1Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Cerro de Hula Wind Project
Version number of the PDD	Version: 10
Completion date of the PDD	13/03/2015
Project participant(s)	- Energía Eólica de Honduras, S.A. (prívate entity)
Host Party	Honduras
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	- Sectoral Scope 1, Energy Industries (renewable-/non-renewable sources). - ACM0002: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version 12.2.0, EB 65, valid from 17 September 2010 onwards.
Estimated amount of annual average GHG emission reductions	262,688 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Cerro de Hula Wind Project (hereafter, the "Project") is being developed by Energía Eólica de Honduras, S. A. (EEHSA) (hereafter referred to as the "Project Developer") which is a subsidiary of Globeleq Mesoamerica Energy.[1]. The Project will be located in the Municipalities of Santa Ana and San Buenaventura, Department of Francisco Morazán, 24 km South of Tegucigalpa in Honduras (hereafter referred to as the "Host Country"). The elevation of the Project site is between 1,340 and 1,720 m above sea level[2].

The proposed Project will be the first wind farm interconnected to the National Interconnected System of Honduras. The Project will have 126 MW of installed capacity[3], consisting of 63 turbines, each with a 2MW capacity. The electricity generated will be sold to the National Power Utility in Honduras called Empresa Nacional de Energía Eléctrica ("ENEE"[4]) through a 25 year Power Purchase Agreement (PPA) contract.

Before the development of Cerro de Hula Wind Project there was no wind based electricity generation in Honduras, therefore electricity that will be 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[5] as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The proposed large scale project activity reduces greenhouse gas emissions through the application of environmentally safe and sound technology by generating electricity from a new zero emission energy generation technology.

The Project is contributing to the sustainable development of Honduras in various aspects, among others:

- Reduces greenhouse gas emissions (GHG), especially carbon dioxide (CO_2), by displacing energy from thermal power plants utilizing the wind resources of the area of "*Cerro de Hula*" through a Wind Farm in order to generate zero emission electrical energy and supply it to the Honduras National Interconnected System – *Sistema Interconectado Nacional (SIN)* (hereafter referred to as the "Grid"). The electricity delivered by the project to the Grid will substitute electricity that would otherwise be generated by the operation of Grid-connected power plants (*baseline scenario*)[6].
- Reduces the import of fossil fuels considering that Honduras is not an oil-producing country itself[7] and relies on imports[8]. The Project will *reduce the dependence on foreign resources*, thus strengthening the nation's energy security and self sufficiency;

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[1]Globeleq Mesoamerica Energy web page. (http://www.mesoamericaenergy.com)

[2]Energía Eólica de Honduras, S.A. & Mesoamérica Energy. (2008). Feasibility study. Eoloeléctrico Honduras 2000. Cerro de Hula. Original title in Spanish*"Estudio de Factibilidad. Proyecto Eoloeléctrico Honduras 2000. Cerro de Hula"*

[3]The PPA originally foresaw a 100 MW capacity project; this was later revised to cover the project´s full 124 MW capacity (as per Decree Number 229-2012, published in March 2nd, 2013). In addition, 2 MW of stand-by capacity were considered since the original version of the PPA, totaling 126 MW.

[4]ENEE's web page http://www.enee.hn

[5] The Honduran grid is primarily composed by fossil fuel generation plants as described on the combined margin calculations on Section B.6.1

[6]Please refer to section B.4 for the description of the identified baseline scenario

[7] According to "The World Factbook"(CIA) Honduras does not produce any oil (#183)

- Increases employment opportunities in the area where the Wind Farm will be located:
    - During construction of the initial 102 MW, an average of 50 people will be hired, and during the construction peak stage, 180 employees will be contracted by the EPC contractors, additionally 20 indirect jobs will be created. Similar figures are foreseen during the implementation of the additional 24 MW capacity.
    - Once operating, the initial 102 MW will demand 40 people, who will be permanently employed, and an estimate of 20 indirect jobs will be created. The 24 MW expansion will require an additional 3 permanent workers.
    - During maintenance stage (three months per year), 75 permanent employees will be needed, and an estimated 15 indirect jobs will be created through.
- Enhances the local investment environment and therefore improves the local economy
- Diversifies the sources of electricity generation, important for meeting growing energy demands and the transition away from fossil fuel electricity generation
- Makes greater use of wind renewable energy generation resources for sustainable energy production
- Demonstrates replicable clean energy technology

Furthermore, the Project Developer is making donations to several community based development projects located in the Municipality of San Buenaventura and Santa Ana (i.e. projects linked to electrification, water distribution services, road maintenance, improvement of equipment and accessories in schools, health clinic support, etc.).

In order to avoid any unwanted change of the current land-use (mainly agriculture) the Project Developer will only acquire the minimum land for its needs. As such, the only land being bought is that where the substation and operation and maintenance building will be located. For the rest of the land where access roads, electrical interconnection, turbines, and contiguous areas are located, either long term lease agreements or easements were negotiated. A lease agreement, as opposed to the purchase of the land, contributes to the active and direct involvement of the landowners and the community as stakeholders in whose community the project is hosted.

The project also benefited the local communities with a degree program that achieved the enrolment of more than 220 full ownership titles to community residents with the support of the Municipalities, and the project has brought significant benefits directly to the local communities, through a grants of more than 5 million Lempira (HNL)[9] in the areas of health, education, electrification, water and infrastructure, including support for municipalities, schools, churches, foundations and other local organizations.

The substation was completed by September 2011and energy tests performed by the end of the same month. Civil works too were completed by December 2011 and full commercial operations started by 21 December 2011 (much before the originally expected date of March 2012). The following table summarizes the main expected milestones from the Cerro de Hula Wind Project:

https://www.cia.gov/library/publications/the-world-factbook/rankorder/2173rank.html?countryName=Honduras&countryCode=ho&regionCode=cam&rank=183#ho

[8] According to “The World Factbook”(CIA)Honduras is a mere oil importer (#86th worldwide) accounting on 53,630 bbl/day,

https://www.cia.gov/library/publications/the-world-factbook/rankorder/2175rank.html?countryName=Honduras&countryCode=ho&regionCode=cam&rank=86#ho

[9] 5million HNL equal 264,550.27 USD approx. (source http://www.xe.com/ as of Oct 6, 2011)

Milestone[10]	Date
Substation Completion	September 2011
Test energy	September 2011
Civil Work Completion (initial 102 MW)	December 2011
Commercial operations start date	December 21, 2011
Civil Work Completion (full 126 MW capacity)	December, 2014

Table 1. Main milestones on the implementation of the Project

The project activity is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

A.2. Location of project activity

A.2.1. Host Party

Honduras

A.2.2. Region/State/Province etc.

Department of Francisco Morazán

A.2.3. City/Town/Community etc.

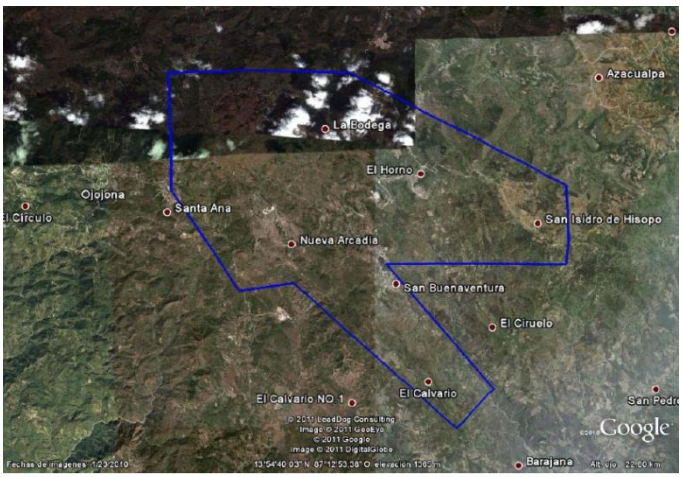
Municipalities of Santa Ana and San Buenaventura

A.2.4. Physical/Geographical location

The Project is located in "*Cerro de Hula*" an area, 24 km South of Tegucigalpa (See **Figure 1**).

[10] Substation completion and test energy completion expected dates are as per original registered PDD.

Honduras



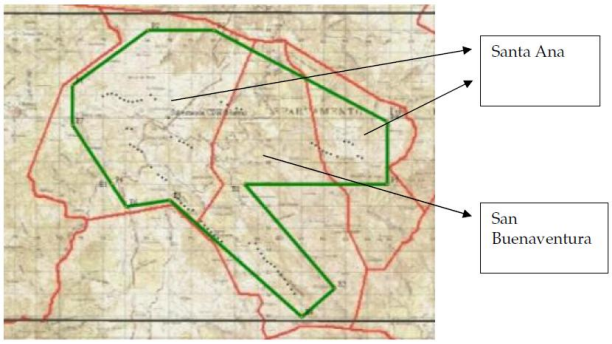


Figure 1. Location of the Project

The geographical coordinates of the project area are the following:

Longitude	Latitude
87° 16’ 21.508’’ W	13° 56’ 36.776’’ N
87° 14’ 26.612’’ W	13° 57’ 58.275’’ N
87°12’ 46.619’’ W	13° 57’ 58.368’’ N
87° 8’ 23.221’’ W	13° 55’ 43.472’’ N
87° 8’ 23.165’’ W	13° 54’ 10.701’’ N
87° 11’ 59.759’’ W	13° 54’ 10.55’’ N
87° 9’ 43.032’’ W	13° 51’ 37.66’’ N
87° 10’ 32.975’’ W	13° 50’ 55.308’’ N
87° 13’ 53.031’’ W	13° 53’ 47.664’’ N
87° 14’ 59.663’’ W	13° 53’ 37.883’’ N
87° 16’ 21.439’’ W	13° 55’ 38.184’’ N

Table 2.a Project Coordinates

Note that the 24 MW expansion falls within the same polygon originally allowed for the development of the 102 MW plant.

