del 30 de mayo de 2008*.
[29] 4. 040809 Env. Lic. 0340-04.pdf
[30] 23. 091215 MGM HAINA CDM.pdf and 30. 100504 Amendment MGM HAINA.pdf

of the project (project starting date) was taken once the agreement for the construction of the wind farm was made; thus, although a PDD for Juancho Los Cocos Project was already published, a Prior Consideration of the CDM Form was submitted to UNFCCC and the DNA on May 24th, 2010, in order to ensure the prior consideration of the CDM.

However, the PDD was initially published for global stakeholder comments on 5 January 2007, i.e. prior to the start date. Hence, a prior consideration form does not need to be submitted to the UNFCCC and the DNA, according to the CDM Guidelines[31].

On **March 23, 2010** EGE HAINA signed with COBRA the agreement for the construction of Los Cocos Wind Farm. This is the first real action related to the implementation of the proposed project related to the final project configuration. Therefore, this is the **starting date of the project activity**. Moreover, this date is also considered to be the **date of investment decision**. On 18/11/2010, a resolution was issued by EGE Haina to retroactively authorize the signature of the EPC contract, which demonstrates that the investment decision was also made on 23/03/2010.

The timeline of events leading to implementation of Los Cocos Wind Farm is described in Table 8:

Table 8. Timeline of events leading to implementation of the project activity

Date	Entity	Event	Document/Reference
01/ 2002	CEPM - Risø	First wind studies developed by Risø for the proposed project activity. Site inspection report for one year of dedicated measurements of the wind resource at four sites situated in Dominican Republic.	*CEPM Wind Energy Project. Site Inspection Report.* 1. 020101 Riso.Site Inspection Report.pdf
02/2003	CEPM - Risø	Risø wind studies. One Year Status Report for CEPM Wind Energy Project. Results and findings after 12 months of wind measurements at the five CEPM wind sites in Dominican Republic	2. 030201 Riso.One-year-final.pdf
02/2004	CEPM	Development of the Environmental Impact Assessment for the project Juancho-Los Cocos and delivery of it to the Ministry of Environment and Natural Resources.	5. 2004 DIA Informe final.zip *Declaración de Impacto Ambiental "Parque Eólico Juancho – Los Cocos".* MBG & Asociados, 2004
07/2004	CEPM-Risø	Risø wind studies. Two-year status report	3. 040701 -Two-year status.pdf
08/2004	CEPM	Approval of the Environmental Impact Assessment of Juancho Los Cocos Wind Farm Project and emission of Environmental Permit number 0340-04 for the installation of Juancho Los Cocos Wind Farm by SEMARENA	4. 040809 Env. Lic. 0340-04.pdf
07/2005	CEPM-Risø	Risø wind studies. Site inspection report 2005	6. 050701 Riso. Site Inspection.pdf
11/2005	CEPM-Risø	Risø wind studies. 18 Wind Farm Cases at Los Cocos/Juancho - Site 4	7. 051101 Riso. 18 cases.pdf
02/2006	CEPM-Risø	Risø wind studies. Characteristics of wind farm energy production at site 4	8. 060201 Riso.Site4.pdf
04/08/2006	CEPM-ESD	Professional Services Agreement between CEPM and Energy for sustainable Development (ESD) for the development of	10. 060804 CDM.CEPM-ESD.pdf

[31] EB 62, Annex 13, version 4: Guidelines on the demonstration and assessment of prior consideration of the CDM.

Date	Entity	Event	Document/Reference
		CDM project: Los Cocos wind power project	
14/08/2006	CEPM - IAD	Cooperation agreement between CEPM and the Instituto Agrario Dominicano (IAD) for the land use for Juancho Los Cocos wind farm.	9. 060814 Coop.Agr. IAD CEPM.pdf
19/09/2006	CEPM	Internal memo between the Director of the Development Department of CEPM, Jose Rodriguez, and the General Manager of CEPM which expresses the importance of CDM revenues in the development of the wind project.	11. 060919 Los Cocos CDM memo.doc
31/10/2006	CEPM – TÜV SÜD	Service Order for the validation of Juancho Los Cocos Wind Farm Project	12. 061031 TUV SUD Order.pdf
05/01/2007	CEPM - ESD - TÜV SÜD	PDD for “Juancho - Los Cocos wind farm project, 100MW” is placed at UNFCCC web site, open for comments until February 3, 2007.	http://cdm.unfccc.int/Projects/Validation/DB/5N8UXX9QLCP557KL4X8H3VRJ77QLRK/view.html 13.070105 PDD Juancho Los Cocos.pdf
13/04/2007	TÜV SÜD	Draft Validation Report of the CDM Project: “Juancho – Los Cocos wind farm project, 100 MW” from TÜV SÜD, which expressed positive opinion on the project.	14. 070413 Validation Report.pdf
07/05/2007		Promulgation of Renewable Energy Law Nr. 57-07.	070507 Ley57-07.pdf
06/11/2007	DNA	Letter of Approval (LoA) for Juancho - Los Cocos.	15. 071106 LoA.pdf
19/03/2008	CEPM - IAD	Addendum to Cooperation Agreement between IAD and CEPM for the development of Juancho Los Cocos wind farm project	16. 080326 Amendment IAD CEPM.pdf
09/2008	EGE HAINA	The project activity is presented to EGE HAINA’s Board.	20. 080901 Presentacion Consejo EGE HAINA.pptx
16/09/2008	EGE HAINA	Haina’s Executive Board Meeting which approves the purchase of 25 wind turbine generators Vestas.	17. 0408 EB Minute.pdf
16/09/2008	EGE HAINA	Down payment upon the purchase of 25 wind turbine generators model Vestas V80, 2MW for the project “Juancho Los Cocos”.	18. 080912 Vestas letter.pdf 19. 080916 Payment VESTAS.pdf
01/10/2008	EGE HAINA CEPM	CEPM signs a lease agreement with EGE HAINA, for common land use between the two companies.	21. 081001 Land use EGE HAINA CEPM.PDF
26/10/2009	EGE HAINA	EGE HAINA requests for an extension of the environmental license approved for Juancho Los Cocos wind project, in order to include Los Cocos wind farm project	22. 091026 Solicitud Esición.pdf
15/12/2009	EGE HAINA MGM	Professional Services Agreement between EGE HAINA and MGM Innova for the development of the project as CDM	23. 091215 MGM EGE HAINA CDM.PDF
23/12/2009	EGE HAINA - VESTAS	EGE HAINA signs a contract with Vestas for the purchase of 14 Vestas V90 1.8 MW turbines.	24.091223 Supply&Inst VESTAS.PDF
23/12/2009	GARRAD HASSAN- EGE HAINA	GARRAD HASSAD completes a “bankable” study for CEPM and EGE HAINA.	25. 091223 Garrad Hassan.pdf
23/12/2009	CNE	The CNE authorizes EGE HAINA the preliminary concession for the development of	Resolución CNE-CP-0071-2009

Date	Entity	Event	Document/Reference
		Los Cocos Wind Farm.	091223 Resolución CNE-CP-0071-2009.pdf
23/02/2010	CEPM - TÜV SÜD	CEPM writes a letter to TÜV SÜD in order to terminate the Service Order agreement for the validation of Juancho Los Cocos Wind Farm Project	26. 100223 Withdrawn L. TUV SUD CEPM.pdf
12/03/2010	EGE HAINA CEPM PRODEVAJ	Cooperation agreement between CEMP, EGE HAINA and PRODEVAJ for the development of two wind projects and the use of the land.	27. 100312 Prodevaj.Haina.CEPM.PDF
23/03/2010	EGE HAINA COBRA	EGE HAINA signs an agreement with COBRA (UTE Los Cocos) for the construction of Los Cocos Wind Farm. *This is considered to be the" date of investment decision" and the "start date" of the project activity*.	28. 100323 Cobra Contract.zip
05/04/2010	EGE HAINA COBRA	Start of construction works. Invoice for Milestone payment number 1 from UTE Los Cocos to EGE HAINA	29. 100405 Invoice Construction.pdf
04/05/2010	EGE HAINA - MGM	Amendment Agreement to Professional Services Agreement Dated on December 15, 2009 between EGE HAINA and MGM Innova.	30. 100504 Amendment MGM HAINA.pdf
24/05/2010	EGE HAINA	Prior Consideration Form submission to UNFCCC and DNA	31. 100519 UNFCCC.pdf 31. 100524 email UNFCCC DNA.htm
06/2010	EGE HAINA	Haina starts developing fauna studies as a complement of the Environmental Impact Assessment	*Primer Informe de Avance Ornitofauna.pdf*
22/10/2010	TÜV SÜD	TÜV SÜD letter to CEPM regarding closure of Juancho Los Cocos Wind Farm Project, 100 MW.	32.101022 Tuv Sud-CEPM Letter.pdf
13/11/2010	EGE HAINA-MGM - TÜV Nord	PDD for "Los Cocos wind farm" is placed at UNFCCC web site, open for comments.	http://cdm.unfccc.int/Projects/Validation/DB/MROMUKO2COBBAA08FNK2NJN8I1F4E5/view.html
18/11/2010	EGE HAINA	Seventh Resolution of EGE Haina's Executive Board Meeting to approve four decisions taken by Pastor Sanjurjo in the name of EGE HAINA, including (iv) Turnkey Supply, Construction and Installation Agreement between Urbanenergía, S.L. y Energía y Recursos Ambientales Internacional, S.L. Unión Temporal de Empresas Ley 18/1982 and EGE HAINA, executed on 23 March 2010. The resolution demonstrates that the decision was made on 23 March 2010.	Resolucion_Firma_Don_Tito_(Los_Cocos_I).pdf

As noted earlier the start date of the project activity was 23 March 2010. However, since the PDD was published for global stakeholder comments prior to this date, on 5 January 2007, the project meets the Guidelines for the prior consideration of the CDM.

The additionality of the project activity is demonstrated and assessed applying the "*Tool for the demonstration and assessment of additionality*" (version 06.0.0), as stated in ACM0002 version 12.3.0. at the moment of project validation.

The tool provides a stepwise approach to demonstrate and assess additionality. These Steps include:

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations;

Step 2. Investment analysis to determine whether the proposed project activity is not: (1) the most economically or financially attractive, or (2) economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

Step 3. Barriers analysis; and

Step 4. Common practice analysis.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a: Define alternative scenarios to the project activity

As per methodology and as stated in Section B.4, the baseline scenario consists of the electricity that would have been generated and delivered to the grid in the absence of the proposed project activity by:

a) Other plants currently connected to the SENI, and

b) New additions to the system

Sub-step 1b: Consistency with mandatory laws and regulations

There are two main laws which define the regulatory framework of the electricity generation sector in Dominican Republic in general, and to promote renewable energy in particular. These are briefly described below.

- The ***General Electricity Act*** (created by the law 125-01 of 2001) and its modification with the decree 749-02 of September 2002. The main issues defined by the law are the following:
  - Assurance that at least 20 % of all electricity trading is done on the spot market.
  - Limiting distribution company ownership of generating plants to not more than 15% of peak load in the interconnected system (renewable energy sources are exempt from this rule).
  - Regulation of electricity tariffs for public-grid customers with maximum connected loads of 2 MW as long as the customers do not enter into direct contracts with the suppliers.
  - Electricity companies which intend to operate an electricity generation business above 2 MW[32] must request a concession for the operation of electricity works.
  - Regulation of transit tariffs for the use of transmission and distribution of facilities.
  - Provision of preferential treatment to companies that generate electricity from renewable energy sources with regard to sales and load distribution - if prices and conditions are otherwise identical.
  - Exemption of companies generating electricity using renewable energy sources from national and local taxes for five years.

- The ***Law on Incentives for the Development of Renewable Energy Sources and Special Regimes, No. 57-07***[33] and its Implementation Regulation[34] This law promotes wind farms with

[32] Source: *Reglamento para la Aplicación de la Ley General de Electricidad (No. 125-01).* Article 60. http://www.sie.gov.do/archivos/leyes/Reglamento%20para%20la%20Aplicacion%20de%20la%20Ley%20General%20de%20Electricidad.pdf

a capacity of up to 50 MW, mini hydropower plants of up to 5 MW, PV installations of all sizes, concentrating solar thermal power stations of up to 120 MW, biomass power stations with a biomass fuel input of at least 60% and an output of a maximum 80 MW, and ocean power plants. The law also promotes technologies for solar heat generation and refrigeration. The incentives include the following:

- 100% exemption over import duties for equipment, machinery and accessories required for renewable energy production.
- 100% exemption over sales tax, for all above mentioned equipments.
- Reduction to a fixed 5% on the tax over foreign financed interest payments, modifying Art. 306 of the Dominican Tax Code for the beneficiaries of this new law.
- Owners or renters of family homes and commercial or industrial establishments who shift to renewable energy systems for their private consumption are given a tax credit equal to 40% of the capital cost of the equipment purchased.
- This law also calls for the creation of a CO_2 emissions bond market under the platform of the Kyoto Protocol, regulated by the Ministry of Natural Resource's Mechanism of Clean Development.

The proposed project activity is consistent with the current laws and regulations of the country. Regarding the *General Electricity Law*, the project activity complies with all applicable legal and regulatory requirements. The *Law on Incentives for the Development of Renewable Energy Sources and Special Regimes*, states that wind farms with overall installed power of under 50MW would be entitled to the incentives established by the Law. As the proposed project activity would entail a total power of 25.2MW, the project would be entitled to the incentives set out in the law. These incentives are tax exemption for imported equipment and for electricity revenues. Thus, the proposed project activity, undertaken without the CDM, is a viable option and is included for further analysis.

The alternative baseline scenario comprises power plants currently connected to the SENI system and new additions to the system. The electricity not generated by project activity would be dispatched to the SENI by existing plants (operating margin) and by future plants (build margin). As operations in existing plants and construction of new plants are valid alternatives under applicable laws and regulations, the alternative scenario is in compliance with the regulatory framework for electricity supply by existing or future SENI plants. Thus, scenario b) is a viable option and is included for further analysis.

<u>Step 2: Investment analysis</u>

The purpose of this step is to show that the proposed project activity is economically and financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sales of certified emission reductions (CERs). The analysis is in compliance with the "*Guidance on the Assessment of Investment Analysis*" (Version 05).

Sub-step 2a. Determine appropriate analysis method

[33] Source: *Ley No. 57-07 de Incentivo a Las Energías Renovables y Regímenes especiales (07 de Mayo del 2007*). http://www.sie.gov.do/archivos/leyes/Ley%20de%20Incentivo%20a%20las%20Energias%20Renovables%20y%20Sus%20Regimenes%20Especiales.pdf

[34] Source: *Reglamento de Aplicación de la Ley No. 57-07, de Incentivo al Desarrollo de Fuentes Renovables de Energía y de sus Regímenes Especiales, aprobado por Decreto No. 202-08. Publicado en la G. O. No. 10469, del 30 de mayo de 2008*. http://faolex.fao.org/docs/pdf/dom95065.pdf

The project activity generates incomes other than CDM related income, so a simple cost analysis (Option I) cannot be applied. The available alternatives are investment comparison analysis (Option II) and benchmark analysis (Option III).

As stated in the "*Guidance on the Assessment of Investment Analysis*" (version 05): *"If the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and* ***a benchmark approach is considered appropriate."***

The guidance further states that:

"The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest."

This is clearly the case for a private facility in general, and for EGE HAINA in particular. This justifies the choice of Option III: Benchmark analysis.

Sub-step 2b. Option III. Benchmark analysis

The additionality tool requires an identification of the most appropriate financial indicator. For the case of a power plant that would supply energy to the grid, the most appropriate indicator is the internal rate of return (IRR) as it characterizes the rate of return on invested capital. In this analysis an equity IRR is calculated in accordance with the additionality tool and the corresponding guidelines as indicated above. Taxation is included as an expense in the IRR calculation, i.e. the IRR is determined as a post-tax indicator.

In accordance with the "Guidelines on the assessment of investment analysis" (version 5) a default value for the expected return on equity is used for the benchmark. The relevant benchmark for energy projects in Dominican Republic (Group 1 with Moody's rating Baa3 as given in the guidelines) is 13.75% in real terms. As per the Guidelines, since the investment analysis is carried out in nominal terms, the real term values provided can be converted to nominal values by adding the inflation rate. Since no long-term inflation forecasts or target rates of the central bank for the duration of the crediting period exists, the average forecasted inflation rate of 5.17% for the next five years after the start of the project activity published by the IMF (International Monetary Fund World Economic Outlook) is used (based on the forecasts in 2011 for the period from 2011 to 2015).

The benchmark, i.e. the Nominal Return on Equity, is therefore found to be 18.92%.

According to the "*Tool for the demonstration and assessment of additionality*" (version 06.0.0), and the "*Guidelines on the assessment of investment analysis*" (version 05), input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant. Thus, the investment analysis is calculated based on available information from the project activity and macroeconomic conditions of Dominican Republic at the moment of the investment decision (23 March 2010).

Sub-step 2c. Calculation and comparison of financial indicators

(1) <u>Basic parameters for calculation of financial indicators</u>

The equity Internal Rate of Return (IRR) of the proposed project activity was calculated based on the financial study of the proposed project at the time of the investment decision (23 March 2010), using the basic parameters for the calculation of financial indicators such as the net generation for sale, nodal factor, capacity factor, monomic price, transmission tolls, capital investment, operation

and maintenance costs, cost of land lease, depreciation, etc[35]. A summary of the basic parameters included in the benchmark analysis is presented in Table 9.

Table 9. Investment parameters included in the benchmark analysis. (see "Los Cocos IRR 28May12.xlsx")

Electricity generation	Value	Unit	Source / Document
Gross generation	74,200	MWh/year	Assessment of the energy production of the proposed Juancho-Los Cocos wind farm. Garrad Hassan, December 23rd, 2009. (25. 091223 Garrad Hassan.pdf), p. 20 top, layout "9c1 v3"
Loss in medium voltage	0%	(%)	Neglected, conservative
Transformer losses	0%	(%)	Neglected, conservative
Auxiliary consumption	0%	(%)	Neglected, conservative
Net generation for sale	74,200	MWh/year	Calculated from above
Installed Capacity	25.20	MW	Calculated based on the number of towers and the capacity of each tower
Number of Towers	14		Amendment No. 1 to Cabo Engaño Wind Park Construction and Turbine Supply Agreement. Scope of Supply. Page 8 (9. VESTAS - Amendment.pdf)
Unit Generation Capacity	1.80	MW	
Energy Injection Nodal Factor	1.0	-	Assumed as a conservative approach. The nodal factor is calculated by the SENI system. It depends on the geographic location of the plant and its connection to the SENI. All of the plants close to the location of the wind farm present nodal factors lower than 1.
Electricity sales			
Monomic Price (2008)	125.2	USD/MWh	Regulation for the application of the Renewable Energy Law Nr. 57-07. (May 2008). Chapter 8. Articles 108, 109 and 110 (page 52) (Reglamento Ley no. 57-07.pdf)
Annual increase in Monomic Price (2009 - 2010)	4%	(%)	Regulation for the application of the Renewable Energy Law Nr. 57-07. (May 2008). Chapter 8. Article 109 Page 52 (Reglamento Ley no. 57-07.pdf)
Annual increase in Monomic Price (2011 - 2018)	2.5%	(%)	Regulation for the application of the Renewable Energy Law Nr. 57-07. (May 2008). Chapter 8. Article 109 Page 52 *(Reglamento Ley no. 57-07.pdf)*. For years 2011 to 2018 the increase is according to Consumer Price Index (CPI). For years 2019 to 2027 the increase is according to CPI minus 1%. The estimated CPI was calculated as the average CPI between 2000 and 2009 (2,54%). This value was estimated based on Consumer Price Index reported by the U.S. Department Of Labor . *Consumer Price Index.xlsx*. Source: ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.
Annual increase in Monomic Price (2019 - 2027)	1.5%	(%)	
Total Capital Costs			
Vestas payment	$15,114,560.87	USD	Advance payment of USD 15,114,560.87, made on 16 September 2008. At the moment of investment decision, the book value is assigned to the project and included as a project expense. See "080916 Payment

[35] *Ibid*

			VESTAS.pdf"
Construction costs (EPC contract)	$54,144,410	USD	Turnkey Supply, Construction and Installation Agreement between EGE Haina and COBRA, see "8.1. Price" on page 27 ("Final Executed Version of Haina-Cobra EPC.pdf"). The total contract amount is the sum of the onshore work price (EUR 4,751,022) and the offshore work price (EUR 35,061,044). The applicable exchange rate 1.36 USD/EUR is defined in the same paragraph of the contract.
Contingencies (5% of additional investment)	$2,707,220	USD	A 5% contingencies is assumed by CEPM. (The Vestas payment is excluded).
Equity	100%	(%)	No loan financing. The project is 100% equity financed.
Debt	0%	(%)	No loan financing. The project is 100% equity financed.
O&M costs			
O&M Fee (USD/yr)	$1,484,107	USD/yr	"Service and Availability Agreement.pdf" (dated: 23/03/2010), Page 40. EUR 50,400 per year for each operational turbine and EUR68 per day per WTG (Interim Fee). The O&M fee is fixed during 10 years as per the terms of the agreement. For sake of conservativeness, this fixed price is further maintained in the financial analysis during the total project period, although an adjustment would be reasonable after the first 10 years due to inflation. (Values converted to USD with the representative exchange rate at the time of investment decision).
Other Expenses			
Insurance	$178,880	USD/yr	Power Guard Speciality Insurance Services indication, (sent by email on 01/02/2010). Annual Premium for Los Cocos Wind Farm. (indication los cocos.pdf). Indication corresponds to annual premium of 166,400 USD/yr covering Operational All Risk (OAR) for USD 62,400,000 ; Business Interruption (BI) for USD 12,000,000 and Catastrophe Perils (CAT Perils), plus the Terrorism Risk Insurance Act (TRIA) premium of 12,480 USD/yr. (Note: the insurance for the construction period is not included, which is conservative).
Land Lease	50,400.00	USD/yr	PRODEVAJ and IAD Agreements. There are two institutions: PRODEVAJ and Instituto Agrario Dominicano (IAD). Both of them require 1,800 USD per tower. - Prodevaj Agreement: (Convenio de Cooperacion PRODEVAJ-CEPM.EGE-Haina (Legalizado).pdf) page 4 paragraph 13th. - IAD Agreement: (Definitive land use agreement.pdf), page 4, article 3.

Balance of Plant costs	$303,597.22	USD/yr	"Service and Availability Agreement.pdf" (dated: 23/03/2010), page 40. "Balance of the plant" (215,424 EUR/year converted to USD). The fee is fixed during 10 years as per the terms of the agreement. For sake of conservativeness, this fixed price is further maintained in the financial analysis during the total project period, although an adjustment would be reasonable after the first 10 years due to inflation.
Regulatory Payments (% of gross revenues)	1.00%	(%)	Regulation for the application of the General Electricity Law Nr. 125-01 (July 2002). Chapter 4, article 46. (2002 Reglamento Ley 125-01.pdf)
Transmission Tolls and Connection Right, year 2000	0.0060	USD/kWh	SIE Resolution 06/2006. Article 2, page 4. (060216 Resolucion Sie-06-2006.pdf)
Transmission Tolls and Connection Right (year 2010)	0.0071	USD/kWh	Calculated value for year 2010, according to SIE Resolution 06/2006. Article 2, page 4. Resolucion SIE-06-2006.pdf. The increase of the annual value for years 2001 to 2010 was done according to the historical annual values of USA CPI with a maximum increase of 2%. (see below rows 78 - 89).
Increase in Transmission Tolls and Connection Right. (from year 2011)	2%	(%)	SIE Resolution 06/2006. Article 2, page 4. *Resolucion SIE-06-2006.pdf.* SIE Resolution 06/2006 states that the annual increase of the Transmission Tolls and Connection Right should be according to USA CPI with a maximum increase of 2%. Since the projected USA CPI for years 2009-onwards is higher than 2% (CPI=2.54%, see below), the maximum increase of 2% has been applied to estimate the future values of this parameter.
Labor and other general & administrative costs	$0.00	USD/yr	Assumed 0 as a conservative assumption
Depreciation			
Depreciation	15%	(%)	Law 11-92. "Codigo Tributario" Article 287. Title II, Chapter 3, Bullet e) (page 70). For category 3, the annual depreciation rate is 15%. (920516 Ley 11-92 Codigo Tributario.pdf)
Project lifetime	20	years	DNV Vestas Turbines Certificate. Annex_1.14_Type_Certificate.pdf
Fair value (year 2032)	0	USD	The equipment lifetime is estimated to be 20 years, see above, i,e, from 2011 to 2030. Hence the fair value of the equipment at the end of the period of investment analysis (2032) is zero. The depreciation rate of the equipment is 15% per year (see "Depreciation Rate" above), so that the "book value" goes to zero in less than seven years, i.e. before 2018. Thus, the fair value as market value of equipment or book value is zero in either case in 2032.
Taxes			
Income Tax rate after exemption expires	25%	(%)	Dominican Tax Law. "Ley 11-92" artículo 297 page 17 (920516 Ley 11-92 Codigo Tributario)
Tax exemption	10	years	Renewable Energy Law. Law Nr. 57-07. (May

			2007). Article 10, page 15. (070507 Ley57-07.pdf)
Macroeconomic Parameters			
Exchange rate USD/EUR at the time of investment decision (23 March 2010)	1.4093	USD/EUR	The 1-year average exchange rate from March 2009 to February 2010 is used, as available on 23/03/2010. See worksheet "Exchange Rate". Source: http://www.x-rates.com/d/USD/EUR/hist2009.html
Exchange rate USD/EUR at the time of the Vestas payment (18 September 2008)	1.4357	USD/EUR	The exchange rate from September 2008 is used. This reflects the real exchange rate at the time of the payment that gives the turbines book value in USD. Therefore, a punctual value is taken for this particular item (instead of a mid- or long-term average). Source: http://www.x-rates.com/d/USD/EUR/hist2008.html
CPI	2.54%	(%)	The estimated CPI was calculated as the average CPI between 2000 and 2009 (2.54%). This value was estimated based on Consumer Price Index reported by the U.S. Department Of Labor. US CPI was used since values are expressed in USD Dollars. (Consumer Price Index.xlsx) ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt.
Benchmark			
Benchmark Return on Equity (post tax)	13.75%	(%)	“Guidelines on the assessment of investment analysis” (version 5), CDM EB62, Annex 5. Appendix. Default values for the expected return on equity
Inflation Adjustment	5.17%	(%)	International Monetary Fund, World Economic Outlook (IMF) Database, September 2011; Dominican Republic % inflation average forecast 2011-2015. As per paragraph 7 of Appendix of the “Guidelines on the assessment of investment analysis” (version 5). The average forecasted inflation rate for the host country published by the IMF for the next five years after the start of the project is used.http://www.imf.org/external/pubs/ft/weo/2011/02/weodata/index.aspx
BENCHMARK: Nominal Return on Equity	18.92%	(%)	Benchmark Return on equity adjusted for inflation, as stated in paragraph 7 of Appendix of the “Guidelines on the assessment of investment analysis” (version 5).

The incentives for the development of renewable energies were considered in the benchmark analysis.

(2) Comparison of the IRR for the proposed project and the financial indicators benchmark

In accordance with the benchmark analysis (Option III), the proposed project will be financially unattractive if the financial indicators of the proposed project (e.g. IRR) are lower than the benchmark rate.

Based on the parameters mentioned above, the equity Internal Rate of Return of the proposed project in the absence of CDM revenues is substantially lower than the benchmark rate, thus, the proposed project activity is unattractive without considering CDM revenues. Details of the calculations are given in Los Cocos IRR 28May12.xlsx.

Table 10. Comparison of the equity IRR for the proposed project activity

IRR of the project without income from CERs	Benchmark
9.21%	**18.92%**

Sub-step 2d. Sensitivity analysis

The purpose of the sensitivity analysis is to examine whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive.

As for the proposed project, four financial parameters were identified as the main variable factors for sensitivity analysis: investment, annual O&M cost, electricity sales price and annual power generation.

Since the IRR of the project is lower than the selected benchmark rate, the sensibility analysis estimates a variation in these four factors of +/- 10%, according to the "Guidelines on the assessment of investment analysis" (version 05), in order to evaluate the likelihood of the IRR to pass the benchmark rate, and becoming the most financially attractive alternative, without considering CDM revenues. The base case represents the real project's IRR (without considering CDM revenues).

The results of the sensitivity analysis are summarized below:

Table 11. Sensitivity analysis

Variation of electricity generation	Base case	10.00%
IRR	9.21%	11.00%

Variation of electricity price	Base case	10.00%
IRR	9.21%	11.00%

Variation of investment costs	Base case	-10.00%
IRR	9.21%	10.73%

Variation of O&M costs	Base case	-10.00%
IRR	9.21%	9.66%

The sensitive analysis above confirms that the proposed project is unlikely to be financially attractive without CDM support, even with a variation of +/-10% of the main parameters of the investment analysis. Therefore, alternative a) is not a feasible alternative baseline scenario. The remaining possible alternative is scenario b).

Since there is at least one alternative scenario, other than the proposed CDM project activity, the common practice analysis is applied in Step 4, to complement and reinforce the investment analysis.

Despite earlier and current intentions to develop grid connected wind projects, at the time of presenting this PDD for validation, no developer has yet succeeded to implement a grid connected

wind farm in the Dominican Republic[36], which is indicative of the range of barriers associated with such an undertaking.

The proposed project activity had to deal with many issues for its implementation. Since there is virtually no local practical knowledge base and experience in developing wind farms in the Dominican Republic, the investment analysis performed at the moment of the investment decision did not consider fully the technical barriers to that were presented once the project started. The unavailability and unfamiliarity of wind power technology in the Dominican Republic means that the imported technology is more difficult to acquire and implied higher costs and increased logistical barriers like international contractual agreements and longer lag times receiving the windmills. Moreover, given the lack of operational wind power projects in the Dominican Republic, it is difficult to find trained staff with the necessary technical skills for operation and maintenance of the turbines. Foreign support is required at all stages of the development of the project, from design and construction to operation, maintenance and decommissioning. Due to the lack of experience, solving problems related to any malfunction of the equipment may require extra time and resources that are not considered by the project. Moreover, all replacement parts will also need to be imported. EGE HAINA will have to take on the learning process costs and learn by means of trial and error. EGE HAINA has subcontracted the operation and maintenance of the wind project, for its first ten years, to COBRA.

In addition, the proposed project is located in an area which is relatively underdeveloped and as such has poor infrastructure. Also, there is no experience in the country in the transport of large size equipment such as wind towers. The installation of large windmills such as those in the project requires specialized cranes that are much taller than average and have a higher than average load capacity in order to accomplish the complicated installation of the mills. Such cranes are very difficult to find and importing them will be necessary in order to complete installation. This requires an adaptation of the port receiving the cranes and the turbines from overseas (Cabo Rojo Port), since the current infrastructure is not prepared for managing the large size equipment. The dock will be modified, and the storage area improved to allow unloading from a vessel berthed at the existing dock and transporting and storage of the major components described below to be used in constructing an inland wind farm.

Step 3: Barrier Analysis

According to the "*Tool for the demonstration and assessment of additionality*" (Version 06.0.0) if after the sensitivity analysis it is concluded that the proposed *CDM project activity is unlikely to be financially/economically attractive, then proceed to Step 4 (Common practice analysis).* The tool further states that in this case, Step 3 (Barrier analysis) is optional. Thus, this step is not being applied.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity:

Sub step 4a requires providing an analysis of any other activities that are operational and that are similar to the proposed project activity. Article 47 of the *"Tool for the demonstration and assessment of additionality"* (version 06.0.0) sets forth a set of steps applicable to measures listed in paragraph 6 of the Tool. Renewable electricity generation falls within paragraph 6(b), so that the Steps defined in Article 47 may be applied, as undertaken below:

Step 1. Calculate applicable output range as +/- 50% of the design output or capacity of the proposed project activity.

[36] The OC operation reports present the operating parameters of all of the electricity power plants connected to the SENI. As shown in the report from November 11, 2010 (Informe Diario OC-11-11-10.xls) no grid connected wind farm is operating in the SENI electricity system. The report can be downloaded from the OC website: http://www.oc.org.do/

The total capacity of the proposed project activity is 25.2 MW. Therefore, the range is between 12.6 MW and 37.8 MW.

Step 2. In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM Project activities shall not be included in this step.

Based on the available information from the Coordinating Organization (Organismo Coordinador – OC)[37] and the project start date (23/03/2010), there are 8 operational power plants in the host country with similar capacity, i.e. within the range determined in step 1. These plants are presented in **Table 12**.

Table 12. Plants identified in the host country with similar capacity in step 2 (Nall = 8) and those that apply technologies different that the technology applied in the proposed project activity as per step 3 (Ndiff = 8). For the complete analysis, see Excel file "Common Practice Los Cocos"

Power Plant	Technology	Capacity [MW]	Step 2: N_{all} (within +/-50%)	Step 3: N_{diff} (different technology)
CEPP 1	Diesel Engines	18.7	x	x
López Angostura	Hydroelectric Plant	18.4	x	x
Pimentel 1	Diesel Engines	31.6	x	x
Pimentel 2	Diesel Engines	28	x	x
Puerto Plata 1	Steam Turbines	27.6	x	x
Río Blanco	Hydroelectric Plant	25	x	x
Sabana Yegua	Hydroelectric Plant	12.8	x	x
San Pedro Vapor	Steam Turbines	30	x	x

Therefore: $N_{all} = 8$.

Step 3. Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

In Table 12, it is summarized which of the plant with similar capacity apply a different technology than the technology applied in the proposed project activity. As can be observed, there is no operational wind power project connected to the SENI with a similar capacity than the project activity. All other power plants are thermal or hydroelectric power plants; therefore: $N_{diff} = 8$.

Step 4. Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

The proposed project activity is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled: (a) the factor F is greater than 0.2, and (b) $N_{all}-N_{diff}$ is greater than 3.

Based on the results of steps 2 and 3, the results for the project case are:

$$F = 1 - \frac{N_{diff}}{N_{all}} = 1 - \frac{8}{8} = 0.0 < 0.2$$

$N_{all} - N_{diff} = 8 - 8 = 0$

Thus, it can be concluded that the proposed project activity is not a common practice.

[37] see Annual Report 2010 (OC-SENI Memoria Annual 2010) pg. 35 (*Memoria 2010 OC.pdf*)

Sub-step 4b: Discuss any similar options that are occurring

As shown in the analysis in sub-step 4a above, there are no similar activities that are occurring. Since wind power plants are still costly and a completely new practice in the SENI, it is clear that this energy resource requires the financial incentives from the CDM in order to be economically more attractive.