Detailed coordinates for each WTG are provided below:

No.	Description	Long [W]	Lat [N]	Z [m]
	CDH1			
1	G87 1-01	87°15'31.28"	13°56'29.77"	1551
2	G87 1-02	87°15'25.48"	13°56'29.90"	1570
3	G87 1-03	87°15'19.71"	13°56'30.72"	1600
4	G87 2-06	87°15'13.78"	13°56'29.04"	1635

5	G87 2-05	87°15'09.04"	13°56'24.48"	1655
6	G87 2-04	87°15'03.74"	13°56'22.02"	1660
7	G87 2-03	87°14'57.97"	13°56'21.37"	1660
8	G87 2-02	87°14'52.14"	13°56'20.82"	1654
9	G87 2-01	87°14'46.24"	13°56'20.57"	1650
10	G87 3-07	87°14'25.66"	13°56'32.21"	1601
11	G87 3-06	87°14'21.25"	13°56'27.17"	1580
12	G87 3-05	87°14'15.28"	13°56'24.77"	1560
13	G87 3-04	87°14'15.93"	13°56'08.04"	1540
14	G87 3-03	87°14'11.50"	13°56'04.17"	1532
15	G87 3-02	87°14'08.16"	13°55'57.66"	1519
16	G87 3-01	87°14'03.26"	13°55'54.41"	1518
17	G87 6-01	87°13'52.87"	13°55'29.48"	1481
18	G87 6-02	87°13'47.30"	13°55'26.59"	1481
19	G87 6-03	87°13'42.00"	13°55'23.57"	1490
20	G87 6-04	87°13'37.06"	13°55'20.29"	1475
21	G87 6-05	87°13'27.89"	13°55'11.57"	1452
22	G87 6-06	87°13'22.05"	13°55'09.27"	1450
23	G87 7-01	87°13'29.38"	13°55'37.86"	1490
24	G87 7-02	87°13'23.44"	13°55'32.93"	1488
25	G87 4-02	87°15'48.61"	13°56'02.71"	1517
26	G87 4-01	87°15'42.27"	13°56'00.62"	1520
27	G87 5-01	87°15'05.94"	13°55'49.48"	1526
28	G87 5-02	87°14'59.80"	13°55'45.01"	1540
29	G87 5-03	87°14'55.66"	13°55'39.90"	1538
30	G87 10-01	87°09'20.16"	13°55'15.44"	1730
31	G87 10-02	87°09'14.99"	13°55'12.52"	1730
32	G87 10-03	87°09'13.55"	13°55'04.64"	1710
33	G87 10-04	87°09'12.25"	13°54'58.88"	1710
34	G87 10-05	87°09'07.91"	13°54'54.55"	1723
35	G87 9-09	87°10'17.21"	13°55'15.73"	1630
36	G87 9-08	87°10'11.57"	13°55'13.46"	1637
37	G87 9-07	87°10'07.31"	13°55'09.62"	1647
38	G87 9-06	87°10'02.17"	13°55'06.92"	1651
39	G87 9-05	87°09'56.91"	13°55'04.48"	1662
40	G87 9-04	87°09'51.44"	13°55'02.50"	1675
41	G87 9-03	87°09'45.84"	13°55'00.97"	1669
42	G87 9-02	87°09'39.37"	13°55'00.07"	1650
43	G87 9-01	87°09'33.58"	13°54'59.42"	1656
44	G87 8-01	87°12'36.89"	13°56'10.57"	1540
45	G87 8-02	87°12'31.19"	13°56'09.30"	1542
46	G87 8-03	87°12'25.42"	13°56'07.47"	1550
47	G87 8-04	87°12'18.46"	13°56'07.93"	1550
48	G87 8-05	87°12'11.79"	13°56'09.12"	1531
49	G87 8-06	87°12'05.76"	13°56'08.90"	1530
50	G87 8-07	87°11'59.89"	13°56'05.39"	1530
51	G87 8-08	87°11'50.93"	13°56'04.58"	1517
	CDH2			

52	4-03L	87°15'54.44"	13°56'03.54"	1510
53	7-03L	87°13'17.94"	13°55'30.04"	1470
54	13-01L	87°13'15.30"	13°54'43.00"	1400
55	13-02L	87°13'10.10"	13°54'38.87"	1388
56	13-03L	87°13'04.76"	13°54'34.61"	1390
57	13-04L	87°12'59.12"	13°54'28.66"	1400
58	14-04L	87°09'12.34"	13°55'45.36"	1670
59	14-03L	87°09'18.38"	13°55'47.90"	1660
60	14-02L	87°09'25.84"	13°55'48.77"	1660
61	14-01L	87°09'31.65"	13°55'52.06"	1650
62	13-05L	87°12'54.05"	13°54'23.56"	1410
63	14-05L	87°09'05.61"	13°55'44.16"	1669

Table 2.b Turbine Coordinates

A.3. Technologies and/or measures

Before the implementation of the project there were no wind energy based electricity generation power units, and the baseline scenario consisted of a continuation of electricity provided by the Grid[11]. The Project will use state of the art wind power technology and has a total of 124 MW installed capacity, consisting of 56 Gamesa G87-2-MW 60Hz and 7 Gamesa G97-2-MW wind turbines. Assuming net capacity factors of 39.5% (initial 102 MW) and 35.5% (additional 24 MW), with a probability of exceedance of P50 (Net yield (P50) 20 years MWh/year)[12] the total estimated net annual generation is 352,889 MWh/yr for the first 102 MW and an incremental 74,775 MWh due to the expansion, resulting in a total of 420,876 MWh/yr[13].The specific project data are shown in the following tables (3-5).

Total nominal capacity	126 MW
Maximum contracted power[14]	124 MW

Table 3. Project features

Brand	GAMESA
Model	G87 and G97
Type	3 blades
Capacity	2.0 MW

[11] Honduras National Interconnected System

[12]From “Energy Yield Assessment for Cerro de Hula Wind Farm, Honduras” report elaborated in March 2010 by Mott MacDonald for the US Export-Import Bank.The Mott MacDonald Group is a diverse management, engineering and development consultancy delivering solutions for public and private clients world-wide (http://www.mottmac.com/aboutmottmac/)

[13]The estimation made in the “Energy Yield Assessment for Cerro de Hula Wind Farm, Honduras” (see above reference) is 352,889 MWh and includes the initial project installed capacity (102MW). Likewise, the estimation from "Energy Yield Assessment for Cerro de Hula II Wind Farm, Honduras” report elaborated in July 2013 by Mott MacDonald for the US Export-Import Bank states an additional 74,775 MWh for the corresponding 24 MW. Since the contracted capacity is 124MW, the value used for ER calculations (420,876 MWh/yr) has been calculated as [(352,889 + 74,775/126)*124] MWh.

[14]The original PPA with ENEE established in clause 2.1 an annual estimation of up to 361,788,000 kWh to be delivered to the ENEE with a 100 MW installed capacity. In order to cover energy production losses due to scheduled maintenance periods and unforeseen events an additional 2MW capacity is installed. The revised PPA considers a total of 124 MW, leaving a 2 MW backup as the original document.

Table 4. Turbine features[15]

Type	Doubly-fed with wound rotor and slip rings
Nominal power	2000 kW (stator + rotor)
Voltage	690 Vac
Frequency	60Hz

Table 5. Generators data

The reason why there will be a 2 MW surplus on the installed capacity with regards to the contracted capacity with the ENEE [16] is to backup electricity generation contracted with ENEE during low wind season, and also during contingency cases to have a spare wind turbine in case one needs to be shut down for maintenance sake and/or force majeure events. The amount of electricity that the project expects to deliver to the ENEE is defined on the PPA[17] and is based on a capacity of 124 MW. For the purpose of ER calculations, a conservative estimate of 420,876 MWh/yr has been used as explained above.

The Project will also consist of the following main parts:

- Internal roads: between wind turbines, to allow access for purpose of operations and maintenance.
- Internal cabling: internal medium voltage cables need to be installed in order to interconnect the wind turbines within the wind farm.
- Substation: the substation will be built close to the wind farm[18].
- Wind turbines transformers: Each wind turbine needs to have a controller and CPU, switchgear and step-up transformer, as well as an adequate grounding and protection system.
- Electricity meters: the 2 electricity meters being installed (main and back-up) will be bidirectional

Electricity supplied to the grid by the project will be monitored at the Metering Point through a Metering System. For more information regarding monitoring specifications refer to section B.7. below. The metering arrangements and the required quality control procedures to ensure accuracy are defined within the Power Purchase Agreement[19] between EEHSA and Empresa Nacional de Energía Eléctrica – ENEE.

The expected lifetime of the equipment according to technology provider is at least 20 years[20] Figure **2** shows the wind farm layout and the representative met mast of each provided position[21]:

[15] *GAMESA – FT Characteristics and general operation of Gamesa G8X-2.0MW 50/60Hz wind turbines*

[16] The estimation made in the "Energy Yield Assessment for Cerro de Hula Wind Farm, Honduras" (see above references) includes the total project installed capacity (102MW) ,

[17] PPA clause 2.1

[18] The substation *Cerro de Hula* was built inside the project area as the interconnection point to deliver the electricity generated by the project to the Grid. Layouts were presented to the DOE upon request.