Since the above analysis satisfies all the steps described in the "*Tool for the demonstration and assessment of additionality*" (version 06.0.0), and as the alternative scenario entails the use of fossil fuels within the established emissions boundary, Los Cocos Wind Farm project is additional.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

Project emissions

According to ACM0002 version 20.0 project emissions (PE_y) for wind farms are zero.

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (1)$$

Where:

PE_y = Project emissions in year y (tCO_2e)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO_2)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases n year y (tCO_2e)

$PE_{HP,y}$ = Project emissions from reservoirs of hydro power plants in year y (tCO_2e)

The proposed project is a wind farm that neither uses fossil fuel nor operates geothermal power. Furthermore, since the project activity has no reservoir, this step is not required, and the project emissions are zero:

Then, $PE_y = 0$

Baseline emissions

The baseline scenario and the emission rate calculation are based on the electricity that otherwise would have been generated by the plants connected to the grid and by addition of future plants.

Baseline emissions include only CO_2 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 would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \, x \, EF_{grid,CM,y} \quad (2)$$

Where:

BE_y = Baseline emissions in year *y* (tCO_2)

$EG_{PJ,y}$ = 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)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*" , version 7.0, (tCO_2/MWh)

Calculation of $\boldsymbol{EG_{PJ,y}}$

If the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield project), then:

$$\boldsymbol{EG_{PJ,y} = EG_{facility,y}} \quad \textbf{(3)}$$

Where:

$EG_{PJ,y}$ = 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)

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

$EG_{PJ,y}$ will be calculated as the sum of the quantity of net electricity generation supplied by the project plant/unit to the grid in each hour h ($EG_{PJ,h}$) during one year.

The project activity will deliver electricity to a 138/34.5 kV substation, which will deliver electricity to the SENI grid. The substation will also receive electricity from Quilvio Cabrera Wind Farm and Los Cocos II. Thus, the measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation performed by meters SMC TR01, TR02, TR03 and TR04, represents the net energy delivered to the grid by Los Cocos Wind Farm – (LCI), Los Cocos II Wind Farm – (LCII) and Quilvio Cabrera Wind Farm – (QC), as shown in Figure 16 in section B.7.2. It is important to clarify that even though Larimar Wind Farm is part of the whole Eolic system as can be seen in **Figure 9**, the wind farm generation data reported to the SENI is measured in the commercial measurement points recognized by the OC-SENI on the side of 34.5 kV located in Lines L10 and L11; which allows to manage Larimar independently from the generations of Quilvio Cabrera, Los Cocos and Los Cocos II Wind Farms. Taking this into account the public generation data and economical transactions reports performed by the OC SENI for Larimar Wind Farm (which includes Larimar I and Larimar II), are always presented separated from the rest of the Wind Farm System.

The quantity of net electricity supplied to the grid by the proposed project activity in hour *h* ($\boldsymbol{EG_{PJ,h}}$) will be calculated multiplying the value of the measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation ($\boldsymbol{EG_{SMC,h}}$) by the proportion of the electricity generated by Los Cocos Wind Farm at each hour *h* ($\boldsymbol{K_{LC,h}}$). This value represents the net electricity delivered to the grid by Los Cocos Wind Farm, and is calculated as follows:

$$\boldsymbol{EG_{PJ,h} = EG_{SMC,h} \times K_{LC,h}} \quad \text{(Additional equation 1)}$$

Where,

$\boldsymbol{EG_{SMC,h}}$ = Quantity of net electricity supplied to the grid at Commercial Measurement System (SMC) point at the 138/34.5kV substation by Los Cocos Wind Farm, Los Cocos II Wind Farm and Quilvio Cabrera Wind Farm in hour *h* (MWh/h). Measurement points are identified as SMC TR01, TR02, TR03 and TR04.

$\boldsymbol{K_{LC,h}}$ = Proportion of the electricity generated by Los Cocos Wind Farm in hour *h* (ad), taking into account transformation losses to be able to handle similar voltage levels (From 34.5 kV to 138 kV-network delivery point $\boldsymbol{EG_{SMC,h}}$).

The calculation of $\boldsymbol{EG_{PJ,h}}$ for the project activity will be as follow

The proportion of the electricity generated by Los Cocos Wind Farm in hour *h* ($K_{LC,h}$) is calculated dividing the hourly value of the total net electricity generated by Los Cocos Wind Farm measured at the 34.5 kV lines (measurement of lines L2 and L3, applying transformation losses as showing bellow for parameter $EG_{(LCI), L2+L3,h}$) by the hourly value of the total net electricity generated by Los Cocos – (LCI), Los Cocos II – (LCII) and Quilvio Cabrera – (QC) Wind Farms, measured at the 34.5 kV lines (measurements of lines L1, L2, L3, L5, L6, L8 and L9, applying transformation losses as showing bellow for parameters $EG_{(LCI), L2+L3,h}$, $EG_{(QC),L1,h}$ and $EG_{(LCII), L5+L6+L8+L9,h}$), as shown in **Figure 9** and **Figure 10**. Thus, $K_{LC,h}$ is calculated as follows:

$$K_{LC,h} = \frac{(EG_{(LCI),L2+L3,h})}{(EG_{(QC),L1,h} + EG_{(LCI),L2+L3,h} + EG_{(LCII),L5+L6+L8+L9,h})} \quad \text{(Additional equation 2)}$$

$EG_{(LCI), L2+L3,h}$ = Quantity of net electricity generated by Los Cocos Wind Farm, which add the energy produced by the wind turbines connected to L2 and L3 at the 34.5 kV line, representing the generation sum of lines L2 and L3 in hour *h* (MWh/h), using class 0.2S equipment.

Since the electricity measurement is calculated by means of measurements at 138kV ($EG_{SMC,h}$) and also 34.5 kV ($EG_{(LCI), L2+L3,h}$). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the following transformation losses equation to Los Cocos I generation data ($EG_{(LCI), L2+L3,h}$).

$$E(h)_{138\,kV}|LCI = E(h)_{34.5\,kV}|LCI - [25.59 + 0.003988 \times E(h)_{34.5\,kV}|LCI]$$

$EG_{(QC),L1,h}$ = Quantity of net electricity generated by Quilvio Cabrera Wind Farm measured at the 34.5 kV line, line L1 in hour *h* (MWh/h), using class 0.2S equipment.

Since the electricity measurement is calculated by means of measurements at 138kV ($EG_{SMC,h}$) and also 34.5 kV ($EG_{(QC),L1,h}$). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the following transformation losses equation to Quilvio Cabrera generation data ($EG_{(QC),L1,h}$).

$$E(h)_{138\,kV}|QC = E(h)_{34.5\,kV}|QC - [8.44 + 0.003988 \times E(h)_{34.5\,kV}|QC]$$

$EG_{(LCII), L5+L6+L8+L9,h}$ = Quantity of net electricity generated by Los Cocos II Wind Farm measured at the 34.5 kV line, representing the generation sum of lines L5, L6, L8 and L9 in hour *h* (MWh/h), using class 0.2S equipment.

Since the electricity measurement is calculated by means of measurements at 138kV ($EG_{SMC,h}$) and also 34.5 kV ($EG_{(LCII), L5+L6+L8+L9,h}$). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the following transformation losses equation to Los Cocos II generation data ($EG_{(LCII), L5+L6+L8+L9,h}$).

$$E(h)_{138\,kV}|LCII = E(h)_{34.5\,kV}|LCII - [53.22 + 0.003988 \times E(h)_{34.5\,kV}|LCII]$$

Leakage

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.

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{(4)}$$

Where:

ER_y = Emission reductions in year *y* (tCO_2e)

BE_y = Baseline emissions in year *y* (tCO_2e)

PE_y = Project emissions in year *y* (tCO_2e)

Calculation of the combined margin CO_2 emission factor for grid connected power generation in year y ($EF_{grid,CM,y}$)

Following the methodology ACM0002 version 20.0, the combined margin CO_2 emission factor for grid connected power generation in year *y* ($EF_{grid,CM,y}$) is calculated using the latest version of the "*Tool to calculate the emission factor for an electricity system*" (version 7.0).

The combined margin emission factor ($EF_{CM,y}$) consists of the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$), as detailed in below.

According to the "*Tool to calculate the emission factor for an electricity system*" version 7.0, project participants shall apply the following six steps:

- STEP 1. Identify the relevant electricity systems.
- STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).
- STEP 3. Select a method to determine the operating margin (OM).
- STEP 4. Calculate the operating margin emission factor according to the selected method.
- STEP 5. Calculate the build margin emission factor.
- STEP 6. Calculate the combined margin (CM) emissions factor.

Step 1: Identify the relevant electricity systems

For determining the electricity emission factors, a **project electricity system** is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

- The relevant electricity system for the proposed project activity is the National Interconnected Electricity System of Dominican Republic (SENI).
- For the purpose of determining the operating margin emission factor, the CO_2 emission factor(s) for net electricity imports is chosen as 0 t CO_2/MWh.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Since information from power generation is available for grid connected power plants and the dispatch data analysis for the calculation of the $EF_{grid,OM,y}$ is used, in order to calculate the operating margin and build margin emission factor only grid power plants are included in the calculation.

- For the proposed project activity, off-grid power plants are not included in the project electricity system (Option 1).

Step 3: Select a method to determine the operating margin (OM)

In accordance with the tool, 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 calculation of the operating margin emission factor ($\boldsymbol{EF_{grid,OM,y}}$) is based on option (c) of the "*Tool to calculate the emission factor for an electricity system*" version 7.0: ***Dispatch data analysis OM.***

- For the project activity, the Dispatch data analysis OM (option c) was selected. The Simple OM method cannot be used since low cost, must-run resources constitute less than 50% of total grid generation in Dominican Republic[38]. Also, it was not necessary to use either the Simple adjusted OM approach or the Average OM approach because hourly detailed dispatch data is available.

- Since this method analyzes the hourly generation of the plants connected to the SENI and their order of merit, the dispatch data analysis provides a more realistic analysis of the electricity displaced by the proposed project activity, and thus, the emission reductions generated by the proposed project activity. The required information to perform this analysis is publicly available at the Coordinating Organization (OC) web site (www.oc.org.do).

- This approach is not applicable to historical data and, thus, requires annual monitoring of $\boldsymbol{EF_{grid,OM,y}}$. The emission factor will be calculated *ex post*, determined for the year in which the project activity displaces grid electricity, and will be updated annually during monitoring.

Step 4: Calculate the operating margin emission factor according to the selected method

(c) Dispatch data analysis OM

The dispatch data analysis OM emission factor ($\boldsymbol{EF_{grid,OM\text{-}DD,y}}$) 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.

Since $\boldsymbol{EF_{grid,OM\text{-}DD,y}}$ is not applicable to historical data and, thus, must be calculated *ex post* and adjusted on an annual basis, in order to estimate *ex ante* emission reductions, historical data has been applied to calculate an ex ante $\boldsymbol{EF_{grid,OM\text{-}DD,y}}$, which is necessary for the *ex-ante* estimation of $\boldsymbol{BE_y}$

The emission factor is calculated as follows:

$$EF_{grid,OM-DD,y} = \frac{\sum h \; EG_{PJ,h} * EF_{EL,DD,h}}{EG_{PJ,y}} \quad \textbf{(5)}$$

Where:

$\boldsymbol{EF_{grid,OM\text{-}DD,y}}$ = Dispatch data analysis operating margin CO_2 emission factor in year *y* (tCO_2/MWh)

$\boldsymbol{EG_{PJ,h}}$ = Electricity displaced by the project activity in hour *h* of year *y* (MWh)

$\boldsymbol{EF_{EL,DD,h}}$ = CO_2 emission factor for grid power units in the top of the dispatch order in hour *h* in year *y* (tCO_2/MWh)

$\boldsymbol{EG_{PJ,y}}$ = 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

- Since hourly fuel consumption data of the power plants connected to the SENI is not publicly available, hourly fuel consumption data is calculated based on each plant's hourly

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[38] OC-SENI (2018) Annual Statistic. Pg 32.

generation and fossil fuel consumption rate. The fossil fuel consumption rate of each plant, the type of fuel used, and the net calorific value of each fuel is published on a weekly basis by the Coordinating Organization (OC)[39]. These reports are available at the OC web site (www.oc.org.do). The file that summarizes all this information available at the OC web site is Fuels2019.xlsx

- Since there are no publicly available country specific CO_2 emission factors of fossil fuels, the CO_2 emission factor of each fossil fuel is estimated based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, as detailed in section B.7.1.
- The grid system dispatch order of operation and the electricity generated and delivered to the grid by each grid power unit in the system during each hour *h* that the project activity is displacing electricity, is obtained from the OC daily operation reports, publicly available at the OC website. This data was provided by EGE HAINA in the file Generacion Neta SENI 2019.xlsx

Then,

$$EF_{EF,DD,h} = \frac{\sum_{i,n} FC_{i,n,h} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{n} EG_{n,h}} \qquad \textbf{(6)}$$

Where:

$EF_{EL\text{-}DD,h}$	=	CO_2 emission factor for grid power units in the top of the dispatch order in hour *h* in year *y* (tCO_2/MWh)
$FC_{i,n,h}$	=	Amount of fuel type *i* consumed by grid power unit n in hour *h* (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,I,y}$	=	CO2 emission factor of fuel type *i* in year *y* (t CO_2/GJ)
$EG_{n,h}$	=	Electricity generated and delivered to the grid by grid power unit n in hour *h* (MWh)
n	=	Grid Power units in the top of the dispatch. At each hour, h, stack each grid power unit's electricity generation using the merit order. The group of grid power units n in the dispatch margin includes the units in the top x% of total electricity dispatched by the hour h, where x% is equal to the greater of either: (a) 10%; or (b) The quantity of electricity displaced by the project activity during hour h divided by the total electricity generation in the grid power plants during that hour *h*.
i	=	Fuel types combusted in grid power unit *n* in year *y*
h	=	Hours in year *y* in which the project activity is displacing grid electricity
y	=	Year in which the project activity is displacing electricity

To determine the set of grid power units n that are in the top of the dispatch, the data was obtained from the national dispatch centre:

(a) The grid system dispatch order of operation for each grid power unit of the system including power units from which electricity is imported; and

[39] SENI Coordinating Organism (OC). Weekly reports SENI operation. "DEFINITIVO – VERIFICACION CVP" Sheet: "Costos Variables de Producción".

- Dispatch order is available daily in the web page of the OC SENI[40] (Organismo Coordinador del Sistema Eléctrico Nacional Interconectado). This merit order changes every day and it depends of the total cost of energy production by each unit. In case of one power unit with multiple fossil fuels used, the CO_2 lower emission was selected. All the data from 2019 is summarized in the file LMs2019.xlsx

(b) The amount of power (MWh) that is dispatched from all grid power units in the system during each hour *h* that the project activity is displacing electricity.

- The amount of power generation (MWh) is considered from “PARQUE EOLICO LOS COCOS” generation project in each hour h in the OC-SENI web page.
- The total data of “PARQUE EOLICO LOS COCOS” was separated in “LOS COCOS I”, “LOS COCOS II” and “QUILVIO CABRERA”.

At each hour *h*, stack each grid power unit’s electricity generation using the merit order. The group of grid power units n in the dispatch margin includes the units in the top x percent of total electricity, dispatched in the hour h, where x percent is equal to the greater of either:

(a) 10 per cent (if 10 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation); or
(b) The quantity of electricity displaced by the project activity during hour h divided by the total electricity generation by grid power plants during that hour h.

- Top x is calculated as follow:
  Every daily file was ordered according to dispatch data order (the first to be displaced is the most expensive)
  The 10% of total generation, for each hour is calculated.
  10% of total hourly generation is compared with electricity generation by project. The higher value is chosen in every hour.
- This model is summarized on an excel worksheet that incorporates and processes data on hourly electricity generation by the plants connected to the SENI, and specific fuel consumption. Hourly dispatch data from the plants connected to the SENI, their merit order and specific fuel consumption is publicly available at the OC website. This information is obtained by EGE HAINA´s Commercial Department on a daily basis. For every day and on an hourly basis, the model calculates the accumulated electricity generation of the grid power units in the top of the dispatch order, until 10% of the total SENI generation is reached. At that percentage of generation, the fuel consumption of the involved plants is calculated based on the fossil fuel consumption rate. Then, the hourly emission factor of the grid power units in the top of the dispatch order is obtained applying equation 13 of the *“Tool to calculate the emission factor for an electricity system”* (version 7.0), by dividing the CO_2 emissions (calculated based on the fossil fuel consumption of the group of *n* plants and the fossil fuel emission factors) by the electricity generation of the group of *n* plants. In file Los_Cocos I_EF_2019.xlsx in sheet “DISPATCH ANALYSES”.
- In order to obtain the dispatch data analysis OM emission factor ($EF_{grid,OM-DD,y}$), the hourly emission factor of the grid power units in the top of the dispatch order is then multiplied by the hourly electricity generation of the proposed project activity. The sum of this product for a whole year is divided by the net electricity generation produced and fed into the grid by the project activity for a whole year, according to equation 12 of the *“Tool to calculate the emission factor for an electricity system”* (version 7.0). The calculation is show in the file Los_Cocos I_EF_2019.xlsx in sheet “DISPLACING PROJECT OM”.

[40] SENI Coordinating Organism (OC). Weekly reports SENI operation. Daily Programming."DEFINITIVO – VERIFICACION CVP" Sheet: "Lista de mérito".Information is available at https://www.dropbox.com/sh/oypr2eikkgpr50d/AAAfeLkIfb_zkpRpz1cxGetJa?dl=0

The OM emission factor results for Dominican Republic for 2019 using the dispatch data analysis are presented below.

Table 13. Operating Margin emission factor for Los Cocos Wind Farm

Year	Sum of EG $_{PJ,h}$ (MWh) [41]	EFgrid,OM-DD,y (tCO_2/MWh)
2019	59,037.94	0.673709603

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, the project participant has chosen for the first crediting period option 1 of the "*Tool to calculate the emission factor for an electricity system"* (version 7.0):

Option 1: For the first crediting period, calculate the build margin emission factor *ex ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Therefore, for this second crediting period the build margin is updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE.

The sample group of power units *m* used to calculate the build margin is determined as per the procedure presented in the "*Tool to calculate the emission factor for an electricity system"* (version 7.0), consistent with the data vintage selected above, as follows:

a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

- The SET_{sample} was determined only using steps (a) ,(b) and (c), because all the units inside the $AEG_{SET\text{-}\geq 20\%}$ started to supply electricity to the grid less than 10 years, so the steps (d), (e) and (f) are ignored.

- The following table shows the set of power units used to calculate the build margin. The selection is based on the available information at the time of the CDM-PDD submission to the DOE for validation.

[41] Los Cocos Wind Farm electricity generation during 2019.

Table 14. Set of power units included in the calculation of the build margin (SETsample)

Power plant / unit	Start of operation	Generation BM MWh	Accumulated generation MWh
PARQUE EOLICO LOS GUZMANCITOS	20/12/2019	5,509.72	5,509.72
PARQUE SOLAR CANOA	20/12/2019	2,152.11	7,661.83
PARQUE SOLAR MATA DE PALMA	15/12/2019	3,875.19	11,537.02
HATILLO 2	22/10/2019	27,72	11,564.74
PUNTA CATALINA 2	29/09/2019	55,015.14	66,579.87
PUNTA CATALINA 1	27/02/2019	1,354,577.52	1,421,157.39
PARQUE EOLICO AGUA CLARA	27/02/2019	116,211.06	1,537,368.45
PARQUE EOLICO LARIMAR II	16/10/2018	131,403.92	1,668,772.37
MONTE CRISTI SOLAR	28/08/2018	103,049.31	1,771,821.68
PALENQUE	21/07/2018	90,495.83	1,862,317.52
PARQUE ENERGETICO LOS MINA CC TOTAL	1/04/2017	1,236,507.00	3,098,824.51
SAN PEDRO BIO-ENERGY	14/02/2017	206,525.23	3,305,349.74
PARQUE EOLICO LARIMAR I	2/08/2016	183,249.54	3,488,599.28

Table 15. Build Margin Results

Step	Character	Result (MWh)
a	**AEGSET-5-units**	66,580
b	**AEG**total WithoutCDM	16,888,616.83
b	**20% of AEG total**	3,377,723.37
b	**AEG**SET-≥20%	3,488,599.28
c	**SET**sample (Larger than AEGSET-5-units)	3,488,599

Note: None of the power units inSETsample startednd to supply electricty to the grid more than 10 years ago, so SETsample is c.

The build margin emissions factor ($EF_{grid,BM,y}$) is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available. $EF_{grid,BM,y}$ is calculated applying equation (7).

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad (7)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/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 (tCO_2/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) is determined as per the guidance in Step 4 (a) for the simple OM, using option A1, based on the total net electricity generation of the *m* power units included in the build margin. The total fuel consumption was estimated based on each plant's hourly generation and fossil fuel consumption rate.

The emission factor is determined as follows:

$$EF_{EL,m,y} = \frac{\Sigma_i FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y}}{EG_{m,y}} \qquad (8)$$

Where:

$EF_{ELm,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$FC_{i,m,y}$	=	Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
EGm,y	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y (*MWh)
m	=	All power units serving the grid in year *y* except low-cost/must-run power units
i	=	All fossil fuel types combusted in power unit *m* in year *y*
y	=	The relevant year as per the data vintage chosen in Step 3

- Since annual fuel consumption data of the power plants connected to the SENI is not publicly available, annual fuel consumption data is calculated as before, the same to OM.

- Since there are no publicly available country specific CO_2 emission factors of fossil fuels, the CO_2 emission factor of each fossil fuel is estimated based on the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, as detailed in section B.7.1.

- The electricity generated and delivered to the grid by each grid power unit in the system for one year was obtained from the OC monthly operation reports, publicly available at the OC website[42]. Data from the period January 1st, 2019 to December 31st, 2019 has been analyzed.

As the result of the methodology the BM for Dominican Republic for 2019 is presented in the table below.

Table 16. Build margin for 2019 in Dominican Republic

Total Generation 2019 (MWh)	17,411,497
20% Generation 2019 (MWh)	3,482,299
Generation in BM (MWh)	3,488,599.28
Total emissions (tCO2)	1,781,621
BM (tCO2/MWh)	0.5106

Step 6: Calculate the combined margin emissions factor

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

(a) Weighted average CM; or

(b) Simplified CM.

According to the *"Tool to calculate the emission factor for an electricity system"*, version 7.0, the weighted average CM method (option A) should be used as the preferred option. Thus, option A is chosen.

[42] http://www.oc.org.do (Informe diario de Operación)..

The 2019 data is obtained from the monthly reports from the OC. The monthly reports from year 2019 are available at the OC web site: http://www.oc.org.do/

(a) Weighted average CM

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM} \quad (9)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/MWh)

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

According to the tool, wind and solar power generation project activities should apply the following values of w_{OM} and w_{BM} for the first crediting period and for subsequent crediting periods:

w_{OM} = 0.75 and **w_{BM} = 0.25**

Then applying the equation (9) the results for combined margin are:

Table 17. Combined margin emission factor for Los Cocos Wind Farm

Year	2019
Generation (MWh)	59,037.94
EF grid,OM-DD,y (tCO_2/MWh)	0.673709603
EF grid BM,2019 (tCO_2/MWh)	0.5106
w OM	0.75
w BM	0.25
EF grid,CM,y (tCO_2/MWh)	0.632932

B.6.2. Data and parameters fixed ex ante

Data/Parameter	***$NCV_{i,y}$***
Data unit	TJ/ktonne
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	NCV for fuel oil (BTU/Gal), coal (kJ/kg) and Natural Gas (BTU/Lb) is obtained from the SENI Coordinating Organization (OC) weekly reports: "Informe - Programación Semanal – Verificación CVP ". Sheet: "Costos Variables de Producción". Fuel oil is converted from BTU/Gal to TJ/ktonne multiplying the value by 1.05506 (KJ/BTU) and then dividing the value in kJ/Gal by the fuel density (in gr/lt) and by 3.7854 lt/gal. Coal is converted to TJ/ktonne dividing the value in kJ/kg by 1000. Natural Gas is converted to TJ/ktonne multiplying the value by 1.05506 (KJ/BTU) and then multiplying by 2204.62 (Lb/ktonne).
Value(s) applied	For Coal, Natural Gas and Fuel Oil Nr. 2 and 6 please refer to the spreadsheets in Los_Cocos I_EF_2019.xlsx sheet FUEL DATA
Choice of data or measurement methods and procedures	Country specific NCV for fuels Coal, Natural Gas and Fuel Oil are updated weekly.
Purpose of data	Calculation of baseline emissions
Additional comment	The NCV value is related with the specific consumption value of each one of the plants per week to find the unit performance in KJ/KWh that is the value applied in the Emission factor equations

Data/Parameter	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Data unit	tCO_2/TJ
Description	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data	IPCC Guidelines for National Greenhouse Gas Inventories, Reference Manual, Volume 2 (2006), chapter 1. Table 1.4. (IPCC, 2006). IPCC default values at the lower limit of the uncertainty at a 95% confidence interval
Value(s) applied	<table><tr><th>Fuel</th><th>Value</th><th>Unit</th><th>Source</th></tr><tr><td>Coal</td><td>89.5</td><td>tCO2/TJ</td><td>IPCC, 2006</td></tr><tr><td>Natural Gas</td><td>54.3</td><td>tCO2/TJ</td><td>IPCC, 2006</td></tr><tr><td>Fuel Oil Nr. 2</td><td>72.6</td><td>tCO2/TJ</td><td>IPCC, 2006</td></tr><tr><td>Fuel Oil Nr. 6</td><td>75.5</td><td>tCO2/TJ</td><td>IPCC, 2006</td></tr></table>
Choice of data or measurement methods and procedures	Since country specific emission factors for fuels are not available IPCC default figures were used.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$EG_{m,y}$, EG_y, and $EG_{n,h}$
Data unit	MWh
Description	Net electricity generated by power plant/unit *m* or *n* (or in the project electricity system in case of EG_y) in year *y* or hour *h*
Source of data	Official publications from the Coordinating Organization (OC) http://www.oc.org.do/
Value(s) applied	Please refers to excel file Los_Cocos I_EF_2019.xlsx – Sheet: GENERATION DATA
Choice of data or measurement methods and procedures	The OC records present the best available and verifiable information.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$FC_{i,m,y}$ and $FC_{i,n,h}$
Data unit	Tonnes
Description	Amount of fossil fuel type *i* consumed by power unit *m* or *n* in year *y* or hour *h*
Source of data	Calculated based on specific fuel consumption and electricity generation. Specific fuel consumption is obtained from official publications from the Coordinating Organization (OC) http://www.oc.org.do/
Value(s) applied	Please refers to excel file Los_Cocos I_EF_2019.xlsx – Sheet: FUEL DATA
Choice of data or measurement methods and procedures	The OC records present the best available and verifiable information.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2/MWh
Description	Build Margin CO_2 emission factor for grid connected power generation in year *y* calculated using version 7.0 of the "Tool to calculate the emission factor for an electricity system".
Source of data	Coordinating Organization (OC) http://www.oc.org.do/ Calculated as per the "*Tool to calculate the emission factor for an electricity system*" version 7.0. See worksheet: Los_Cocos I_EF_2019.xlsx – Sheet: BM
Value(s) applied	0.5106 tCO_2/MWh

Choice of data or measurement methods and procedures	The Build Margin for this second crediting period is updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE, year 2019. This value is set ex-ante, then is calculated once at the beginning of the second crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	--

B.6.3. Ex ante calculation of emission reductions

As mentioned in section B.6.1 in accordance with the ACM0002 version 20, no project emissions neither leakage emissions from the proposed project activity should be considered. Thus, if $\boldsymbol{PE_y} = 0$ and $\boldsymbol{LE_y} = 0$ applying equation (10):

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(10)}$$

The emission reductions are calculated as follows:

$$ER_y = BE_y$$

Therefore, the calculation of the emission reduction only takes into account the baseline emissions.

Where baseline emissions are calculated applying equation (2) and (4) presented in section B.6.1:

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

Where $EG_{PJ,y} = EG_{facility,y}$

For the second crediting period the value used for the $\boldsymbol{EG_{PJ,y}}$ parameteris based on the Energy Production Assesment of Los Cocos Wind Farm presented by GR-Garrad Hassan.

The *ex-ante* value of $\boldsymbol{EG_{PJ,y}}$ is **57,600 MWh/yr.** [43]

As shown above in Section B.6.1, the combined margin grid emission factor for year y ($\boldsymbol{EF_{grid,CM,y}}$) is calculated applying the dispatch analysis method and equation (9) as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$$

According to the Tool, for Wind Power generation projects in their second crediting period, the weights to be applied are: $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

The OM emission factor is determined applying the dispatch analysis option, based on the most recent data available at the time of submission of the project documentation to the DOE for validation. Specifically, data for the year 2019, and the resulting OM emission factor is 0.6737 tCO_2/MWh.

The BM emission factor is determined based on the most recent information available on units already built at the time of submission of the project documentation to the DOE for validation. Specifically, data from year 2019 are used, and the resulting BM emission factor is 0.5106 tCO_2/MWh.

Thus, the resulting CM emission factor is the following:

[43] See Energy production assessment of Los Cocos I and II Wind Farms document - Los Cocos I -II 20130322 vientos.pdf page 6

$EF_{grid,CM,y}$= 0.6737 tCO_2/MWh × 0.75 + 0.5106 tCO_2/MWh × 0.25 = **0.632932 tCO_2/MWh**

Consequently, the annual value of emission reductions estimated for the project activity is the following:

ER_y = 57,600 MWh × 0.632932 tCO_2/MWh = **36,457 tCO_2**

Thus: **ER_y = 36,457 tCO_2/yr**

B.6.4. Summary of ex ante estimates of emission reductions

The *ex-ante* emission reductions are estimated to be 255,198 tCO_2e for the second crediting period of 7 years. The selected crediting period for Los Cocos Wind Farm Project is renewable: three crediting periods of 7 years, leading to a total of 21 years.

The project is expected to generate approximately 57,600MWh of clean renewable electricity per year. The estimated emission reductions during the second crediting period are shown in the Table below. These estimates are based on conservative approaches and calculations for a wind farm of 25.2 MW. Note that actual emission reductions will be based on monitored data and may differ from the estimate shown below.

Table 18. Summary of ex ante estimates of emission reductions

Year	Baseline Emissions (t CO_2e)	Project Activity Emissions (t CO_2e)	Leakage (t CO_2e)	Emission Reductions (t CO_2e)
2020	36,457	0	0	36,457
2021	36,457	0	0	36,457
2022	36,457	0	0	36,457
2023	36,457	0	0	36,457
2024	36,457	0	0	36,457
2025	36,457	0	0	36,457
2026	36,457	0	0	36,457
Total	**255,198**	**0**	**0**	**255,198**
Total number of crediting years	**7**			
Annual average over the crediting period	36,457	0	0	36,457

(baseline emissions and emission reductions are rounded down)

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{facility,h}$ (or $EG_{PJ,h}$)
Data unit	MWh/h
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in hour h
Source of data	Calculated as detailed in section B.6.1. The value will be the result of multiplying the value of the measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation in hour *h* ($EG_{SMC,h}$) by the proportion of the electricity generated by Los Cocos Wind Farm at each hour *h* ($K_{LC,h}$).
Value(s) applied	6.58 MWh/h (estimated from expected annual electricity generation)
Measurement methods	As detailed in section B.6.1.

and procedures	The quantity of net electricity supplied to the grid by the proposed project activity in hour *h* (***$EG_{PJ,h}$***) will be calculated multiplying the value of the measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation in hour *h* (***$EG_{SMC,h}$***) by the proportion of the electricity generated by Los Cocos Wind Farm at each hour *h* (***$K_{LC,h}$***). This value represents the net electricity delivered to the grid by Los Cocos Wind Farm. The measurement of the ***$EG_{SMC,h}$*** at the 138/34.5 kV substation represents the net energy delivered to the grid by Los Cocos Wind Farm, Los Cocos II Wind Farm and Quilvio Cabrera Wind Farm, as shown in **Figure 10** in section B.7.3. This will be the main measurement, and the value of the net electricity generation supplied by the project activity to the grid in hour (***$EG_{PJ,h}$***) is obtained multiplying this value by the proportion of the electricity generated by Los Cocos Wind Farm.
Monitoring frequency	Hourly
QA/QC procedures	Measurements will be conducted with calibrated measurement equipment according to relevant industry standards. Periodic calibration will be carried out according to the guidelines presented in the Regulation for the application of the General Electricity Law 125-01. Electricity meters will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. The calculated value of the net electricity generation supplied by the project plant/unit to the grid in hour h will be cross checked with: 1. The sum of the values from the measurements at lines 2 and 3 at 34.5kV in hour h (which correspond to the total net electricity generation by Los Cocos Wind Farm measured at 34.5 kV in hour h at the point PQube (LCI) EG-L2+L3; 2. The sum of the Scada data of each wind turbine of Los Cocos Wind Farm. The lowest value will be applied in case of discrepancy. In addition, it will be checked that the result of sum of the proportion of the electricity generated by Quilvio Cabrera Wind Farm, Los Cocos II and Los Cocos Wind Farm is never higher than 1. In the case the sum is higher than 1, the value of the proportion of the electricity generated by Los Cocos Wind Farm will be reduced until the sum is equal to 1. Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	***$EG_{facility,y}$*** (or ***$EG_{PJ,y}$***)
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	Calculated as the sum of hourly values of ***$EG_{PJ,h}$*** for one year
Value(s) applied	57,600 MWh/yr[44]
Measurement methods and procedures	***$EG_{PJ,y}$*** will be calculated as the sum of the values of ***$EG_{PJ,h}$*** for one year. ***$EG_{PJ,h}$*** will be calculated as detailed in section B.6.1., and in the table above. The quantity of net electricity supplied to the grid by the proposed project activity in hour *h* (***$EG_{PJ,h}$***) will be calculated multiplying the value of the measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation in hour *h* (***$EG_{SMC,h}$***) by the proportion of the electricity generated

[44] This value differs from the value estimated in the validation phase as a new study has been made after the installation of Los Cocos II Wind Farm, located next to the Project Activity.
See the most updated Energy production assessment of Los Cocos I and II Wind Farms, document - Los Cocos I -II 20130322 vientos.pdf page 6.

	by Los Cocos Wind Farm at each hour *h* (***$K_{LC,h}$***). This value represents the net electricity delivered to the grid by Los Cocos Wind Farm. The measurement of the at the 138/34.5 kV substation represents the net energy delivered to the grid by Los Cocos, Los Cocos II and Quilvio Cabrera Wind Farms, as shown in **Figure 10** in section B.7.2. This will be the main measurement, and the value of the net electricity generation supplied by the project activity to the grid in hour (***$EG_{PJ,h}$***) is obtained multiplying this value by the proportion of the electricity generated by Los Cocos Wind Farm (***$K_{LC,h}$***).
Monitoring frequency	Annualy
QA/QC procedures	Measurements will be conducted with calibrated measurement equipment according to relevant industry standards. Periodic calibration will be carried out according to the guidelines presented in the Regulation for the application of the General Electricity Law 125-01. Electricity meters will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. The calculated value of the net electricity generation supplied by the project plant/unit to the grid in year y will be cross checked with: 1. The sum of the values from the measurements at lines 2 and 3 at 34.5kV in hour h (which correspond to the total net electricity generation by Los Cocos Wind Farm measured at 34.5 kV in hour h at the point PQ (LCI) EG-L2+L3; 2. The sum of the Scada data of each wind turbine of Los Cocos Wind Farm. The lowest value will be applied in case of discrepancy. Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	***$EG_{SMC,h}$***
Data unit	MWh/h
Description	Quantity of net electricity supplied to the grid at Commercial Measurement System (SMC) point at the 138/34.5kV substation by Los Cocos, Los Cocos II and Quilvio Cabrera Wind Farms in hour *h.*
Source of data	EGE HAINA dispatch data reports for the project
Value(s) applied	Not applied *ex ante*
Measurement methods and procedures	The measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation represented by the measurement points SMC TR01, TR02, TR03 and TR04, will monitor the net electricity generated by Los Cocos – (LCI), Los Cocos II – (LCII) and Quilvio Cabrera – (QC) Wind Farms, delivered to the grid. The SMC points of measurement will be located at the power delivery Line 1 and Line 2 at the 138 kV voltage side of the project 34.5/138 kV substation, before the 138 kV bar of the wind farm interconnection, as shown in Figures 17 and 18 in section B.7.2. Line 1 and Line 2 are two circuits to the same power delivery line at the 138 kV voltage side of the project substation. Having two circuits increases the reliability of the line due to the line's redundancy. Line 2 will serve as a redundant circuit if required, in case of failure of the power delivery circuit Line 1 at 138 kV. The circuit Line 2 presents the same characteristics as Line 1 regarding the electricity meters (main electricity meter and backup meter), the measurement procedures and QA/QC procedures. The electricity generated at the SMC point will be measured by four electricity meters ION 8650, class 0.2 (SMC TR01, TR02, TR03 and TR04). A main meter and a backup meter will be installed.