[19] Please refer to Exhibit C-IV of the PPA

[20] From tech provider (GAMESA) http://www.mercer.k12.pa.us/highschool1/teacher/bchess/General%20Science/GAMESA%202007-6.pdf (pg 27)

[21] *Idem.*

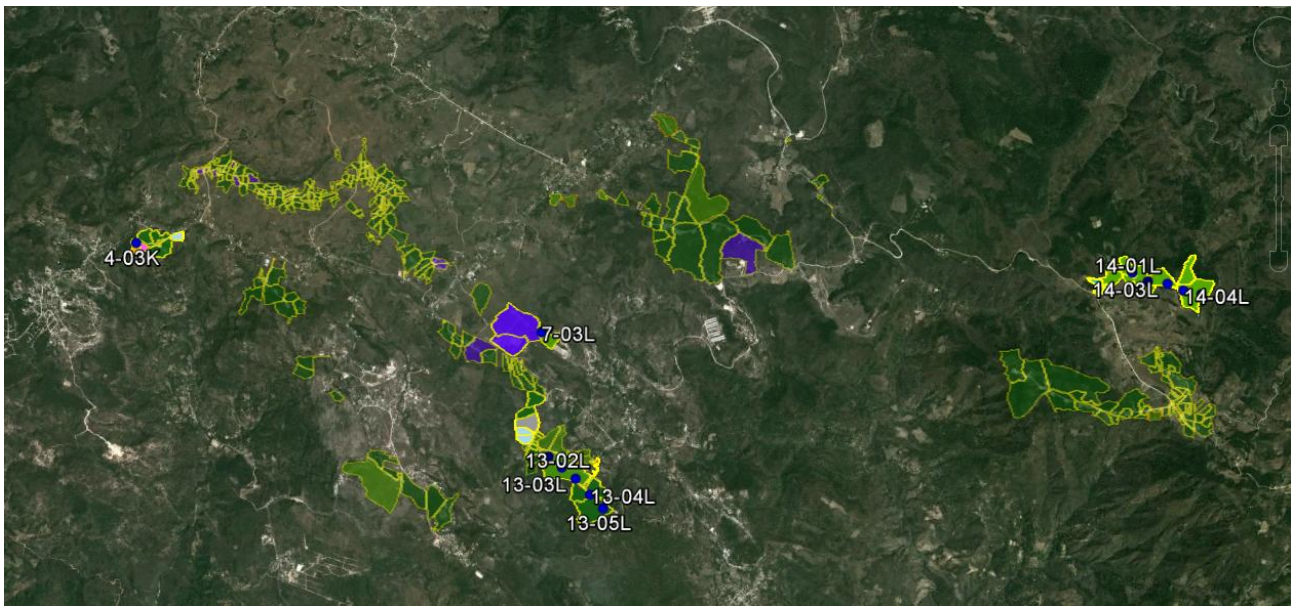


Figure 2. Distribution of turbines at site (purple areas correspond to the 24 MW expansion)

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Honduras (host)	Energía Eólica de Honduras, S.A. (prívate entity)	No

Further contact information of project participants is provided in **Annex 1**.

A.5. Public funding of project activity

The Project will not receive any public funding from Parties included in Annex I of the UNFCCC.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

1. The baseline and monitoring methodology ACM0002 is used: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" Version 12.2.0, EB 65, valid from 17 September 2010 onwards.

2. The tool for demonstration and assessment of additionality used is: "Tool for demonstration and assessment of additionality", Version 06.0.0, EB 65.

3. The tool for calculation the emission factor for an electricity system used is: "Tool to calculate the emission factor for an electricity system", Version 2.2.0, EB 61.

4. The "Guidelines on additionality of First-of-its-kind project activities" Version 01.0, EB 63

More information about the methodology and tools can be obtained at:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved

B.2. Applicability of methodology and standardized baseline

The project activity consists of the installation of a renewable electricity generation plant (wind farm) that will be installed at a site where no renewable power plant was operated previously. The electricity generated will be dispatched to the Grid. The applicability conditions for ACM0002 are met as can be seen summarized in the table below.

Applicability Conditions	***Description of applicability condition as per ACM0002 v12.2.0***	***Justification***
Condition 1	The project activity is the installation, capacity addition, retrofit or replacement of power plant/unit of one of the following types: hydro power plant/ unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	Project activity involves installation of a wind power plant with an installed capacity of 126MW
Condition 2	In case the capacity additions, retrofits or replacements: (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter $EG_{PJ,y}$): the existing plant 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 or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	Project activity is not a capacity addition, retrofit or modification of an existing power plant.
Condition 3	In case of hydro power plants: • The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs. • The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2. • The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m2.	The project activity is not a hydro power plant

Applicability Conditions	*Description of applicability condition as per ACM0002 v12.2.0*	*Justification*
Condition 4	The methodology is not applicable to the following: • 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; • Biomass fired power plants; • Hydro power plants that result in new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4W/m^2.	The project activity does not involve switching from fossil fuels to renewable energy at the site of the project activity; it is neither a biomass fired power plant nor a hydro plant.

B.3. Project boundary

	Source	GHGs	Included?	Justification / Explanation
Baseline scenario	Grid electricity production	CO_2	Included	According to ACM0002 only CO_2 emissions from the grid electricity generation (including existing grid-connected power plants and the addition of new grid-connected power plants) are to be accounted for.
		CH_4	Excluded	According to ACM0002 minor emission source
		N_2O	Excluded	According to ACM0002 minor emission source
Project scenario	Wind electricity production	CO_2	Excluded	As the project is a wind farm no greenhouse gas emissions from the project have to be considered according to ACM0002.
		CH_4	Excluded	
		N_2O	Excluded	

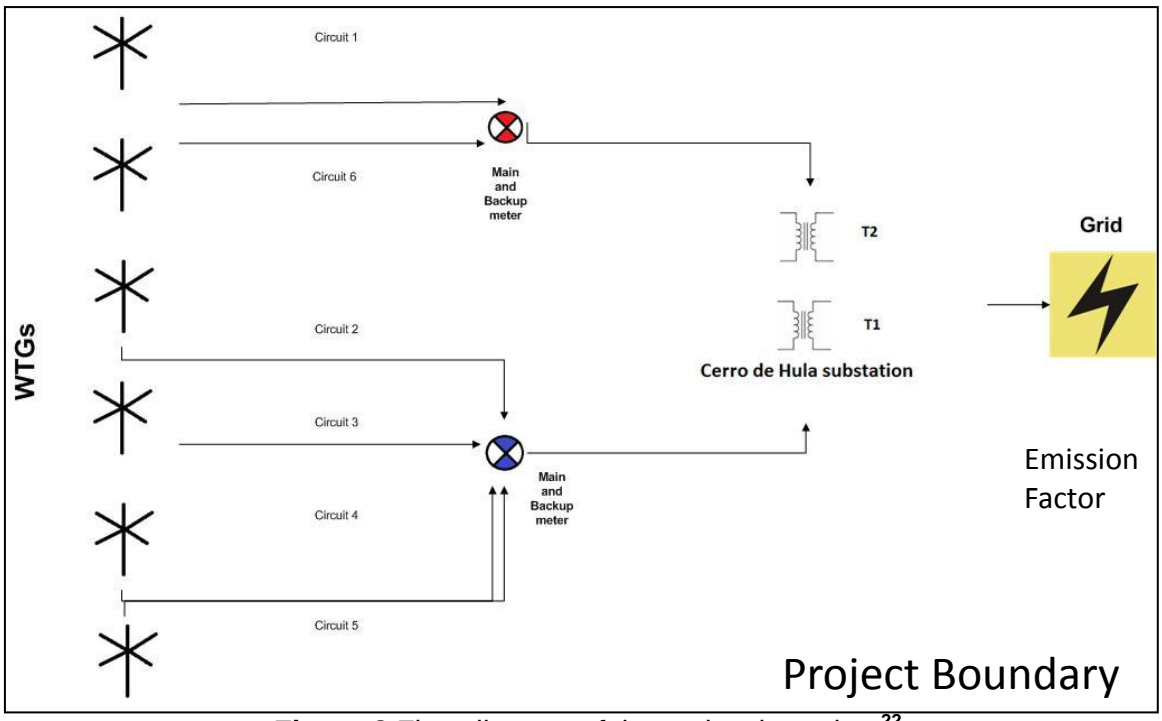


Figure 3. Flow diagram of the project boundary[22]

B.4. Establishment and description of baseline scenario

According to the approved baseline methodology ACM0002, (v.12.2.0) 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".

The project activity consists of the installation of a new grid-connected renewable plant- As the project does not modify or retrofit existing electricity generation facilities; the baseline scenario is based on the displacement of grid electricity.

B.5. Demonstration of additionality

Background on Project Context and CDM consideration

From 1995 onwards, a group called Zond began to carry out studies in order to determine the wind potential in the Cerro de Hula Region in the area of "*Cerro de Hula*" in the Municipalities of Santa Ana and San Buenaventura, in the Department of Francisco Morazán. This process had the support of the Honduran Ministry of Communications, Public Works and Transport (SECOPT). These studies continued to be carried out by Zond until May 2005 (when the studies and data that had been gathered to date were bought by Energías Renovables de Mesoamerica[23]. Since May

[22] For turbine location please refer to figure 2 on section A.4.3. For circuit connections, electricity meters, substation and transmission line please refer to layout in Appendix B.

[23] Now Globeleq Mesoamerica Energy

2005 to date Energías Renovables de Mesoamerica[24]have continued to build on these studies to determine the full wind potential in the region and design an appropriate wind farm configuration.

From 2000 onwards Zond consulted several specialized consultants in the CDM process to analyze the applicability and potential that the project might have in terms of carbon credit generation. Zond held talks with a CDM consultant to develop carbon potential studies which were to be submitted to the Prototype Carbon Fund of the World Bank[25]. On December 2000 an initial PIN was submitted to the Prototype Carbon Fund, though financing by the PCF was not ultimately realised.