	The meters ION 8650 installed are bidirectional (Deliver and Receive). Its manufacturer is Schneider Electric. The measurement in the substation will follow the same measurement system as the Dominican Republic's electrical system standard, according to articles 287 and 288 of the Regulation for the application of the General Electricity Law 125-01. These articles define how the SMC should be constituted and the equipment to be applied. The Regulatory Office requires the following components **A.** A system of measuring and recording active energy at each connection point: 1. Accuracy class 0.2 for current transformer (IEC standard) 2. Accuracy class 0.2 for Voltage transformers (IEC standard) 3. Accuracy class 0.2 for Energy Meters (IEC standard). The meters have non-volatile memory to store the information of the last forty (40) days at least, considering the use of five (5) channels and records every fifteen (15) minutes. They have built-in battery to keep data stored in memory for at least seven (7) days before the auxiliary power supply failure. According to article 307 of the Regulation for the application of the General Electricity Law 125-01, in each connection point 2 independent electricity meters should be installed: a main one and a backup one. Both meters should be the same class and can be connected to the same set of transformers. Thus, as required by the Regulatory Office, two meters will be installed in each point (principal and backup); the backup meter will follow the same requirements as the main meter. **B.** A communications system for recording data based on a public or private switch telephone network. According to article 316 of the Regulation for the application of the General Electricity Law 125-01, each connection point should count with a modem with a phone channel which allows the lecture of the registries at any moment, both of the main meter as well as the backup meter. Also, the communication system should enable the possibility of communications with a computer. **C.** A system of centralized data recording is located both in the electrical system's Regulatory office and the company headquarters in Santo Domingo. It records the following Magnitudes at each point of connection: 1. Active energy incoming and outgoing 2. Voltage average integrated over time to three phases. The measurement in the substation will be carried out by EGE HAINA. Data will be recorded continuously and integrated and stored every 15 minutes, according to article 312 of the Regulation for the application of the General Electricity Law 125-01.
Monitoring frequency	Hourly
QA/QC procedures	Electricity meter specifications are according to legal requirements of Coordinating Organization in Dominican Republic and the specifications of the Regulation for the application of the General Electricity Law 125-01. Measurements will be conducted with calibrated measurement equipment according to relevant industry standards. Periodic calibration will be carried out according to the guidelines presented in the Regulation for the application of the General Electricity Law 125-01. Electricity meters will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. Calibration of electricity meters will be performed as detailed in articles 342, 343, 344 and 345 of the Regulation for the application of the General Electricity Law 125-01. These

	evaluations will be carried out by specialized companies or with certified equipment. The measurement for the Commercial Measurement System (SMC) point will be cross-checked with: - The backup measurement. - Electricity generation published in OC Reports at the end of the year - Records for sold electricity (electricity sales invoices) The lowest value will be applied in case of discrepancy. Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$K_{LC,h}$
Data unit	-
Description	Proportion of the electricity generated by Los Cocos Wind Farm at each hour *h*
Source of data	Calculated as detailed in section B.6.1.
Value(s) applied	Not applied ex ante
Measurement methods and procedures	The proportion of the electricity generated by Los Cocos Wind Farm at each hour *h* ($K_{LC,h}$) is calculated dividing the total electricity generated by Los Cocos Wind Farm measured at the 34.5 kV lines (measurement of L2 and L3 at (LCI) measurement point) by the total electricity generated by Los Cocos – (LCI), Los Cocos II – (LCII) and Quilvio Cabrera – (QC) Wind Farms, measured at the 34.5 kV lines (measurements of lines 1, 2, 3, 5, 6, 8 and 9), as detailed in section B.6.1. For this calculation, transformation losses are taking into account to be able to handle similar voltage levels (138 kV- network delivery point - $EG_{SMC,h}$). Figure 10 shows a detail of lines 1, 2, 3, 5, 6, 8 and 9 at 34.5 kV. For monitoring period from 01/01/2020 to 31/12/2026). Where the measurement procedure to be applied for the measurements at lines 1, 2, 3, 5, 6, 8 and 9 is: a. ($EG_{(QC),L1,h}$, $EG_{(LCI),L2+L3,h}$ and $EG_{(LCII),L5+L6+L8+L9,h}$) This procedure is detailed below in the following tables. This calculation will be performed on an hourly basis.
Monitoring frequency	Hourly
QA/QC procedures	Since this value is calculated, QA/QC procedures for the parameters $EG_{(QC),L1,h}$, $EG_{(LCI),L2+L3,h}$, and $EG_{(LCII),L5+L6+L8+L9,h}$ monitored to calculate $K_{LCI,h}$ are detailed in the following tables.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$EG_{(LCI),L2+L3,h}$
Data unit	MWh/h
Description	Total quantity of net electricity generated by Los Cocos Wind Farm measured at the 34.5 kV line, representing the generation sum of L2 and L3.
Source of data	Measurement records from (LCI) equipment which adds the energy produce by the wind turbines connected to L2 and L3 at 34.5 kV.
Value(s) applied	Not applicable *ex ante*
Measurement methods and procedures	The measurement of the electricity generated by Los Cocos Wind Farm at the 34.5 kV lines L2 and L3 will be carried out by the (LCI) equipment which adds the energy generated by wind turbines connected to L2 and L3 at 34.5 kV. The (LCI) equipment, has an accuracy class 0.2S. These measurements will follow the same measurement system as the Dominican Republic's electrical system standard. It will follow the standards presented in article 297 of the Regulation for the application of the General Electricity Law 125-01. According to this article, the measurements correspond

	to Category II, and thus, equipment class 0.2S (IEC Standard). The measurement of the net electricity generated by for Los Cocos Wind Farm at line 2 (L2) and line 3 (L3) will be carried out by HAINA. This meter will be integrated into EGE HAINA's internal network and configured on the automatic download platform through the PRIME READ program. The captured data will be taken to a database of the measurement systems. Additionally, there will be individual remote access to said meter in case the PRIME READ does not capture the data. The Commercial management will be responsible for monitoring, supervising and capturing the information from said meter. Data will be recorded continuously and integrated and stored every 15 minutes, according to article 312 of the Regulation for the application of the General Electricity Law 125-01. The frequency of data verification will be monthly. Since the electricity measurement is calculated by means of measurements at 138kV (***$EG_{SMC,h}$***) and also 34.5 kV (***$EG_{(LCI),L2+L3,h}$***). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the following transformation losses equation to Los Cocos I generation data (***$EG_{(LCI),L2+L3,h}$***). $E(h)_{138\ kV}\|LCI = E(h)_{34.5\ kV}\|LCI - [25.59 + 0.003988 \times E(h)_{34.5\ kV}\|LCI]$
Monitoring frequency	Hourly
QA/QC procedures	Electricity measurement specifications are according to legal requirements of Coordinating Organization in Dominican Republic and the specifications of the Regulation for the application of the General Electricity Law 125-01. Measurements will be conducted with calibrated measurement equipment according to relevant industry standards. Periodic calibration will be carried out according to the guidelines presented in the Regulation for the application of the General Electricity Law 125-01. Electricity meters and PQube equipment will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. Calibration of electricity meters will be performed as detailed in articles 342, 343, 344 and 345 of the Regulation for the application of the General Electricity Law 125-01. These evaluations will be carried out by specialized companies or with certified equipment. The measurements of the electricity generation at the 34.5 kV, lines L2 and L3 will be cross-checked with the data reported by the PQube equipment (PQ - LCI) of the Wind Farm or whit the data reported by the Scada of each wind turbine of the Wind Farm. The lowest measurement will be applied in case of discrepancy. Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	This variable corresponds to the electricity output of ***this*** CDM project

Data/Parameter	***$EG_{(QC),L1,h}$***
Data unit	MWh/h
Description	Quantity of net electricity generated by Quilvio Cabrera Wind Farm measured at the 34.5 kV line, line L1 by the QC measurement equipment.
Source of data	Measurement records from the (QC) equipment which adds the energy generated by wind turbines connected to L1 at 34.5 kV.
Value(s) applied	Not applied *ex ante*
Measurement methods and procedures	The measurement of the net electricity generated by Quilvio Cabrera Wind Farm for L1 will be carried out by the QC equipment with an accuracy class 0.2S, at 34.5 kV. These measurements will follow the same measurement system as the

	Dominican Republic's electrical system standard. It will follow the standards presented in article 297 of the Regulation for the application of the General Electricity Law 125-01. According to this article, the measurements correspond to Category II, and thus, the equipment is class 0.2S (IEC Standard). The measurement of the electricity generated by Quilvio Cabrera Wind Farm at line 1 (L1) will be carried out by CEPM and EGE Haina. Since the electricity measurement is calculated by means of measurements at 138kV (***$EG_{SMC,h}$***) and also 34.5 kV (***$EG_{(QC),L1,h}$***). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the following transformation losses equation to Quilvio Cabrera generation data (***$EG_{(QC),L1,h}$***). $E(h)_{138\ kV}\|QC = E(h)_{34.5\ kV}\|QC - [8.44 + 0.003988\ \times E(h)_{34.5\ kV}\|QC]$ Data will be recorded continuously and integrated and stored every 15 minutes, according to article 312 of the Regulation for the application of the General Electricity Law 125-01.
Monitoring frequency	Hourly
QA/QC procedures	Electricity measurement specifications are according to legal requirements of Coordinating Organization in Dominican Republic and the specifications of the Regulation for the application of the General Electricity Law 125-01. Measurements will be conducted with calibrated measurement equipment according to relevant industry standards. Periodic calibration will be carried out according to the guidelines presented in the Regulation for the application of the General Electricity Law 125-01. Electricity meters will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. Calibration of electricity meters will be performed as detailed in articles 342, 343, 344 and 345 of the Regulation for the application of the General Electricity Law 125-01. These evaluations will be carried out by specialized companies or with certified equipment. The measurements of the electricity generation at the 34.5 kV line L1 will be cross-checked whit the data reported by the Scada of each wind turbine of the Wind Farm, the CEPM measurement, PQube equipment or by the QC-L1 backup meter. The lowest measurement will be applied in case of discrepancy. Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period
Purpose of data	Calculation of baseline emissions
Additional comment	This variable corresponds to the electricity output of Quilvio Cabrera Wind Farm, which is a separate CDM project currently registered.

Data/Parameter	***$EG_{(LCII),L5+L6+L8+L9,h}$***
Data unit	MWh/h
Description	Total quantity of net electricity generated by Los Cocos II Wind Farm measured at the 34.5 kV line, adding generation of lines L5 – L6 – L8 and L9.
Source of data	Measurement records from (LCII) equipment which adds the energy produced by the wind turbines connected to lines L5 – L6 – L8 – L9 at 34.5 kV.
Value(s) applied	Not applied *ex ante*
Measurement methods and procedures	The measurement of the electricity generated by Los Cocos II Wind Farm at the 34.5 kV lines L5, L6, L8 and L9 will be carried out by the (LCII) equipment which adds the energy generated by wind turbines connected to L5, L6, L8 and L9 at 34.5 kV. The (LCII) equipment, has an accuracy class 0.2S. These measurements will follow the same measurement system as the Dominican Republic's electrical system standard. It will follow the standards presented in article 297 of the Regulation for the application of the General Electricity Law 125-01. According to this article, the measurements correspond

	to Category II, and thus, the equipment class 0.2S (IEC Standard). The measurement of the net electricity generated by for Los Cocos II Wind Farm at L5, L6, L8 and L9 will be carried out by EGE HAINA. This meter will be integrated into EGEHAINA's internal network and configured on the automatic download platform through the PRIME READ program. The captured data will be taken to a database of the measurement systems. Additionally, there will be individual remote access to said meter in case the PRIME READ does not capture the data. The Commercial management will be responsible for monitoring, supervising and capturing the information from said meter. Data will be recorded continuously and integrated and stored every 15 minutes, according to article 312 of the Regulation for the application of the General Electricity Law 125-01. The frequency of data verification will be monthly. Since the electricity measurement is calculated by means of measurements at 138kV ($EG_{SMC,h}$) and also 34.5 kV ($EG_{(LCII), L5+L6+L8+L9,h}$). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the following transformation losses equation to Los Cocos II generation data ($EG_{(LCII), L5+L6+L8+L9,h}$). $$E(h)_{138\,kV}\|LCII = E(h)_{34.5\,kV}\|LCII - [53.22 + 0.003988 \times E(h)_{34.5\,kV}\|LCII]$$
Monitoring frequency	Hourly
QA/QC procedures	Electricity measurement specifications are according to legal requirements of Coordinating Organization in Dominican Republic and the specifications of the Regulation for the application of the General Electricity Law 125-01. Measurements will be conducted with calibrated measurement equipment according to relevant industry standards. Periodic calibration will be carried out according to the guidelines presented in the Regulation for the application of the General Electricity Law 125-01. Electricity meters will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. Calibration of electricity meters will be performed as detailed in articles 342, 343, 344 and 345 of the Regulation for the application of the General Electricity Law 125-01. These evaluations will be carried out by specialized companies or with certified equipment. The measurements of the electricity generation at the 34.5 kV lines L5 – L6 – L8 – L9 will be cross-checked with the data reported by the PQube equipment or whit the data reported by the Scada of each wind turbine of the Wind Farm. The lowest measurement will be applied in case of discrepancy Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$NCV_{i,y}$
Data unit	TJ/ktonne
Description	Net calorific value (energy content) of fossil fuel type i in year y
Source of data	NCV for fuel oil (BTU/Gal), coal (kJ/kg) and Natural Gas (BTU/Lb) is obtained from the SENI Coordinating Organization (OC) weekly reports: "Informe - Programación Semanal – Verificación CVP ". Sheet: "Costos Variables de Producción". Fuel oil is converted from BTU/Gal to TJ/ktonne multiplying the value by 1.05506 (KJ/BTU) and then dividing the value in kJ/Gal by the fuel density (in gr/lt) and by 3.7854 lt/gal. Coal is converted to TJ/ktonne dividing the value in kJ/kg by 1000. Natural Gas is converted to TJ/ktonne multiplying the value by 1.05506 (KJ/BTU) and then multiplying by 2204.62 (Lb/ktonne).