After acquiring Zond de Honduras S.A., Energías Renovables de Mesoamérica S.A.[26]continued communications with various CDM consultants for the carbon credit generation potential. The original projections contemplated the installation of 49.5MW in the region; nevertheless wind data measurements were still incomplete and additional data continued be gathered in order to determine the total wind potential of the region.

Subsequently, Energías Renovables de Mesoamérica S.A[27] created a local subsidiary called Energía Eólica de Honduras, S.A. ("EEHSA"- referred hereto as the Project Developer) in order to carry out the additional wind analysis as well as to develop the project on-site[28]. The potential capacity of the site was increased from 49.5 MW originally to over a hundred MW.

EEHSA finally signed a contract on the 23rdFebruary 2006 with EcoSecurities Group PLC (now EcoSecurities International Limited) to carry out a CDM Eligibility Analysis and further develop the Project under the CDM. The Eligibility Analysis was completed in November that year. EcoSecurities has continued to guide the development of the CDM component of the project since this point. Also the preliminary feasibility study for the project was elaborated in Nov 2006.
On the 11thDecember 2007, the Project Developer received the "Mitigation Measures or Environmental Control Fulfilment Contract" for Project's Implementation[29]. Two days after, on the 13thDecember 2007, the Project Developer obtained the Environmental Licence #352-2007 from the Ministry of Natural Resources and Environment (SERNA).

Furthermore, in September 2008 Project Developer and SERNA signed a 50 years Operation Contract and afterwards the Project Developer and ENEE signed a 25 years PPA[30].

On the 22nd and 23rdNovember 2008, a local stakeholder consultation was carried out (see **Section E.1**for more details). As per CDM requirements, the "Prior consideration of CDM notification" was initially submitted on the9th January 2009, and resubmitted on the 7th January, 2011 (as

[24]*Idem*.

[25] The Prototype Carbon Fund is a partnership between seventeen companies and six governments, and managed by the World Bank, the PCF became operational in April 2000. As the first carbon fund, its mission is to pioneer the market for project-based greenhouse gas emission reductions while promoting sustainable development and offering a learning-by-doing opportunity to its stakeholders. The Fund has a total capital of $180 million (More information available at: http://wbcarbonfinance.org/Router.cfm?Page=PCF)

[26] Now Globeleq Mesoamerica Energy

[27]Now Globeleq Mesoamerica Energy

[28] The Project activity is also known as "*Eoloeléctrico Honduras 2000"* project in Honduras.

[29]The original Spanish title is the following : *Contrato de Cumplimiento de Medidas de Mitigación o de Control Ambiental, para el Desarrollo del Proyecto Eoloeléctrico Honduras 2000*

[30]The PPA was published in the Honduran Government Official Gazette on March 26, 2009. Additional capacity was later introduced into the same PPA and operation contract. This was in turn published in the Official Gazette on March 2, 2013. The revised PPA also extended the term from the original 20 years to 25.

established by the 'Guidelines on the Demonstration and Assessment of Prior Consideration of the CDM').

Date	Stage	Evidence
2000-2001	Zond contacts CDM consultant[31] to develop carbon feasibility studies of the project	Proposals and communications with CDM consultant to develop carbon potential studies to submit for the Prototype Carbon Fund of the World Bank
22nd December 2000	PIN	A preliminary Project Idea Note (PIN) is developed for the Prototype Carbon Fund, World Bank
1st May 2005	Mesoamérica Energy buys Zond de Honduras	Sale contract between ZOND and Energías Renovables de Mesoamerica (known as Mesoamerica Energy)
23rd February 2006	Project Funding Agreement with CDM consultant – **serious CDM consideration**	EcoSecurities and EEHSA sign a CDM Project Development and Service Agreement
13th November 2006	Eligibility analysis	Eligibility analysis is concluded by CDM consultant (EcoSecurities)
November 2006	Feasibility study	Preliminary feasibility study is developed
15th July 2007	Land tenure process start	The first lease agreement contract is executed
11th December 2007	Environmental Control Fulfilment	The Contract for the Mitigation is obtained
13th December 2007	Environmental Licence granted	SERNA approved EIA and issued Environmental Licence
11th January 2008	Environmental License renewed	Extension approval of the Environmental License (035-2008)
September 2008	Feasibility study	Second feasibility study is developed and submitted to the Ministry of Environment (SERNA) for approval
30th September 2008	Operation Contract signed	EEHSA signs an Operation Contract with the Ministry of Environment (SERNA). This was later modified to include the project's full capacity on 12/12/2012, as published on the Official Gazette on 02/03/2013).
1st October 2008	PPA	The Power Purchase Agreement is signed with National Utility (Empresa Nacional de Energía Eléctrica-ENEE)[32].
3rd October 2008	Request for modification of Environmental License	A modification of the Environmental Licensed is requested to SERNA
22&23 November 2008	Stakeholder consultation	Minutes of stakeholder consultation event (see section E)
9th January 2009	**Prior CDM Consideration form submitted**	**A CDM Prior Consideration Form is submitted to the UNFCCC**
12th January 2009	**Confirmation of reception of CDM**	**Confirmation E-mail from CDM team**

[31] Carbon Trade Inc/Ecoenergy was the consultant contacted by Zond to the assisting with the validation and review of carbon emission information and data, and assisting Zond with review of the monitoring and verification protocols, as well as any certification reports

[32] An addendum to the PPA was signed on 20/12/2012. It was published together with the Operation Contract on 02/03/2013.

Date	Stage	Evidence
	consideration form	
12th March 2009	Environmental License renewed	SERNA issues the renewal of the Environmental License
26rd March 2009	PPA publishing	PPA approval is published
22nd March 2010	New Agreement signed with CDM consultant as a CDM Project Development and Service Agreement	Contract signed between EcoSecurities and EEHSA
May2010	Energy Yield Assessment developed	Report elaborated by Mott MacDonald for the US Export-Import Bank

Table 6 – CDM development progress before CDM starting date

The starting date of the project[33] is considered to be the 24th June 2010; the date that the contract was signed with Gamesa (technology provider) for the construction of the initial 102 MW. This project is a "first-of-its-kind" in Honduras and as a result inevitably faced a variety of issues that delayed the project's development. These include the fact there was no previous wind data existing and the Project Developer had to perform these studies and generate this data from scratch. Other issues such as the lack of local technical expertise among others meant that the technical characteristics of the project could not be appropriately defined such that it was bankable.
These issues also contributed to delaying the project entering validation during the 2 year period following CDM notifications.

Availability of land and land tenure issues also played an important role in the significant delays to the project´s development. The majority of land on which the project will be sited was part of large Municipal grants. Therefore EEHSA undertook a significant process of reviewing one-on-one the property documentation with the local population (land titles, purchase agreements, records, taxes, etc.) to formalize registry and codification of land ownership. Further, lease agreements were signed between the property owner and EEHSA, as well as by the municipal Mayor, as a witness of honour. While the process itself was a cause of major delays for the project´s implementation, the Project Developer was able to build a strong relationship with the land tenants and the municipalities, building a great deal of trust and mutual respect during the process.

Finally, a major challenge facing the project was the difficulty in accessing capital, as Honduras is a country that presents difficulties in obtaining finance. For example, in 2009 discussions to secure debt financing were underway. At this time there was significant domestic political upheaval (as a military coup removed the incumbent President). As a result of this a great deal of debt financing dried up for Honduran projects. CABEI (the ultimate debt lender to the Project) withdrew all debt financing to the country for example. This caused major delays occurred until finance could be secured. Finance was not ultimately secured until November 2010[34].

The project developer has taken full consideration of CDM in the development of this project activity. The following timeline illustrates the real and continuing actions taken to secure CDM status for the project since the CDM Starting date:

[33] According to the EB the start date is: "the earliest date at which either the implementation or construction or real action of a project activity begins"(EB 33). Also, "the start date shall be considered to be the date on which the project participant has committed to expenditures related to the implementation or related to the construction of the project activity" (EB41).

[34] CABEI & EX_IM BANK credit agreements, both dated November 4, 2010

24th June 2010 (CDM Starting date)	**Contract signed with technology provider**	**Contract signed between GAMESA and EEHSA is signed**
17th September 2010	Land Tenure Process ends	Last land lease agreement for turbines and access signed
4th November 2010	Finance Closure	US Ex-Im Bank and CABEI approve financing
17th December 2010	Construction Start date	Civil works begin at site
7th January 2011	**Prior CDM Consideration form re-submitted**	**A new CDM Prior Consideration Form is submitted to the UNFCCC, according to the existing procedures**
11th January 2011	**Prior CDM Consideration form submitted to DNA**	**E-mail to DNA including CDM Prior Consideration Form**
11th January 2011	Confirmation of reception of CDM consideration form	Confirmation from DNA confirming reception of CDM Prior Consideration Form
26th January 2011	Ground breaking Ceremony	Official act in which Honduran President officially inaugurated the civil works
3rd March 2011	Modalities of Communication signed	MOC
4th April 2011	Validation contract	Signed validation work order with PJR
14th April 2011	Validation start	Start of global stakeholder comments period
20th May 2011	Applied for LOA.	Submission of CDM project proposal to DNA.
5th August 2011	Host Country Approval	LOA from Honduras DNA
12th October 2011	Annex 1 approval	LOA from UK DNA

Table 7 – CDM development progress from CDM starting date onwards

The above demonstrates that the project activity would not have been executed without the involvement of carbon market participant. CDM benefits were a vital component of the project, in absence of which, the project would not have been implemented. It is also clear that the project developer was aware of CDM before the start date of the project activity. The start date of the project is after 2nd August 2008 and the project developer had sent notifications to the UNFCCC the Host Nation DNA at appropriate times to inform them of their intention to seek CDM status. Therefore, the project activity is in line with Annex 13, EB62.

The following steps are used to demonstrate the additionality of the project according to the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the Executive Board:

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

Sub-step 1a. Define alternatives to the project activity

Project activities that apply the **"Tool for the demonstration and assessment of additionality" (Version 06.0.0)** in the context of approved consolidated methodology ACM0002 (v. 12.2.0), only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity. The following two alternatives to the proposed CDM project activity were analysed:

Alternative 1: The proposed project activity without CDM: construction of a wind farm with an installed capacity of 126 MW connected to the Grid, implemented without considering CDM revenues.

The Project is first-of-its-kind, and is very unlikely to be implemented in the absence of the CDM. There are no commercial wind farms operating in Honduras, nor it has been proposed in another CDM project activity. Cerro de Hula Wind Project was the first wind project that was proposed and will be implemented in the country and the only one that has been published by a DOE for public comments. Therefore in accordance to the definitions provided by the Executive Board the project can be considered as a "first-of-its-kind"[35].This alternative faces the largest number of barriers, and is therefore not considered to be a viable baseline scenario. These barriers are expanded on below, to add context to the "first-of-its-kind" nature of this project activity.

Alternative 2: Continuation of the current situation. Electricity will continue to be provided by the existing Grid.

If the current situation is continued, project developer would not have to invest any amount of money, and would not face any technological or other barriers. Electricity would continue to be provided by the existing mix of power plants in the Grid(predominantly fossil fuel) as explained below. Hence, this alternative would face the least barriers, and is therefore identified as the baseline scenario.

Both alternatives presented above are credible and feasible alternatives. The Project Developer would either a) develop a non-existent technology (electricity by wind generation) for Honduras that requires qualified labour capacities or b) do not push forward a brand new technology and rather let BAU situation for electricity generation in Honduras prevail, therefore Alternative 2: *Continuation of the current situation* is the most credible and feasible alternative of both, and is considered the *Baseline Scenario*.

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

The alternatives considered above comply with the laws and regulatory requirements for electricity generation in Honduras.

Step 2. Investment Analysis

According to the "Tool for the demonstration and assessment of additionality", a barrier analysis was chosen; therefore no investment analysis was performed.

Step 3. Barrier Analysis

The barrier analysis aims to identify barriers that prevent the implementation of this type of project activity, but which do not prevent the implementation of at least one of the proposed alternatives identified in step 1.

Sub-step 3a. Identify barriers that would prevent the implementation of the proposed CDM project activity.

The objective of sub-step 3a is to demonstrate that there are barriers that would prevent the project activity from being carried out if it was not registered as a CDM project. For this project a "first-of-its-kind" barrier is being followed. According to the "Guidelines on additionality of first-of-its-kind project activities" v1.0 (EB63 Annex11), and as integrated recently in ACM0002 v.12.2.0, additionality of a project can be demonstrated in a simple and straightforward manner if it can be demonstrated that no similar project has been implemented previously in the applicable geographical area. If this condition can be demonstrated then the project is considered "first-of-its-kind" and the project deemed to be additional if it meets the relevant criteria specified in the Guidance and ACM0002 v12.2.0.

[35] Guidelines on Additionality of First-of-its-kind Project Activities (Version 01.0) EB63 Annex 11

To complement this "first-of-its-kind" barrier approach technological barriers as well as investment barriers are discussed. These barriers are included only to elaborate and highlight the factors that discourage/prevent the project developer in implementing the project activity without CDM; and to help characterise the multiplicity of factors that ultimately contribute to development of projects such as Cerro de Hula being held back. They are not been presented as direct arguments for additionality itself. Therefore, this project is being deemed additional by virtue of its **"first of its kind" nature.**

Prevailing practice barrier, *inter alia*: The project activity is the **first of its kind.**

The Cerro de Hula Wind Project will be the first wind farm in Honduras, as can be confirmed in the ENEE database[36]. The total contracted capacity by the ENEE from private power generators in Honduras during 2009 was 883.28MW (734.40 MW is thermal (83.1%), 57.485MW is hydro power (6.5%), and 91.401MW is biomass based generation (10.3%))[37]. The information substantiates that there is no wind based power generation in the country.

Contracted Capacity by ENEE from private power plants kW) Period 2000-2009										
Plant type	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Hydro	800	800	1,280	2,510	11,513	14,699	38,471	55,266	57,529	57,485
Thermals	323,500	326,000	431,000	431,000	646,400	743,900	736,900	739,900	747,900	734,400
Biomass	2,700	2,700	18,200	18,200	30,000	59,800	59,800	67,751	81,751	91,401
TOTAL	327,000	329,500	450,480	451,710	687,913	818,399	835,171	862,917	887,180	883,286

Source: ENEE 2009[38]

The total annual electricity production in the Grid during 2008 and 2009 under various categories is provided in table 8:

Description	**2008**		**2009**	
	Energy	**Percentage**	**Energy**	**Percentage**
	GWh	**%**	**GWh**	**%**
Thermal (Private)	4,045.6	61.9	3,585.3	54.2
Thermal (State owned)	3.1	0.0	28.9	0.4
Total Thermal	4,048.7	61.9	3,614.2	54.6
Hydro (State owned)	2,006.3	30.7	2,539.6	38.4
Renewable (Private)	470.2	7.2	413.5	6.3
Total Renewable	**2,476.5**	**37.9**	**2,953.1**	**44.7**
Electricity Imported	11.7	0.2	46.2	0.7
Total Electricity	**6,537.0**	**100**	**6,613.4**	**100**

Table 8. Historical Electricity Generation 2008 and 2009 in the Grid[39]

As it is evident from table above, of the total electricity generated in the host country, thermal power generation dominates the nation's supply, accounting for 61.9% in 2008 and 54.6% in 2009.

The total renewable electricity generation (state + private) was 2,476.4 GWh in 2008 and 2,952.8 GWh in the year of 2009. The breakdown of total renewable electricity generation for the last five years has been provided below in table 9.

[36] http://www.enee.hn/

[37] http://www.enee.hn/Estadisticas2009/estadisticasPDF_2009/CUA3_1_2009.pdf

[38] *Idem.ref 37*

[39] http://www.enee.hn/Estadisticas2009/estadisticasPDF_2009/CUA4_2009.pdf

PLANT	TECHNOLOGY	PRIVATE/ STATE	ANNUAL ELECTRICITY PRODUCTION (GWh)						
			2003	2004	2005	2006	2007	2008	2009
Cañaveral	Hydro	State	172.9	149.8	120.8	185.9	164.5	152.0	192.3
Rio Lindo	Hydro	State	540.5	467.4	383.0	586.3	520.6	474.5	591.7
El Nispero	Hydro	State	36.9	29.6	83.7	91.3	55.7	34.2	42.8
El Cajón	Hydro	State	955.5	702.4	1,004.3	1,038.6	1,236.3	1,298.6	1,689.0
Santa Maria del Real	Hydro	State	0.5	6.0	4.8	3.8	2.6	5.1	3.2
Nacaome	Hydro	State	31.6	16.2	50.0	32.4	42.7	41.8	20.6
La Nieve	Hydro	Private	1.5	1.2	1.4	1.5	1.0	1.3	1.0
Zacapa	Hydro	Private	0.7	0.0	0.5	3.0	2.4	3.1	3.1
La Esperanza	Hydro	Private	0.5	1.9	3.6	23.8	35.0	44.6	31.5
Babilonia (Energisa)	Hydro	Private	0.0	17.6	29.9	30.6	30.2	32.7	23.7
Yojoa	Hydro	Private	0.0	0.0	1.1	1.3	1.9	2.2	2.8
Rio Blanco	Hydro	Private	0.0	9.2	33.3	38.4	34.4	35.0	38.8
Cececapa (Congelsa)	Hydro	Private	0.0	0.0	1.6	18.9	14.6	16.4	17.0
Cuyamapa	Hydro	Private	0.0	0.0	0.0	14.0	50.3	52.5	53.6
Cuyamel	Hydro	Private	0.0	0.0	0.0	0.0	17.6	38.9	33.9
Cortecito	Hydro	Private	0.0	0.0	0.0	0.0	1.6	21.8	20.4
Las Glorias	Hydro	Private	0.0	0.0	0.0	0.0	2.8	20.6	5.1
San Carlos	Hydro	Private	0.0	0.0	0.0	0.0	0.0	15.8	16.5
Coronado	Hydro	Private	0.0	0.0	0.0	0.0	0.0	0.0	9.6
Aysa	Biomass	Private	2.5	1.3	1.6	0.3	1.2	0.0	0.0
La Grecia	Biomass	Private	17.8	36.8	28.0	35.9	30.3	20.7	25.7
Cahsa	Biomass	Private	0.0	0.0	18.2	27.1	42.5	39.4	43.8
Azunosa	Biomass	Private	0.0	0.0	7.0	10.1	12.1	13.4	11.1
Tres Valles	Biomass	Private	0.0	0.0	21.4	26.5	21.5	22.3	22.0
Chumbagua	Biomass	Private	0.0	0.0	0.0	0.0	3.8	8.3	9.6
Ecopalsa	Biomass	Private	0.0	0.0	0.0	0.0	2.5	2.9	0.1
Celsur	Biomass	Private	0.0	0.0	0.0	0.0	0.0	78.3	43.9
	TOTAL		1,760.8	1,439.4	1,794.0	2,169.9	2,328.1	2,476.4	2,952.8

Table 9. Historical Renewable Electricity Generation in the Grid

As observed from the above table, the total renewable energy generation only includes hydro and renewable biomass based electricity generation as there are no existing wind power projects.