<table>
<tr><td>Value(s) applied</td><td>For Coal, Natural Gas and Fuel Oil Nr. 2 and 6 please refer to the spreadsheets in Los_Cocos I_EF_2019.xlsx sheet FUEL DATA
As per applied TOOL07, in case national data is not available, IPCC default values will be applied.
<table>
<tr><th>Data source</th><th>Conditions for using the data source</th></tr>
<tr><td>Values provided by the fuel supplier of the power plants in invoices</td><td>If data is collected from power plant operators (e.g. utilities)</td></tr>
<tr><td>Regional or national average default values</td><td>If values are reliable and documented in regional or national energy statistics/energy balances</td></tr>
<tr><td>IPCC default values at the lower limit of the uncertainty at a 95 per cent confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories</td><td></td></tr>
</table></td></tr>
<tr><td>Measurement methods and procedures</td><td>Country specific NCV for fuels Coal, Natural Gas and Fuel Oil are updated weekly. The values will be monitored annually for the year y in which the project activity is displacing grid electricity.
The values will be reviewed annually for the year y in which the project activity is displacing grid electricity.</td></tr>
<tr><td>Monitoring frequency</td><td>Annually</td></tr>
<tr><td>QA/QC procedures</td><td>The OC records present the best available information. NCV for fuels Coal, Natural Gas and Fuel Oil will be updated weekly. The OC records are available at the web: http://www.oc.org.do/

Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.</td></tr>
<tr><td>Purpose of data</td><td>--</td></tr>
<tr><td>Additional comment</td><td>The NCV value is related with the specific consumption value of each one of the plants per week to find the unit performance in KJ/KWh that is the value applied in the Emission factor equations</td></tr>
</table>

<table>
<tr><td>Data/Parameter</td><td>$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$</td></tr>
<tr><td>Data unit</td><td>tCO_2/TJ</td></tr>
<tr><td>Description</td><td>CO_2 emission factor of fossil fuel type i used in power unit m in year y</td></tr>
<tr><td>Source of data</td><td>IPCC Guidelines for National Greenhouse Gas Inventories, Reference Manual, Volume 2 (2006), chapter 1. Table 1.4. IPCC default values at the lower limit of the uncertainty at a 95% confidence interval</td></tr>
<tr><td>Value(s) applied</td><td>
<table>
<tr><th>Fuel</th><th>Value</th><th>Unit</th><th>Source</th></tr>
<tr><td>Coal</td><td>89.5</td><td>tCO_2/TJ</td><td>IPCC, 2006</td></tr>
<tr><td>Natural Gas</td><td>54.3</td><td>tCO_2/TJ</td><td>IPCC, 2006</td></tr>
<tr><td>Fuel Oil Nr. 2</td><td>72.6</td><td>tCO_2/TJ</td><td>IPCC, 2006</td></tr>
<tr><td>Fuel Oil Nr. 6</td><td>75.5</td><td>tCO_2/TJ</td><td>IPCC, 2006</td></tr>
</table></td></tr>
<tr><td>Measurement methods and procedures</td><td>The values will be reviewed annually for the year y in which the project activity is displacing grid electricity.

Since country specific emission factors for fuels are not available 2006</td></tr>
</table>

	IPCC default figures will be used.
Monitoring frequency	Annually
QA/QC procedures	The values will be reviewed annually for the year *y* in which the project activity is displacing grid electricity.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$EG_{m,y}$, EG_y, and $EG_{n,h}$
Data unit	MWh
Description	Net electricity generated by power plant/unit *m* or *n* (or in the project electricity system in case of EG_y) in year *y* or hour *h*
Source of data	Official publications from the Coordinating Organization (OC) http://www.oc.org.do/
Value(s) applied	Please refers to excel file Los_Cocos I_EF_2019.xlsx – Sheet: GENERATION DATA
Measurement methods and procedures	In the case of $EG_{n,h}$ the values will be monitored hourly for each hour *h* in the year y in which the project activity is displacing grid electricity. In the case of $EG_{m,y}$ the values will be monitored annually for the year y in which the project activity is displacing grid electricity. Daily reports will be downloaded from the OC website and processed as part of the emission factor calculation Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Monitoring frequency	Annually
QA/QC procedures	The OC records present the best available and verifiable information. These records are available at the web: http://www.oc.org.do/
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$FC_{i,m,y}$ and $FC_{i,n,h}$
Data unit	Tonnes (Mass or volume unit)
Description	Amount of fossil fuel type *i* consumed by power unit *m* or *n* in year *y* or hour *h*
Source of data	Calculated based on specific fuel consumption and electricity generation of each power plant.
Value(s) applied	Please refers to excel file Los_Cocos I_EF_2019.xlsx – Sheet: FUEL DATA
Measurement methods and procedures	Specific fuel consumption and electricity generation data is obtained from official publications from the Coordinating Organization (OC) http://www.oc.org.do/. Daily reports will be downloaded from the OC website and processed as part of the emission factor calculation Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Monitoring frequency	Annually
QA/QC procedures	The OC records present the best available and verifiable information.
Purpose of data	Calculation of baseline emissions
Additional comment	--

Data/Parameter	$EF_{grid, CM,y}$
Data unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using version 7.0 of the "*Tool to calculate the emission factor for an electricity system".*
Source of data	Calculated as per the "*Tool to calculate the emission factor for an electricity system"* version 7.0. Data source: http://www.oc.org.do/.

	See worksheet*:* Los_Cocos I_EF_2019.xlsx – Sheet: CM
Value(s) applied	0.632932 tCO_2/MWh
Measurement methods and procedures	Calculation as per the "*Tool to calculate the emission factor for an electricity system*" (version 07.0).
Monitoring frequency	Annually
QA/QC procedures	Collected data will be archived electronically and be kept at least for 2 years after the end of the last crediting period.
Purpose of data	Calculation of baseline emissions
Additional comment	--

B.7.2. Sampling plan

There is no sampling involved in the monitoring of the proposed project activity.

B.7.3. Other elements of monitoring plan

The Monitoring and Verification Plan (MVP) describes the procedures to be followed in order to collect information and auditing required for the project activity development. This plan is necessary to determine and verify emission reductions achieved by the project activity.

The MVP document fulfils the CDM Executive Board requirements regarding the credibility and accuracy of the monitoring and verification procedures used in CDM projects. The purpose of these procedures is to manage and support the continuous monitoring process of project performance and periodic auditing, verification and certification activities to determine project outcomes, in particular in terms of greenhouse gas (GHG) emission reductions. The MVP is a vital component of project design and, as such, is subject to a formal third-party validation process – along with the project baseline and other project design features.

The guidelines presented in the MVP must be followed by the project activity implementers and operators of EGE HAINA. The adherence to the procedures set out in this monitoring plan is necessary for the project managers and operators to successfully measure and track project impacts for audit purposes. CDM project developer MGM Innova will provide capacity building to the Technical Department of EGE HAINA in order to meet the requirements presented in this MVP.

MVP worksheet

The methodology applied to this project activity describes the procedure and equations to calculate emission reductions from monitored data. The procedure to calculate emission reductions is simple, and it is presented in a excel worksheet which contains the different aspects of emission reduction calculation:

- Brief description of the monitoring structure and parameters
- Data entry sheets (*monitored values of the variables involved*)
- Calculation and result sheet (*emission reductions*)

There are worksheets where the user is allowed to enter data (input data). All other cells contain model fixed parameters or computed values (result fields).

Data gathering and recording

According to methodology ACM0002 (version 20.0), the main parameters that need to be monitored during the operation of the wind farm are:

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

- $EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the *"Tool to calculate the emission factor for an electricity system"* (version 7.0).

Monitoring of electricity supplied by the project to the national electricity grid (SENI):

As detailed in section B.7.1, the Commercial Measurement at the 138/34.5 kV substation will monitor the net electricity generated and delivered to the grid by Los Cocos, Los Cocos II and Quilvio Cabrera Wind Farms. The SMC (Commercial Measurement System) points of measurement (SMC TR01, TR02, TR03 and TR04), are located at the 138 kV line, before the 138 kV bar of the wind farm interconnection, in the 34.5/138 kV substation.

The quantity of net electricity supplied to the grid by the proposed project activity ($EG_{PJ,h}$) will be calculated multiplying the value of the measurement of the SMC at the 138/34.5 kV substation in hour *h* ($EG_{SMC,h}$) by the proportion of the electricity generated by Los Cocos Wind Farm at each hour *h* ($K_{LC,h}$). This value represents the net electricity delivered to the grid by Los Cocos Wind Farm.

As shown in Figure 10, the net electricity generated by Los Cocos Wind Farm will be carried out by the (LCI) equipment which adds the energy produce by the wind turbines connected to L2 and L3 , at 34.5 kV lines. The total net electricity of Los Cocos Wind Farm in hour *h* will be calculated as the sum of L2 and L3 ($EG_{(LCI),L2+L3,h}$). The measurement of the total net electricity generated by Quilvio Cabrera Wind Farm in hour *h* ($EG_{(QC),L1,h}$) will be carried out by the (QC) equipment which measures the energy produce by the wind turbines connected to L1, at 34.5 kV. And the measurement of the total net electricity generated by Los Cocos II Wind Farm in hour *h* ($EG_{(LCII),L5+L6+L8+L9,h}$) will be carried out by the (LCII) equipment which measures the energy produce by the wind turbines connected to L5, L6, L8 and L9, at 34.5 kV.

The proportion of the electricity generated by Los Cocos Wind Farm at each hour *h* ($K_{LC,h}$) is calculated as the sum of the net electricity generated by Los Cocos Wind Farm ($EG_{(LCI),L2+L3,LC,h}$) in hour *h*, divided by the total net electricity of Los Cocos, Los Cocos II and Quilvio Cabrera Wind Farms ($EG_{(QC),L1,h} + EG_{(LCI),L2+L3,h} + EG_{(LCII),L5+L6+L8+L9,h}$) in hour *h*.

Since the electricity measurement is calculated by means of measurements at 138kV ($EG_{SMC,h}$) and also 34.5 kV ($EG_{(QC),L1,h} - EG_{(LCI),L2+L3,h} - EG_{(LCII),L5+L6+L8+L9,h}$). Transformation losses at the delivery point for electricity generation 138/34.5 kV substation are taken into account, applying the respective transformation losses equations for each wind farm generation data, as detailed in section B.6.1.

The electricity registered at the Commercial Measuremnt System - SMC point in hour *h* ($EG_{SMC,h}$) will be measured by four electricity meters ION 8650, class 0.2 (SMC TR01, TR02, TR03 and TR04): a main meter and a backup meter will be installed, as required by article 307 of the Regulation for the application of the General Electricity Law 125-01. The measurement in the substation will follow the same measurement system as the Dominican Republic's electrical system standard, according to articles 287 and 288 of the Regulation for the application of the General Electricity Law 125-01.

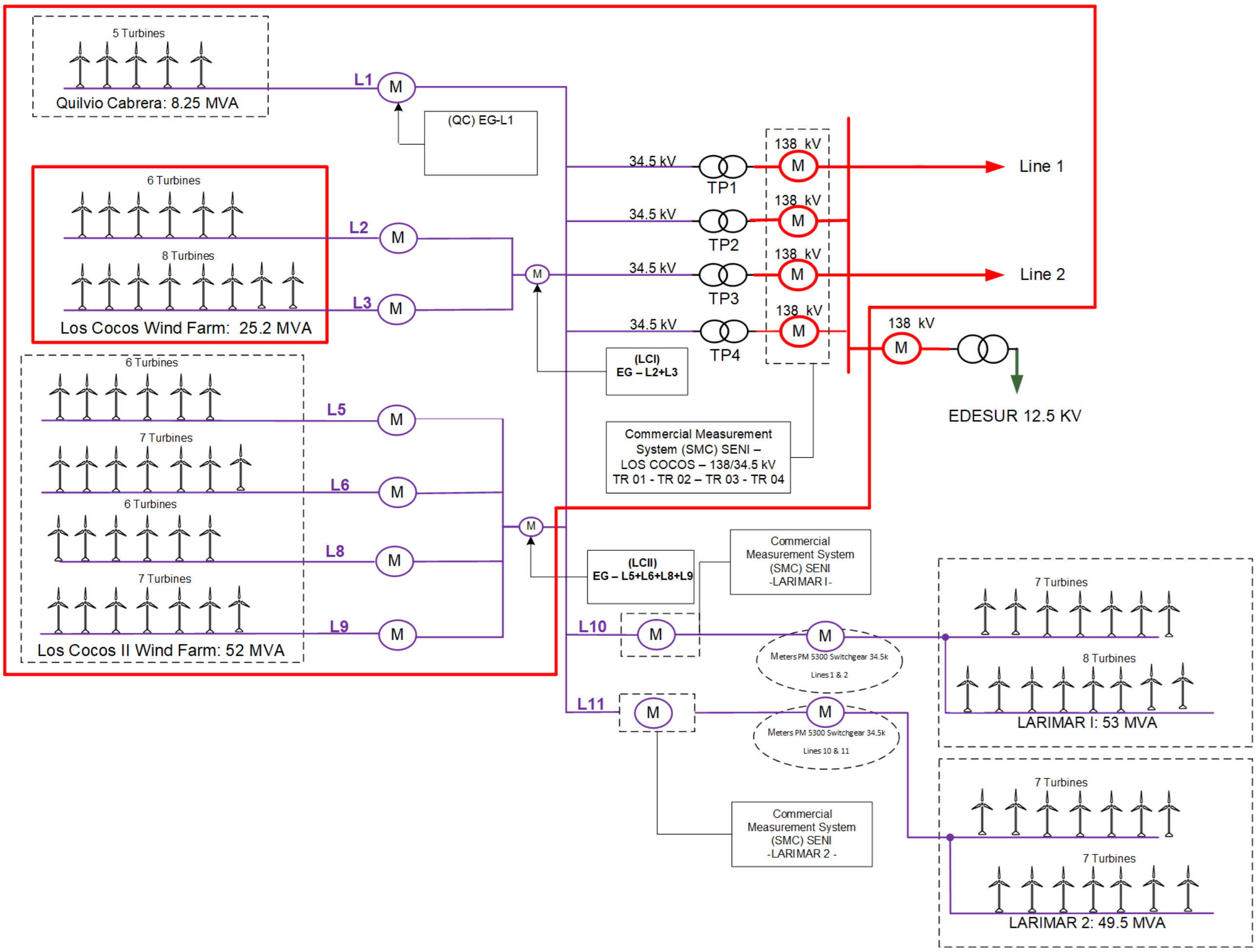

Figure 10. Monitoring points (shown schematically as red circles (M)) of Los Cocos (LCI) wind farm and its interaction with Quilvio Cabrera (QC), Los Cocos II and Larimar Wind Farms

Note that Quilvio Cabrera Wind Farm latter is a separate CDM project (currently registered). The two lines from Los Cocos wind farm (this project), the four lines of Los Cocos II and one from QC generate electricity to a 34.5 kV line, and each Wind Farm generation is monitored separately. All the flows join together and are transformed to 138 kV where it is connected to the grid. This total is monitored $\left(EG_{SMC,h}\right)$ using the Commercial Measurement System.

It is important to clarify that even though Larimar Wind Farm is part of the whole Eolic system as can be seen in **Figure 10**, the data reported is shown independently from the generations of Quilvio Cabrera, Los Cocos and Los Cocos II Wind Farms. Then it is possible to manage Larimar as an independent wind farm, since there is measurement equipment recognized by the OC-SENI on the side of 34.5 kV for lines L10 and L11.

The measurements at the 34.5 kV lines (lines 1, 2, 3, 5, 6, 8 and 9): ($EG_{(QC),L1,h} + EG_{(LCI),L2+L3,h} + EG_{(LCII),L5+L6+L8+L9,h}$) will be performed by the QC, LCI and LCII equipment for the monitoring of third crediting period. They follow the same measurement system as the Dominican Republic's electrical system standard. According to 297 of the Regulation for the application of the General Electricity Law 125-01, the measurements correspond to Category II, and thus, the electricity meters will be of class 0.2S (IEC Standard).

The net electricity generation, measured at the SMC point, will be monitored continuously and integrated and stored every 15 minutes using electricity meters located at the project site.

Monitored data will be recorded by the computer system, as detailed in section B.7.1. The recorded data will be centralized in the electrical system's Regulatory office and the company headquarters in Santo Domingo. Collected data on the measurement at the SMC point will be

cross-checked against the backup measurement and electricity sales receipts and the values of electricity generation data published in OC Reports at the end of the year. The lowest value will be applied in case of discrepancy. The measurements at the 34.5 kV lines, used to determine the proportion of Los Cocos, Los Cocos II and Quilvio Cabrera electricity generation, will be cross checked with the data reported by the Scada of each wind turbine of the Wind Farm or the PQube equipment, the lowest value will be applied in case of discrepancy. It will be checked that the sum of both proportions is not higher than 1.

Data will be recorded continuously and integrated and stored every 15 minutes. The recorded data will be centralized in the company headquarters in Santo Domingo

Electricity generation data will be aggregated and recorded on a daily basis and presented in the Monitoring and Verification Plan worksheet.

Calculation of the Combined Margin grid emission factor of the SENI:

The Combined Margin emission factor for the national grid of the Dominican Republic ($EF_{grid,CM,y}$) will be calculated *ex post* using dispatch data, and adjusted annually.

The Build Margin emission factor will remain fixed for the second crediting period and is calculated as shown in section B.6.3. of this PDD.

The Operating Margin emission factor will be calculated applying a model developed by a consulting company, which follows the guidelines detailed in section B.6.3 of this PDD. The model gathers data on net electricity generation by each power plant/unit *n* of the SENI in hour *h* ($EG_{n.h}$), their specific fuel consumption and the merit order of the SENI, on a daily basis, using daily electronic reports on SENI's operations, and processes this information in order to calculate the hourly dispatch emission factor. These reports are available on the SENI Coordinating Body's website.

Quality Assurance and Quality Control

The quality assurance and quality control procedures for recording, processing and archiving data will be followed, according to EB rules and requirements, to ensure accurate and consistent data is collected, and to allow the proper verification of the emission reductions on an annual basis.