Thus, the generation of electricity through wind power is non-existent in Honduras as is evident from the statistical information generated by the ENEE where it is confirmed that the project is a "first-of-its-kind" in Honduras[40]in a market thoroughly dominated by thermal, hydro power, and biomass plants.

According to the *Guidelines on additionality of First-of-its-kind project activities,* a proposed project activity is additional if the *First-of-its-kind* in the geographical area if:

(a) The project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the project;
(b) Project participants selected a crediting period for the project activity that is "a maximum of 10 years with no option for renewal".

In the case of Cerro de Hula Wind Project, as has been described above, there is not a single wind farm in Honduras (the applicable geographical area), therefore it can be concluded that no similar project activity is being implemented as the technology used in the project activity is different from any other technologies that has been used in the host country to deliver the same output that have started commercial operations in the country before the start date of the project.

[40] http://www.enee.hn/Estadisticas2009/Capacidadinstalada.html

The technology for the Cerro de Hula Wind Project is wind power electricity generation which is defined as *the conversion of wind energy into a useful form of energy, such as using* wind turbines *to make electricity*[41]. This form of electricity generation is considered a renewable source of energy that produces no GHG. Basically two different types of energy generation projects can be defined: onshore windfarm (those occurring inland) and off-shore wind farms (those occurring in bodies of water). In Honduras no such electricity generation technology exists, therefore it can be concluded that **no similar technology** is used in the country to supply electricity to the grid as per *Guidelines on additionality of First-of-its kind.*

The **geographical area** used to the assessment for this project is the Republic of Honduras, and as it has been explained above the number of wind farms in Honduras is zero. The first wind farm to start operations in the country is Cerro de Hula Wind Project.

Technological Barrier

The "Law of Incentives for Electricity Generation with National Renewable Resources" (Decree267-98) was published on 25th November 1998 with the purpose of promoting renewable energy generation, nevertheless, despite the existence of this law for more than a decade, thermal power plants have remained the primary source for electricity generation in Honduras (refer to **Table 8**).Electricity generation from fossil fuel sources still represents 55% of the total installed capacity of the Grid[42]. Development and the critical research and resource mapping required to develop new, alternative technologies for electricity generation that have not been developed in the country face serious difficulties in accessing sources of investment. This is further explained in the investment barrier section below.

Since thermal plants are the prevailing practice in the country, the operational capacity to implement and operate other kinds of projects -especially wind farms- is limited. It is important to consider that in Honduras the lack of local personal safety situation along with the political instability that has existed in recent years[43] make it impossible to get this kind of support and the lack of trained labor is a barrier that the project faces which can hardly be overcome by additional financial means. For instance, since no local know-how is available, the implementation of wind farms requires foreign technology providers, especially from Spain (as in the case of Cerro de Hula)[44], Germany and Denmark, indeed the engineering design and development team is head quartered in Costa Rica. It is also important to mention that GAMESA (technology provider) will be in charge of operating the wind farm for the first two years in order to create a local know how. Eventually, after these initial years of operation, GAMESA will hand over the operation of the project to Energía Eólica de Honduras; and the local personnel that were trained during this time, will take over operation. These technical knowledge barriers combined to the high level of variability of the resource are significant difficulties that the wind farm project developers have to face. Further, as explained above, there is no specific law/policy in the host country to promote large scale wind power plants and only limited access to incentives is available.

Technical Difficulties

Compared to other renewable energy project wind farms rely on the most uncertain renewable resource the wind. This resource has a very high variability and has a lower degree of predictability and consistency than geothermic temperature gradient (geothermal projects), water (hydroelectric

[41] http://en.wikipedia.org/wiki/Wind_power

[42] Source: National Power Utility (*Empresa Nacional de Energía Eléctrica*, ENEE), http://www.enee.hn/estadistica2006/pdf/Cuadro_3.pdf

[43] Note: Honduras faced political turmoil in 2009 caused by a coup that deposed its former president, Manuel Zelaya, and divided Hondurans provoking riots an instability.

[44] GAMESA (http://www.gamesa.es/) is the manufacturer and tech provider for the wind turbines

projects) or solar energy[45]. This project will be the first wind farm in Honduras, and is the result of a significant research effort carried out to map the wind potential in the area, mapping that has taken more than a decade[46] to provide reliable data. The project developer only had a minimal amount of wind data that was bought from Zond. This data had to be reinforced by developing additional wind resource studies carried out by EEHSA to determine wind potential to a high enough standard to facilitate investors to invest. It is important to mention that the measurements performed by Zond were carried out at a 30m height while measurements needed to be taken at a higher height, considering the actual size of the turbines. In order to minimize technical risks and avoid the need to make corrections, EEHSA performed measurements up to 80m high with measuring devices at 30, 60 and 80m. Furthermore some wind measurement equipment will remain *in situ* to support on-going operations. Once again, this has to be undertaken by the project developer.

Added to the intrinsic risk of wind turbines operation due to the variability of the resource, the technical barrier is further underlined by the fact that wind turbines are a new technology in Honduras, with no domestic hands on experience of developing or managing a wind asset.

On a more micro level, the Cerro de Hula Wind Project is located in a difficult topographical location, which poses an engineering and development barrier to the project implementation[47]. The complex terrain involves various risks for civil works, particularly during the rainy season. The average precipitation in project area is between 1000 and 1200mm[48]. As a result of the steep topography and tropical climate, erosion and landslides are common, which can cause delays and extra costs during construction and eventually operation. In addition there is no support infrastructure in the area such as rough dirt tracks, approach roads, etc.

Technology Transfer

The installation of a wind farm can be considered as a positive technology transfer in the host country. The fact is that electricity generation in Honduras still relies on imports of energy sources such as bunker, diesel, coal, etc. to meet its electricity demands. In addition the fact that equipment must be imported from abroad (Spain), as the technology does not exist locally, indicates that this specific technology is considered as advanced in Honduras. The development of Cerro de Hula Wind Project will foster the gradual development and replications of such technologies in Honduras, hence the related catalytic benefits from the CDM project in terms of technology transfer.

The absence of any wind project – and hence, the absence of an illustration of a successful operation of a wind power project in the host country associated with the fact that there is at present, very limited technical know-how related to the technology in the host country - poses risks and discourages project developers to venture into this technology for power generation. CDM allows the project developer to hedge this risk associated with a new technology.

Investment barrier

It must be noticed that in spite of the availability of wind resources in Honduras, wind energy has not been tested as a mainstream source of electricity generation in the host country. There are currently no other existing wind farms in the country. The high up-front investment requirements (that include early expenditures such as wind availability studies, land tenure closure, etc.) have

[45] http://www.nrel.gov/wind/systemsintegration/system_integration_basics.htmlstates:"Wind power is by its nature variable, and as a result, it differs from the majority of generation supplying the electric grid."

[46]Feasibility study Section V *"Estudio y evaluación del proyecto"*

[47] Energía Eólica de Honduras, S.A. & Mesoamérica Energy. (2008). Feasibility study. Eoloeléctrico Honduras 2000. Cerro de Hula. Original title in Spanish*"Estudio de Factibilidad. Proyecto Eoloeléctrico Honduras 2000. Cerro de Hula"*

[48]Qualitative Environmental Diagnosis elaborated by Ambitec SA de CV Original title in Spanish "Diagnostico ambiental Cualitativo – Ampliación proyecto Eoloeléctrico Honduras 2000" September 2008

made wind power unattractive in a competitive electricity market, where the long term market price is difficult to estimate. For the financial sector, wind energy is a risky investment because of the intermittent supply of energy, dependent upon the natural and variable wind resource[49]. Besides, the nation´s banking sector has a lack of experience of financing such projects; there is no information about available financing as well as uncertainty and risk in the country[50]. Additionally, banks have a risk-based approach, which depends on the market, where it is possible for the bank to provide cover.

US Export-Import Bank sets out "Exposure Fee Advice" which is determined by five variables: exposure fee level of the country, percentage of the cover, the "quality" of the product provided, and the length of the drawdown and repayment periods. The Exposure Fee Level (1-7, lowest to highest risk) is established for every market in which Ex-Im Bank is open for business. The minimum exposure fee for a country is determined by the *Organisation for Economic Co-Operation and Development* (OECD) country classification. Ex-Im Bank exposure fee levels are consistent with OECD country classifications. The OECD country Risk Classification Method measures the country credit risk, i.e. the likelihood that a country will service its external debt. This method establishes eight country risk categories (0-7, lowest to highest risk).

The Ex-Im Bank Exposure Fee Level for Honduras is 6 (See www.exim.gov/tools/exposure/thond48.pdf*), hence Honduras is classified as a very risky country to invest.*

The historical country risk classification of OECD for Honduras is shown in the following table. Honduras has been a very risky country up to now, and the tendency is to continue under category 6.

1999	***Period***	*22 Jan – 26 Mar*	*19 Mar – 24 Jun*	*17 Jun – 21 Oct*	*14 Oct – 31 Dec*
	Category	***6***	***7***	***7***	***7***
2000	***Period***	*24 Jan – 09 May*	*02 May – 20 Jul*	*13 Jul – 03 Nov*	*27 Oct – 1 Feb (01)*
	Category	***7***	***7***	***7***	***7***
2001	***Period***	*25 Jan – 07 May*	*30 Apr – 19 Jul*	*12 Jul – 03 Nov*	*27 Oct – 25 Jan (02)*
	Category	*7*	*7*	*7*	*7*
2002	***Period***	*18 Jan – 25 Apr*	*18 Apr – 04 Jul*	*27 Jun – 01 Nov*	*25 Oct – 23 Jan (03)*
	Category	***7***	***7***	***7***	***7***
2003	***Period***	*16 Jan – 11 Apr*	*04 Apr – 03 Jul*	*26 Jun – 31 Oct*	*24 Oct – 22 Jan (04)*
	Category	***7***	***7***	***7***	***7***
2004	***Period***	*15 Jan – 07 May*	*30 Apr – 02 Jul*	*25 Jun – 29 Oct*	*22 Oct – 28 Jan (05)*
	Category	***7***	***7***	***7***	***7***
2005	***Period***	*21 Jan – 06 May*	*29 Apr – 27 Jun*	*20 Jun – 28 Oct*	*21 Oct – 3 Feb (06)*
	Category	***7***	***7***	***7***	***7***
2006	***Period***	*27 Jan – 28 Apr*	*21 Apr – 06 Jul*	*29 Jun – 27 Oct*	*20 Oct – 2 Feb (07)*
	Category	***7***	***7***	***7***	***7***
2007	***Period***	*26 Jan – 02 Apr*	*30 Mar – 02 Jul*	*29 Jun – 29 Oct*	*26 Oct – 8 Feb (08)*

[49] 2004. BUN-CA. Biomass Users Network. http://www.bun-ca.org. Principales barreras que enfrenta la inversión de proyectos eólicos en América Central.

[50] 2001. BUN-CA. Biomass Users Network. http://www.bun-ca.org. Barreras al Mercado de Fuentes Renovables de Energía.http://www.bun-ca.org/publicaciones/14.pdf(pg24)

	Category	*7*	*7*	*6*	*6*
2008	***Period***	*01 Feb – 25 Apr*	*18 Apr – 27 Jun*	*20 Jun – 30 Oct*	*24 Oct – 6 Feb (09)*
	Category	***6***	***6***	***6***	***6***
2009	***Period***	*30 Jan -10 Apr*	*3 Apr – 10 Jul*	*3 Jul – 30 Oct*	*23 Oct – 5 Feb (10)*
	Category	***6***	***6***	***6***	***6***
2010	***Period***	*29 Jan – 09 Apr*	*02 Apr – 09 Jul*	*02 Jul- 17 Dec*	*10 Dec 10 – 04 Feb (11)*
	Category	***6***	***6***	***6***	
2011	***Period***	*28 Jan – 07 Apr*	*31 Mar – 08 Jul*	*01 Jul- 4 Nov*	*28 Oct – 31Dec (11)*
	Category	***6***	***6***	***6***	*6*

Source: OECD[51]

Table 10. Historical Country Risk Classification for Honduras by OECD

The Belgian Export Credit Agency (ONDD) too shows Honduras as a risky country *to invest.* Countries are classified into seven categories (from 1 to 7) reflecting the intensity of political risk. Category 1 includes those countries for which political risk is the lowest and category 7 groups those countries with the highest political risk. Honduras is under categories 3 & 4 for short term and for special transactions respectively; and is under category 6 for medium/long terms.

According to the intensity of commercial risk, countries are classified into three categories (from A to C). This is the risk of default by a foreign private buyer, i.e. the risk of a buyer being unable to meet its financial obligations or not honouring them without any legitimate reason. Commercial risk not only depends on the situation of the buyer at its micro-level, but also on macroeconomic and systemic factors impacting on the repayment capacity of all the buyers in a country. Category A groups countries in which systemic commercial risk is the lowest, while category C groups countries with the highest risk. Honduras is under category C with the highest risk.

The risk of expropriation and government action according to the *Belgian Export Credit Agency (ONDD)* for Honduras is 4, which not only covers the risks of expropriation and breach of contract by the government, but also risks related to the (dis)functioning of the judiciary system and the risk of a possible negative change of attitude towards foreign investors.

The transfer risk for Honduras is 5, and is based on the same principles as the assessment of political risk related to medium/long term exports transactions. A summary of the above can be seen in the following link: http://www.ondd.be/WebONDD/Website.nsf/AllWeb/Honduras?OpenDocument&Disp=1&Language=en

.

[51] Own elaboration with data from OECD (http://www.oecd.org/dataoecd/9/12/35483246.pdf)

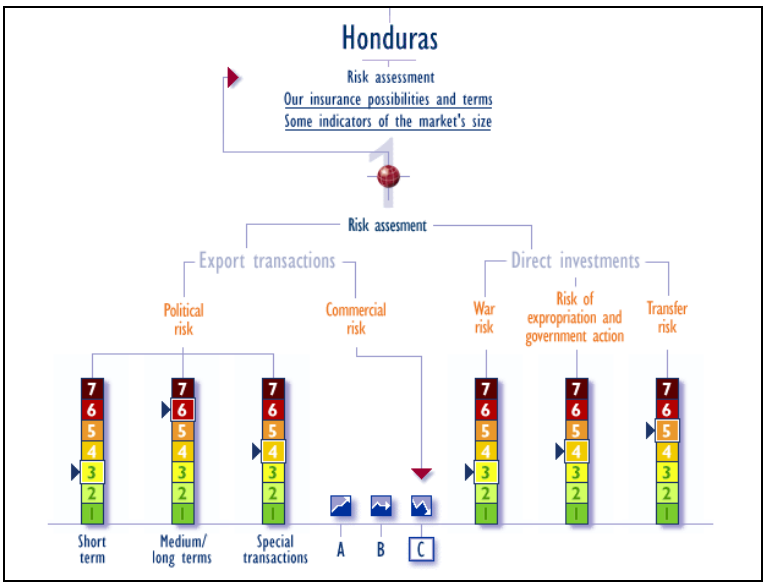


Figure 4. Risk assessment for Honduras according to ONDD.

Based on the above, it can be concluded that Honduras is not perceived as an attractive country to invest; therefore, substantial financial support is needed, especially during the first few years of the project. The CDM revenues from the project are thus considered crucial to hedge this risk and promote the development of a clean energy technology in the country.

Conclusion

We can conclude that the electricity generation from the grid (*business as usual*) is the most financially attractive baseline scenario since such a course of action does not imply a requirement for investment for the project developer. This is clearly shown by observing the additions to the Sistema Interconectado Nacional, where despite incentives that have existed for more than a decade[52]; the Government has not succeeded in meeting the country´s energy demands through less carbon intensive energy generation alternatives. Further, it can be noticed that most of the private renewable energy generation projects that have come up recently (hydro and biomass projects) have pursued CDM revenues as it can be appreciated in the table below.

[52] Note that he "Law of Incentives for Electricity Generation with National Renewable Resources" (Decree267-98) was published on November 25th 1998

Renewable electricity generation privately owned plants in Honduras			
Project	Type	Year of operation start date*	CDM Reference number
La Nieve	Hydro	2002	*No CDM revenue considered*
La Grecia	Biomass	2002	1056
La Esperanza	Hydro	2003	9
Babilonia	Hydro	2004	*No CDM revenue considered*
Rio Blanco	Hydro	2004	28
Azunosa	Biomass	2004	1034
Tres Valles	Biomass	2004	1066
Zacapa	Hydro	2005	235
Yohoa	Hydro	2005	157
CECECAPA	Hydro	2005	156
Cahsa	Biomass	2005	1035
Cuyamapa	Hydro	2007	45
Cuyamel	Hydro	2007	83
Cortecito	Hydro	2007	51
La Gloria	Hydro	2007	154
Chumbagua	Biomass	2007	1043
Ecopalsa	Biomass	2007	1877
San Carlos	Hydro	2008	51
Celsur	Biomass	2008	492
Coronado	Hydro	2009	in validation
Mezapa	Hydro	na	4206
Chamelecón	Hydro	na	in validation
La Vegona	Hydro	na	in validation
** Information taken from ENEE*			

Table 11. Renewable energy generation plants and CDM

Furthermore this project has faced delays due to the difficulties to close financing. The political situation in Honduras with a president being deposed[53], during the most critical years when the project was trying to close financing, generated an environment of instability for investors. The fact that CDM provided certain guarantee partially helped to alleviate the existing investment barriers.

Finally and more important is the fact that "the Project is the first in the applicable geographical area that applies a technology that is different from any other technologies able to deliver the same output and that have started commercial operation in the applicable geographical area before the start date of the Project"[54] therefore according to the *Guidelines on Additionality of First-of-its-kind project activities* as well as the *Tool for the demonstration and assessment of additionality* (version 6.0) EB 65 Annex 21 in can be considered as additional. The Project complies as well with the 10 year non-renewable crediting period condition[55, 56].

[53] Refer to footnote 43 above

[54]Guidelines on Additionality of First-of-its-kind Project Activities (Version 01.0) EB63 Annex 11 (paragraph 5a)

[55]*Idem* (Paragraph5b)

The successful implementation of a new zero emission energy generation technology will trigger the development of similar projects in the country and take advantage of this abundant yet underexploited resource[57].

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed activity).

As mentioned in Sub-step 1a, realistic and credible alternatives to the proposed project include:

- *Alternative 1:* The proposed project activity without CDM.
- *Alternative 2*: Continuation of the current situation.

According to the analysis, alternative 1 is not considered to be viable, since the project without CDM would face the largest number of the above described barriers. Alternative 2 is considered viable, because the continuation of the current situation would not require additional investment or risk capital, and importantly would not face any technological or other barriers. Therefore there is one realistic and credible alternative, Alternative 2, which is not prevented by barriers.

Step 4. Common Practice Analysis

Sub-step 4a. Analyse other activities similar to the proposed activity

According to the tool this is not applicable a Common Practice analysis as there are no wind farms commercially operational in the country and the project activity is **first of its kind**. Therefore development of this type of project is not considered common practice therefore no such analysis is included as per *Tool for the demonstration and assessment of additionality*.