Calibration of electricity meters will be implemented according to the standards and procedures adopted by the Regulatory Office for the SENI grid. Electricity meters will receive a periodic calibration at least every 2 years according to article 342 of the Regulation for the application of the General Electricity Law 125-01. Calibration of electricity meters will be performed as detailed in articles 342, 343, 344 and 345 of the Regulation for the application of the General Electricity Law 125-01. Electricity transformers will be verified every 10 years. Electricity meters will be evaluated every 2 years. These evaluations will be carried out by specialized companies or with certified equipment. Calibration records will be kept by the project owner for verification purposes.

The values on electricity generation by the project activity will be applied according to the measurements and procedures described in section B.7.1. If there is a failure in the SMC electricity meter, the measurement is assured by a backup meter located at the project site.

All SMC electronic data will be backed up on a monthly basis, and two electronic copies of each document will be kept in different locations (the wind farm and its respective head offices). As a backup procedure, excel files containing the monitoring data will be sent to the head offices at Santo Domingo every week, in order to ensure that data is also stored in a different location. At the time of verifying the associated emission reductions, the loaded values will be cross-checked against the generated records in order to confirm that erroneous values have not been applied for the actual emission reduction calculation. For the electronic data recorded by the internal

measurement equipment (LCI, LCII and QC); this same protocol will be implemented for the second crediting period.

Data Management System and Responsibilities

The monitoring of electricity generation and emission reductions of the project will be carried out by the project staff as described below. They will be responsible for the maintenance of traceable and updated records for verification purposes.

- *CDM Project Coordinator*:
    - Responsible for CDM data monitoring and recording activities, and review of calculations on emission reductions.
    - Responsible for communications with CDM parties (DOE, etc.), consulting company, associates, and miscellaneous procedures related to CDM project activities

- *Commercial Department:*

Reports to the CDM Project Coordinator.

- *Operation and Maintenance Department at the Wind Farm*
    - In charge of printing/retrieving data on electricity generation and reporting to the commercial department.
    - Responsible for addressing and reporting any condition that could prevent the correct monitoring or data acquisition.
    - Responsible for gathering data on electricity displaced by the project activity every hour and reporting on any condition that could prevent the monitoring or data acquisition by the control system.

Managers of the project must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to successfully develop and maintain the proper set of information to undergo an audit for a greenhouse gas (GHG) emission reduction investment. These records and monitoring systems are needed to subsequently allow a Designated Operational Entity to verify project performance as part of the verification and certification process. In particular, this process reinforces the fact that GHG reductions are real and credible to the buyers of the Certified Emission Reductions (CERs).

Verification of emission reductions

It is expected that the verification of emission reductions generated by the project activity will be carried out every 2 to 3 years. In order to facilitate the verification process, have a tracking of the project progress, and identify any potential problem, monthly reports will be developed based on the monitoring data and the calculations of emission reductions. These reports will be a basis for the development of the biannual report for the estimation of emission reductions from the proposed project activity.

Duration of the Monitoring Plan

The Monitoring Plan will be implemented over the 7-year crediting periods of project activity. All data and evidences collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period.

Training measures and maintenance procedures

The technical staff related to the O&M of Los Cocos Wind Farm will receive training. The training includes a V90 course offered by Vestas which includes the following subjects, among others:

Introduction to wind energy; Safety; Power regulation; Control system: Generator; Operational modes; Yaw system; Gearbox; Electrical system; V90 brake hydraulics; V90 pitch hydraulics and SCADA. In addition, a safety course will be taken by a member of the staff involved in Los Cocos Wind Farm operation. If new personnel are hired, they will be formed in the specific skills required to carry out the Monitoring Plan.

Vestas will maintain and service Los Cocos Wind Farm in proper working order in accordance with the Mechanical Operating and Maintenance Manual and the Electrical Operating and Maintenance Manual. The scheduled maintenance tasks are preventive measures and include service to the different components of the wind turbines such as yaw system, gearbox, brake hydraulics, generator, lubrication unit, nacelle, meteorological equipment and electrical parts. In addition, unscheduled maintenance tasks for Los Cocos Wind Farm will be performed promptly, as and when necessary, to keep and maintain the Plant in good working order.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

23/03/2010

(HAINA signs an agreement with COBRA (UTE Los Cocos) for the construction of Los Cocos Wind Farm. This is the first real action and thus the “starting date” of the project activity.)

C.2. Expected operational lifetime of project activity

20 years and 0 month

DNV Statement of Compliance of Vestas V90-1.8 MW VCUS. Date 06/07/2009
Annex 1.2 - Statement of Compliance.pdf

C.3. Crediting period of project activity

C.3.1. Type of crediting period

Renewable (Second crediting period)

C.3.2. Start date of crediting period

01/01/2020 (Second crediting period)

C.3.3. Duration of crediting period

7 years and 0 month (renewable)
01/01/2020 – 31/12/2026

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

A full Environmental Impact Declaration (EID) has been carried out for Juancho – Los Cocos wind farm project, which analyzed the environmental impacts of the construction of a wind farm at the project site. The EID was developed by CEPM and submitted to the Ministry of the Environment and Natural Resources in February 2004 and approved in August 2004[45]. This permit corresponds to Juancho-Los Cocos wind farm project which was intended to be developed by CEPM but was cancelled.

The Environmental Management and Adaptation program presented in the EID for Juancho- Los Cocos wind farm project contained environmental management measures in order to deal with the risks associated to the ornithological fauna on the site. A complimentary study on ornithological fauna on the site was contemplated. During year 2010 EGE HAINA, through the consultant Sercitec, carried out a study on ornithological fauna on the site. The results show that the possibilities for collisions are low and that no migratory routes exist in the area of the project[46].

Since the proposed project activity, Los Cocos Wind Farm, will be developed at the same site, and will have similar characteristics as the previous Juancho - Los Cocos previous project, in October 2009 EGE HAINA applied to obtain a split of the existing environmental license, changing the project developer and applying for the environmental license for Los Cocos Wind Farm.

A request for approval of the Environmental Impact Declaration (EID)[47] of Los Cocos wind farm project, and a request for the submission of the Environmental Permit for Los Cocos wind farm project was made on April 7, 2011 to the Ministry of Environment and Natural Resources.

D.2. Environmental impact assessment

The EID report for Los Cocos Wind Farm Project identified the possible environmental impacts of the project in the construction and operation phases, with the objective of proposing the mitigation measures to minimize such impacts. The study identified that the project generates positive and negative impacts on the environment. The physical environment is the most affected by the negative impacts, while the socio-economic environment is most affected by positive impacts. The construction phase causes 76% of the magnitude of negative impacts in the environment.

The following is a summary of the impacts identified in the EIA report for the construction and operation phases of the project:

- Change in drainage patterns (moderate impact)
- Activation of erosive process (moderate impact)
- Alteration of the soil properties (low impact)
- Alteration of landscape (significant impact)
- Alteration of air quality by the emission of gases and particulate material during construction phase (low impact)
- Increase in noise levels during operation of the wind farm (significant impact)
- Alteration of water quality during construction (moderate impact)

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[45] Reference: *Permiso Ambiental No. 0340-04.pdf*

[46] See Reportes Ornitofauna.rar

[47] See *DIA Los Cocos.pdf* and *Remisión DIA Los Cocos.pdf*

- Loss of vegetable cover (moderate impact)
- Reduction of available habitats and species (moderate impact)
- *Increase in local employment and economic activity during construction and operation* (significant impact)
- *Payment of taxes to the State during operation of the project* (significant impact)
- *Increase in the income levels of the community during operation of the project* (significant impact)
- *Increase in the demand of goods and services during construction and operation* (significant impact)
- *Improvement in life quality of the community during operation of the project* (significant impact)

The results of the environmental evaluation showed the necessity of develop and implement an environmental management and mitigation program which includes measures and actions to address the negative impacts of the project. The objective of the environmental mitigation and management program (PMAA) is to assure that the project contributes to the sustainable development and that complies all of the national environmental regulations. The PMAA is developed throughout environmental management programs, which are composed by management cards, where the prevention, control, mitigation and/or compensation measures are detailed. The PMAA is composed by 8 programs and 14 management cards. The PMAA contains the following programs:

- Program for management of temporary facilities
- Program for management of activities during construction
- Program of abandonment of temporary facilities
- Program of environment, health and security
- Program for management of emissions and noise
- Program for management of fauna
- Program of social management.
- Program for dismantling and abandonment.

These programs will be applied during construction, operation and/or abandonment phases of the project as appropriate.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

Three meetings were held with diverse stakeholders during 2010 to get a complete scenario from local, governmental agencies and electricity sector authorities, students and the general interested public, as well as the people directly affected by the implementation of the project.

First stakeholders' meeting: National Authorities and Organizations

The first meeting was held on July 1st, 2010 with National Authorities and Organizations such as the State-owned Dominican Company of Electricity Enterprises, the National Energy Council, the Climate Change and CDM Council, the Electricity Superintendence, the United Nations Development Programme (UNDP), the Rural Suburban Electrification Unit, the Environmental and National Resources Ministry, the Ministry of Economy, Planning and Development, the

Coordinating Body for the National Electrical System of the Dominican Republic, the Electric Transmission Company, and personnel from CEPM and EGE HAINA. This meeting took place at the offices of the Climate Change and CDM Council.

Figure 11. First Stakeholder Meeting at the Climate Change and CDM Council offices

The list of attendees to this meeting is presented in the following table:

Table 19. List of attendees to the stakeholder meeting held at the Climate Change and CDM Council offices

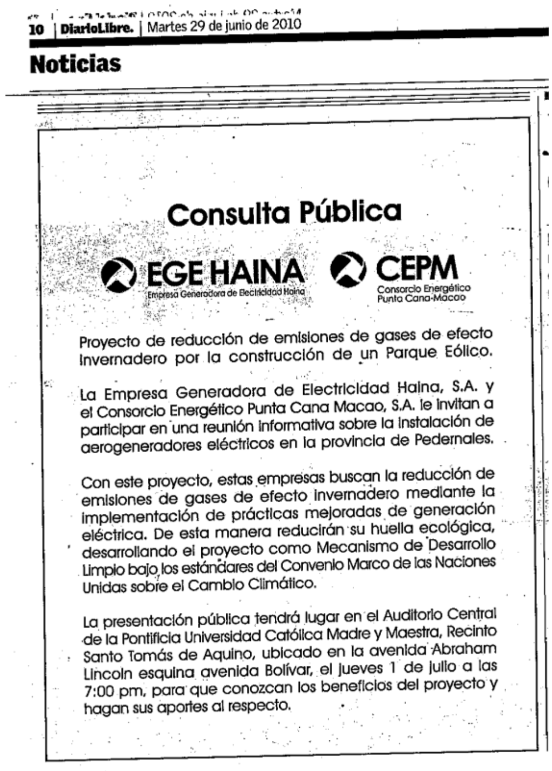
Name	Company or Institution	Position
Federico Valera	EDESUR Dominicana	E. Commerce Manager
Edwards Matos	Environmental Ministry	Technical Assistant
Víctor Paniagua	Rural and Suburban Electrification Unit (UERS) from CDEEE	Wind Energy Manager
Alexis Martínez Cadena	Coordinating Organization from the National Electrical System of the Dominican Republic	Studying Division
Francisco Ortega	Electricity Superintendence	Senior Engineer
María Eugenia Morales	United Nations Development Programme (PNUD)	Officer Program
Bienvenido Sánchez	CDEEE	PV Energy Manager
Wilson Iñiguez	CDEEE	Wind Energy Responsible
Nicolás Cabrera	CDEEE	PV Energy Responsible
Marino Incháustegui	EGE Haina and CEPM	Wind Farm Community Manager
César Santos Sánchez	EGE Haina and CEPM	Project Development Manager
Elizabeth Mosqueda	MGM	Project Engineer
George Reynoso	Corporación Dominicana de Empresas Eléctricas Estatales (CDEE)	Advisor
Hipólito Nuñez	National Energy Council	Advisor
Nelly Cuello	Climate Change and CDM Council	Advisor
Federico A. Grullón	Climate Change and CDM Council	Coordinator
Víctor García	Climate Change and CDM Council	Sub-secretary of State
Omar Ramírez	Climate Change and CDM Council	Executive Vice-President
Tito Sanjurjo	EGE Haina and CEPM	General Manager
Jose A. Rodríguez	EGE Haina and CEPM	Development Director

Name	Company or Institution	Position
Manuel E. Peña G.	National Energy Council	Renewable Energy Manager
María José Martínez	EGE Haina and CEPM	Intern
Leonardo A. Canelat	Electricity Superintendence	Senior Engineer
Alberto García	Consorcio Energético San Pedro de Macorís	Budget Analyst
Héctor Espinoso	The Ministry for Economy, Planning and Development	Analyst
Ramón Thén	EGE Haina and CEPM	Natural Resources and Security Manager

Second stakeholders' meeting: Pontifical Catholic University

The second meeting was held on the 1st of July of 2010, at the University "Pontificia Universidad Católica Madre y Maestra" (PUCMM). An internal invitation was made to the student body and an announcement was presented on the public newspaper, as shown in Figure 13.

Figure 12. Second stakeholders' meeting: Pontifical Catholic University



10 | DiarioLibre. | Martes 29 de junio de 2010

Noticias

Consulta Pública

EGE HAINA Empresa Generadora de Electricidad Haina

CEPM Consorcio Energético Punta Cana-Macao

Proyecto de reducción de emisiones de gases de efecto invernadero por la construcción de un Parque Eólico.

La Empresa Generadora de Electricidad Haina, S.A. y el Consorcio Energético Punta Cana Macao, S.A. le invitan a participar en una reunión informativa sobre la instalación de aerogeneradores eléctricos en la provincia de Pedernales.

Con este proyecto, estas empresas buscan la reducción de emisiones de gases de efecto invernadero mediante la implementación de prácticas mejoradas de generación eléctrica. De esta manera reducirán su huella ecológica, desarrollando el proyecto como Mecanismo de Desarrollo Limpio bajo los estándares del Convenio Marco de las Naciones Unidas sobre el Cambio Climático.

La presentación pública tendrá lugar en el Auditorio Central de la Pontificia Universidad Católica Madre y Maestra, Recinto Santo Tomás de Aquino, ubicado en la avenida Abraham Lincoln esquina avenida Bolívar, el jueves 1 de julio a las 7:00 pm, para que conozcan los beneficios del proyecto y hagan sus aportes al respecto.

Figure 13. Invitation to stakeholders' meeting at the Pontifical Catholic University on local newspaper

The following table presents the list of attendees to the second stakeholders' meeting:

Table 20. List of attendees to the stakeholder meeting held at the Catholic University

Name	Company or Institution	Position
Gustavo Betances	PUCMM	Student
Giomar García	PUCMM	Student
Jennifer Beauchamps	Beauchamps, Haché & Asoc.	Lawyer
Luis Rosario Gratereaux	Beauchamps, Haché & Asoc.	Lawyer
Julio Ferreira	PUCMM	Telematic Director
Gualberto Magallanes	PUCMM	Production manager
Joel Medina	Fluitecnik Solar, S.A.	Engineer
Elio Tavarez	PUCMM	Student
Hugo Martínez	PUCMM	Student
Jamel Alarcón	PUCMM	Student
Ramon O. Alvano	PUCMM	Student
Melissa Aróstegui	Grupo Vicini	Sustainability Department
Lilimar López	Grupo Vicini	Sustainability Department
Yinet Ureña	Grupo Vicini	Corporate Social Responsibility Coordinator
Ramón Thén	EGE Haina and CEPM	Environmental Manager
Young Chow	Paradoxe Dominicana	Director
Douglas Hasbún	Paradoxe Dominicana	Sales Manager
Alejandro Hernández	SERDEM	President

Name	Company or Institution	Position
Alberto Ramírez	PUCMM	Student
Amauris Vasquez	Decamps, Vasquez & Valera	
Tomás Camilo Acevedo	PUCMM / Vapor & Enfriamiento, S.A.	Professor / Territory Manager
Jennifer Hanna	National Committee for Climate Change	Technical Assistant
Napoli Gómez	APEC University	Industrial Engineering
Tomás Andrés Batista	Santo Domingo Technical Institute	Student
Miguel Santana Rojas	PUCMM	Student
Antonio Lee Lan	Santo Domingo Technical Institute	Student
Dagoberto Peña	PUCMM	Director Industrial Eng.
Juan E. Taveras	PUCMM	Student
Nelly Cuello	National Committee for Climate Change	Advisor
Rafael Rojas	Electricity Transmission Company	Supervisor Engineer
César Acosta	Electricity Transmission Company	Supervisor Engineer
Julian Amauris Reyes Báez	Santo Domingo Technical Institute	Student Mechanical Engineering
Julián Javier Reyes	Santo Domingo Technical Institute	Student
Joel Montalvo	Santo Domingo Technical Institute	Student
Miguel Robles Rincón	Santo Domingo Technical Institute	Student
Oscar Sánchez Jimenez	Santo Domingo Technical Institute	Student
Emmanuel Feliz Suero	Santo Domingo Technical Institute	Student Mechanical Engineering
Pedro Barias	Empresa de Transmisión Eléctrica	Supervisor Engineer
Huascar Martínez	-----	-----
Jose Jimenez	Santo Domingo Technical Institute	Professor
Manuel Arias Estevez	PUCMM	Student
Alan Piña	PUCMM	Student
Jaime Brugal	Scotia Bank	Relationship Manager
Isabel Santos	National Committee for Climate Change	Advisor
Rainier Mallol	PUCMM	Student
Germán Bello	PUCMM	Student
Eliza Araujo Santana	Santo Domingo Technical Institute	Student
Pablo Torres	Grupo Marítimo B&R/DIF	New Business Director
Juan Ernesto Castellanos	Santo Domingo Technical Institute	Student
Norberto José Rodríguez	PUCMM	Student

Third stakeholders' meeting: with the community at project site

A third stakeholder meeting was held with the community on August the 6th, 2010 with local stakeholders. The list of the attendees is presented in the table below.

Table 21. List of attendees to stakeholders' meeting with the local community

Name		Name	
1	José Sanches	23	Ramón Alberto Sanchez
2	Pedro Dotel	24	Jose Miguel Terrero
3	Manuel Gómez Mella	25	Jose Antonio Torres
4	Diogenes Saldaña	26	Benjamín Feliz

Name		Name	
5	Manolo Sanchez	27	Ricardo Ulella
6	Pedro Adrian Santana	28	Pedro Samboy
7	Angel Leodoro Pérez	29	Anabel Perez
8	Aguntín Matos Pérez	30	Eduardo Mendez
9	Elkin R. Vilomar	31	Luis Castillo
10	Josue Paredes	32	Porfirio Santana
11	Alba Nudez	33	Carlos Alberto Urbaz
12	Carglos Alberto Gonzalez	34	Daniel Sanchez
13	Farael Leonida	35	Eduardo Dotal
14	Marco Ferrer	36	Pamira Alonso
15	Domingo A. Corto	37	Ramón Alonso Sanchez
16	Pablo Daniel Gomez	38	Ramón Feliz
17	Jose Disney Perez	39	Vistas Guerra
18	Alfonso Piña	40	Miguel Angel Azache
19	Daniel Cuevas	41	Ruth S. Mella
20	Fernando Medina	42	Domingo Baltre
21	Agustin Betta	43	Alfredo Padilla
22	Julio Cesar Ortis	44	Israel Perez

Note: A total of 60 people were registered at the meeting. However, it was unable to read the names in the registry sheets since the writing was not clear.

Figure 14. Third Stakeholder's Meeting

E.2. Summary of comments received

During the three stakeholders' meetings, a list of attendance was filled out and a questionnaire was delivered and filled out by each stakeholder, as presented below:

Figure 15. Example of assistance list and questionnaire for stakeholders' meetings.

The following questions were included in the questionnaire:

1. With reference to the available information and your knowledge in Environmental issues, Climate Change, Kyoto Protocol and Clean Development Mechanism, please express briefly your opinion on the Los Cocos Wind Farm.
2. Do you recommend to the private entities, government authorities, and other organizations to develop this kind of projects, for electricity generation based on wind renewable energy as a contribution to climate change mitigation?
3. Do you consider that the wind project will contribute to sustainable, environmental, economic, and social development of the region and Dominican Republic?
4. Additional comments that you wish to express.

In general, the comments obtained regarding the project presentation were positive. Some notable aspects mentioned were the contribution of this type of project towards improving the interest of other industries in global warming. Most of the participants expressed their awareness of projects that reduce GHG emissions. The project's contribution to greenhouse gas mitigation was clearly understood.

E.3. Consideration of comments received

Comments received by local stakeholders were positive about the implementation of the project activity.

The comments were in line with the main social and environmental concerns of the local community. Doubts were clarified during the meeting.

SECTION F. Approval and authorization

The letter of approval given by the DNA - Consejo Nacional para el Cambio Climático y el Mecanismo de Desarrollo Limpio of Dominican Republic, has an approval date the 01/08/2011 for Los Cocos Wind farm Project[48].

[48] See document 3 - Letter of Approval - 2011 LCI.pdf

Appendix 1. Contact information of project participants

Organization name	Empresa Generadora de Electricidad HAINA (EGE HAINA)
Country	Dominican Republic
Address	Avenida Lope de Vega, número 29, Torre Novocentro, Piso 17.
Telephone	+1 809-947-4008
Fax	+1 809-616-1522
E-mail	estevezr@egehaina.com RodriguezJ@egehaina.com
Website	http://www.egehaina.com/
Contact person	Luis R. Mejía Brache (primary authorized signatory) José Alfredo Rodriguez (alternative authorized signatory)

Appendix 2. Affirmation regarding public funding

Not applicable

Appendix 3. Applicability of methodologies and standardized baselines

Not applicable

Appendix 4. Further background information on ex ante calculation of emission reductions

Not applicable

Appendix 5. Further background information on monitoring plan

Not applicable

Appendix 6. Summary report of comments received from local stakeholders

Not applicable

Appendix 7. Summary of post-registration changes

At registration time, it was established that at delivery point: 138/34.5 kV substation, it will be recorded not only the electricity generation from Los Cocos wind farm but Quilvio Cabrera wind farm.
In accordance with the registered monitored plan (Section B.7.1 of registered PDD), the quantity of net electricity generation supplied by Los Cocos Wind Farm Project to the electrical national grid of Dominican Republic every hour, it shall be calculated as the result of multiplying the value of the

measurement of the Commercial Measurement System (SMC[49]) at the 138/34.5 kV substation[50] in hour h ($EG_{SMC,h}$) by the proportion of the electricity generated by Los Cocos Wind Farm at each hour h ($K_{LC,h}$) as follows:

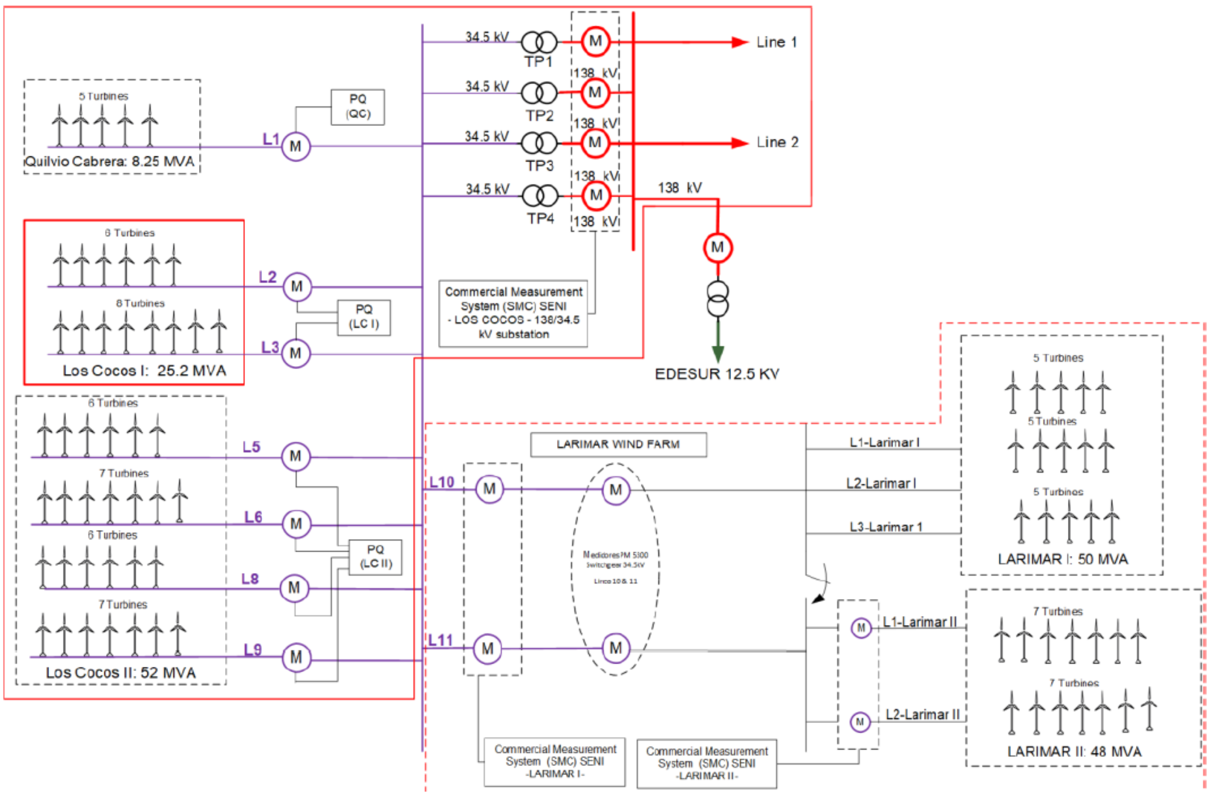
$EG_{PJ,h} = EG_{SMC,h} \times K_{LC,h}$

At registered PDD, $K_{LC,h}$ is calculated as follows:

$$K_{LC,h} = \frac{EG_{L2,LC,h} + EG_{L3,LC,h}}{EG_{L1,QC,h} + EG_{L2,LC,h} + EG_{L3,LC,h}}$$

Where:
$EG_{L2,LC,h}$: Quantity of net electricity generated by Los Cocos Wind Farm measured at the 34.5 kV line, line L2 in hour h (MWh/h)
$EG_{L3,LC,h}$: Quantity of net electricity generated by Los Cocos Wind Farm measured at the 34.5 kV line, line L3 in hour h (MWh/h)
$EG_{L1,QC,h}$: Quantity of net electricity generated by Quilvio Cabrera Wind Farm measured at the 34.5 kV line, line L1 in hour h (MWh/h)

Nowadays, this scenario of registered monitoring plan is different, since there are three more wind farms delivering energy at 138/34.5 kV substation: Los Cocos II Wind Farm, Larimar I Wind Farm and Larimar II Wind Farm.
On Figures 9 and 16 on the revised PDD are illustrating how the wind farms are delivering electrical energy to Dominican electrical grid, as follows:



[49] Commercial Measurement System (Acronym in Spanish: SMC) recognized by Coordinating body of the interconnected national electrical system of the Dominican Republic (OC-SENI)

[50] This is the measurement equipment read by OC-SENI as Administrator on Electrical Whole Market in Dominican Republic. This equipment is used to issue the sales receipts for the electricity generated (in aggregated way) for Quilvio Cabrera Wind Farm, Los Cocos Wind Farm and Los Cocos II Wind Farm.

On these Figures (9 or 16) in revised PDD, purple lines are at 34.5 kV and red lines at electrical substation are at 138 kV. This scenario is sum up in the following table:

<table>
<tr><th colspan="2">Power plant</th><th>Lines involved connected to Commercial Measurement System[3]</th><th colspan="2">Commercial Measurement System[2] at 138/34.5 kV substation</th></tr>
<tr><td colspan="2">Los Cocos Wind Farm</td><td>L2
L3</td><td rowspan="3">SMC</td><td>3275PEJC-01</td></tr>
<tr><td colspan="2">Los Cocos II Wind Farm</td><td>L5
L6
L8
L9</td><td>3275PEJC-02
3275PEJC-03</td></tr>
<tr><td colspan="2">Quilvio Cabrera Wind Farm</td><td>L1</td><td>3275PEJC3-T04</td></tr>
<tr><td rowspan="2">Larimar Wind Farm</td><td>Larimar I Wind Farm</td><td>L10</td><td>SMC, Larimar I</td><td>3276-PELAK-G10</td></tr>
<tr><td>Larimar II Wind Farm</td><td>L11</td><td>SMC, Larimar II</td><td>3276-PELAK-G11</td></tr>
</table>

It is possible to measure directly by SMC how much electrical electricity is delivered by Larimar I and Larimar II wind farms at 34.5 kV. However OC-SENI discount the transformation losses at 138/34.5 kV substation in order to estimated and therefore to issue the electricity sales receipts for the electricity received at 138 kV (voltage level where the energy deliver is recognized by OC_SENI), as the audit team verified by means of documental review. Hence it is easy to trace in the OC-SENI Website[51] not only the energy delivered to national electrical grid from Dominican Republic at 138 kV by Larimar wind Farm (Larimar I and Larimar II wind farms) but the energy delivered (in aggregated way) by Quilvio Cabrera Wind Farm, Los Cocos Wind Farm and Los Cocos II Wind Farm ($EG_{SMC,h}$).

Also, the PP has installed measurement equipments at 34.5 kV over the lines involved for Quilvio Cabrera Wind Farm, Los Cocos Wind Farm and Los Cocos II Wind Farm, as follows:

Power plant	Lines involved connected to Commercial Measurement System[2]	Measurement System at 34.5 kV
Los Cocos Wind Farm	L2 L3	PQ(LC I)
Los Cocos II Wind Farm	L5 L6 L8 L9	PQ(LC II)
Quilvio Cabrera Wind Farm	L1	PQ(QC)

This measurement equipment installed at 34.5 kV meet the Dominican electrical regulatory framework. The PP decided to install the measurement equipment located at 34.5 kV with the same features required by the Dominican electrical regulatory framework in General Electricity Law 125 issued on 2001 (articles 297 to article 300) and also, as it is explained in the revised monitoring plan, the PP has decided to calibrate these measurement systems (PQ(LC I), PQ(LC II) and PQ(QC)) at the frequency required by General Electricity Law 125 (articles 342 to article 345), that is two years.
These new measurement equipment's at 34.5 kV will facilitate the calculation of the updated $K_{LC,h}$, as follows:

$$K_{LC,h} = \frac{EG_{PQ(LCI)L2+L3,LC,h}}{EG_{PQ(QC)L1,QC,h} + EG_{PQ(LCI)L2+L3,LC,h} + EG_{PQ(LCII)L5+L6+L8+L9,LCII,h}}$$

Where:

[51] Reports available at: http://www.oc.org.do/inicio.aspx link: "Informes", List: "Memorias"

- $K_{LC,h}$: the proportion of the electricity generated by Los Cocos Wind Farm at each hour h, measured at the 34.5 kV.
- EG $_{PQ(LCI)L2+L3,LC,h}$: Quantity of net electricity generated by Los Cocos Wind Farm, measured at the 34.5 kV
- EG $_{PQ(QC)L1,QC,h}$: Quantity of net electricity generated by Quilvio Cabrera Wind Farm, measured at the 34.5 kV
- EG $_{PQ(LCII)L5+L6+L8+L9,LCII,h}$: Quantity of net electricity generated by Los Cocos II Wind Farm, measured at the 34.5 kV

To calculate the quantity of net electricity generation supplied by Los Cocos Wind Farm Project to the electrical national grid of Dominican Republic every hour ($EG_{PJ,h}$), the following equation is still used from the registered monitoring plan:
$$EG_{PJ,h} = EG_{SMC,h} \times K_{LC,h}$$

Where:

- $EG_{SMC,h}$: value of the measurement of the Commercial Measurement System (SMC) at the 138/34.5 kV substation in hour h, measured at the 138 kV
- $K_{LC,h}$: the proportion of the electricity generated by Los Cocos Wind Farm at each hour h, measured at the 34.5 kV.

Since the values to calculate $K_{LC,h}$ and the values measured for $EG_{SMC,h}$ are measured in different voltage levels, the PP will take into account the transformation losses in the parameters used to calculate $K_{LC,h}$, with the aim to work the energy values at the same voltage level, 138 kV, since at this level is the energy delivery recognized by OC-SENI.
The transformation losses (transformer's no-load and full-load losses) for electricity generated by Quilvio Cabrera Wind Farm, Los Cocos Wind Farm and Los Cocos II Wind Farm at the 138/34.5 kV substation were calculated by the PP.
Hence, for the calculation of $K_{LC,h}$:

- The values measured for the parameter EG $_{PQ(LCI)L2+L3,LC,h}$ will take into account the following the following transformation losses:

$$EGPQ(LCI)L2+L3,LC,h= E(h)138kV|LCI= E(h)34.5kV|LCI-[25.59+(0.003988\times E(h)34.5kV|LCI)]$$

Where
E(h)138kV|LCI: The energy generated by Los Cocos Wind Farm delivered at 138 kV
E(h)34.5kV|LCI: The energy generated by Los Cocos Wind Farm measured at 34.5 kV
25.59 depicts the No-load losses and 0.003988 depicts the full-load losses

- The values measured for the parameter $EG_{PQ(QC)L1,QC}$,h will take into account the following the following transformation losses:

$$EGPQ(QC)L1,QC,h= E(h)138kV|QC= E(h)34.5kV|QC-[8.44+(0.003988\times E(h)34.5kV|QC)]$$

Where
E(h)138kV|QC: The energy generated by Quilvio Cabrera Wind Farm delivered at 138 kV
E(h)34.5kV|QC: The energy generated by Quilvio Cabrera Wind Farm measured at 34.5 kV
8.44 depicts the No-load losses and 0.003988 depicts the full-load losses

- The values measured for the parameter EG $_{PQ(LCII)L5+L6+L8+L9,LCII,h}$ will take into account the following the following transformation losses:

$$EGPQ(LCII)L5+L6+L8+L9,LCII,h=E(h)138kV|LCII=E(h)34.5kV|LCII-[53.22+(0.003988\times E(h)34.5kV|QC)]$$

Where

E(h)138kV|LCII: The energy generated by Los Cocos II Wind Farm delivered at 138 kV
E(h)34.5kV|QC: The energy generated by Los Cocos II Wind Farm measured at 34.5 kV
53.22 depicts the No-load losses and 0.003988 depicts the full-load losses.

Transformation losses shall apply the to the calculations in the proposed alternative monitoring with the aim to ensure that GHG emission reductions will not be overestimated as a result of these permanent changes.

These permanent changes presented are valid from January 1st/2018 to the end of first crediting period (December 31st/2019).

The Effective approval date of this changes was 23/09/2019 and is notified as approved on 25/09/2019.
The PRC reference for the project is: PRC-7093-002

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

Version	*Date*	*Description*
05.0	25 June 2014	Revision to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from F-CDM-PDD to CDM-PDD-FORM; • Make editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
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