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

No similar activities are observed in Honduras, since Cerro de Hula Wind Project will be the first commercially operated wind farm in Honduras. As discussed above (see **Prevailing practice barrier, inter alia the project activity is First-of-its-kind**), no wind energy project has been developed in Honduras. Moreover, the last state owned large-scale renewable energy project (hydroelectric project) that was constructed was built more than two decades ago.[58]

[56] The project originally considered a 7 year twice renewable crediting period (for a total crediting period of up to 21 yrs) nevertheless during the validation process the *Guidelines on Additionality of First-of-its-kind project activities*(EB 63 Annex 11) was published, and also the fact that this First of its kind approach is included in the *Tool for the demonstration and assessment of additionality* 6.0.0 (EB 65 Annex21)and it limits the crediting period to “a maximum of 10 years with no option of renewal”, therefore this has been considered. In the event that a change in such guideline is approved, EEHSA shall pursue a change on the crediting period as originally planned.

[57] http://www.etsap.org/worsh_4_2005/27.pdf

[58] El Cajón, the last large scale renewable energy project built in Honduras started operations in 1985 (for more information see: http://en.wikipedia.org/wiki/El_Caj%C3%B3n_Dam_%28Honduras%29)

B.6. Emission reductions

B.6.1. Explanation of methodological choices

According to the latest version of ACM0002 and the tool to calculate the emission factor for electricity system, since 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*".

The Project therefore applies the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system (Version 02.2.0)".

Also according to the ACM0002 version 12.2.0 and to the *Tool to calculate the emission factor for an electricity system*, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to. The grid is the *Sistema Interconectado Nacional*. The grid not divided into regional grids, and is not subject to significant transmission constraints.

Step 1.Identify the relevant electricity systems

According to the abovementioned tool, the first step is to identify the relevant electricity system. For the specific case of Cerro de Hula Wind Project, the Grid is therefore determined as the *relevant electricity system*

The baseline emissions factor or combined margin CO_2 emission factor for the project electricity system in year ($EF_{grid,CM,y}$) is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$) of the Grid[59]. The data used to calculate the grid emission factor is sourced from:

- ENEE, National Power Utility's web page
  http://www.enee.hn/estadistica2007/index.html
  http://www.enee.hn/Estadisticas2009/estadisticasPDF_2009/CUA35_2009.pdf

- ENEE's Planning Department

Imports
The emission factor was considered zero for the importation, $EF_{grid,import,y}$ = 0tCO_2/MWh, as mentioned the Tool to calculate the emission factor for an electricity system[60].

Exports
Electricity exports have not been subtracted from electricity generation data used for calculating the electricity emission factors, as mentioned the Tool[61].

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

[59] As stated in the *Tool to calculate the emission factor of an electricity system v 2.2.0*

[60] Tool to calculate the emission factor for an electricity system, Version 2.2.0 (EB 61 Annex 12)

[61] Tool to calculate the emission factor for an electricity system, Version 2.2.0 (EB 61 Annex 12)

Only power plants connected to the National Interconnected System (*Sistema Interconectado Nacional* previously defined as "the Grid"[62] were included in the calculation, Option I.

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

Since the fuel consumption data is available for each plant/unit[63] and the low-cost/must run resources constitute less than 50% of total grid generation, Simple OM-Option ***A*** was applied for operating margin calculation as described in the Tool to calculate the emission factor for an electricity system[64].

Annual Electricity Production (GWh) Period 2005-2009					
Plant	**2005**	**2006**	**2007**	**2008**	**2009**
Imports	58.3	7.3	12.6	45.3	0.7
LCMR	1794.0	2169.9	2328.1	2476.4	2952.8
Thermals	3632.9	3770.3	3933.5	4014.1	3607.8
TOTAL	**5485.3**	**5947.5**	**6274.2**	**6535.8**	**6561.3**
%LCMR	**32.7%**	**36.5%**	**37.1%**	**37.9%**	**45.0%**

Source: Elaborated with the latest information published by ENEE, http://www.enee.hn/Estadisticas2009/estadisticasPDF_2009/CUA6_2009.pdf

Table 12. Grid Annual Electricity Production

The simple OM was calculated using the *ex-ante* option on which the emission factor is determined once at the validation stage, therefore this value is fixed during the whole crediting period and no monitoring and recalculation in necessary. As established in the *Tool,* a 3-year generation-weighted average based on the most recent data available at the time of the CDM-PDD to the DOE for validation was used.[65]

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

(a) Simple OM

The equation used for Simple Operating Margin Option A is based on the net electricity generation and a CO_2 emission factor for each power unit as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid\ OM\ simple,\ y}$ = Simple operating 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)
$EF_{EL,\ m,\ y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
m = All power units serving the grid in year *y* except low-cost / must run power units

[62] Refer to section A.2

[63] The information regarding fuel consumption that was not publicly available was provided by personnel from the ENEE upon previous request

[64] Refer to the *Tool to calculate the emission factor for an electricity system, Version 2.2.0*

[65] The latest published statistics were up to 2009, thus the OM was calculated with data from the years 2007-09

y = The relevant year as per the data vintage (previously chosen in step 3)

If for a power unit *m* data on fuel consumption and electricity generation was available, the emission factor ($EF_{EL,m,y}$) was determined using option A1 of the tool.

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_{m,y}}$$

Where:

$EF_{EL,m,y}$= 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)
$EF_{co2,i,y}$= CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
$EG_{m,y}$= 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

This equation is function of the amount of fossil fuels consumed by each power plant or unit in the Grid (*FC*) versus the net electricity generated and delivered to the grid by each power plant or unit (*EG*).
For the power units in the sample group for which only data on electricity generation and the fuel types used was available, the following formula was used as per option A2 in the *Tool*:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \cdot 3.6}{\eta_{m,y}}$$

Where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)
$EF_{CO2,m,i,y}$ = Average CO_2 emission factor of fuel type i used in power unit m in year y (tCO_2/GJ)
$\eta_{m,y}$ = Average net energy conversion efficiency of power unit m in year y (ratio)
m = All power units serving the grid in year y except low-cost/must-run power units
y = The relevant year as per the data vintage chosen in Step 3

If for a power unit *m* only data on electricity generation was available, an emission factor of $0tCO_2/MWh$ was assumed as a simple and conservative approach as stated in option A3 of the *Tool*.

Compliance with the requirements of the 'Tool to calculate the emission factor for an electricity system' with regard to consideration of electricity imports and exports has been described in Step 1.

Step 5: Calculate the build margin (BM) emission factor
As per option 1 for the choice of data vintage, the BM is calculated *ex-ante* based on the most recent information available on units already built for sample group *m* at time of CDM-PDD submission to the DOE for validation.

The sample group of power units *m* used to calculate the build margin was the set of power capacity additions in the electricity system that comprise 20% (in this case 23.1%) of the system generation (in MWh) and that have been built most recently[66]. For the specific case of the project, the sample consists of a set of the latest plants which have been built most recently[67] and which represent more than 20% of the system generation[68].

As mentioned in the tool, power plants registered as CDM project activities were excluded from the sample group. Furthermore, power units built more than 10 years ago were also excluded from the sample group.

The BM is calculated as 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, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where $EF_{grid,BM,y}$= Build margin CO2 emission factor in year y (tCO2/MWh), $EG_{m,y}$ is the net quantity of electricity generated and delivered to the grid by power unit m in year y (in MWh), $EF_{EL,m,y}$ is the CO_2 emission factor of power unit m in year y (tCO_2/MWh),m is the Power units included in the build margin, y = Most recent historical year for which power generation data is available For this approach the most recent historical year for which power generation is available is used.

Step 6: Calculate the Combined Margin emissions factor ($EF_{grid,CM,y}$)

The weighted average CM method (option A) is used for calculating the combined margin emission factor. The combined margin emission factor*($EF_{grid,CM,y}$)* is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$) as follows:

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

Where,

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

The default weights for wind projects are defined as follows: w_{OM}= 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) as per the **Tool to calculate the emission factor for an electricity system**.

Baseline emissions

The baseline emissions *(BE_y)* are obtained as:

[66]Refer to Annex 3

[67] From 2004 to 2009

[68]The selected sample represents 23.2% of the annual electricity production in MWh, in the last published data

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

Where:

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

$EG_{PJ,y}$ = 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/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emissions factor in year *y*(tCO_2/MWh)

Calculation of $EG_{PJ,y}$

As the Project activity is the installation of a new grid-connected wind farm at a site where no wind farm was operated prior to the implementation of the Project activity, the following formula applies:

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

Where

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

Project Emissions

According to ACM0002, for wind power project activities, $PE_y = 0$.

Leakage

According to ACM0002, no leakage is considered. Hence, Leakage = 0.

Emission Reductions

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions. Being the project of a zero-emission activity the final GHG emission reductions are calculated as follows:

$ER_y = BE_y - PE_y$

Where:

ER_y = Emission reductions in year *y* (t CO_2e/yr)

BE_y = Baseline emissions in year *y* (t CO_2e/yr)

PE_y = Project emissions in year *y* (t CO_2e/yr)

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**$FC_{i,m,y}$**
Unit	1,000 gallons US
Description	Amount of fuel *i* (in mass or volume unit) consumed by each power plant /unit in the Grid
Source of data	ENEE's Planning Department
Value(s) applied	See Annex 3
Choice of data or Measurement methods and procedures	Official statistical data
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	**$EG_{m,y}$**
Unit	GWh/year
Description	Net electricity generated and delivered to the grid by each power plant used for OM/BM calculations in year *y.*
Source of data	• Official statistical data
Value(s) applied	For OM calculations: **Year** | **$EG_{m,y}$ (MWh)** 2007 | 3,946,135 2008 | 4,059,400 2009 | 3,608,500 For BM calculations: **Power plants** | **$EG_{m,y}$ – 2009 (MWh)** Enersa | 1,320,900 Cahsa | 43,800.00 Chumbagua | 9,600.00 Ecopalsa | 100 Green Valley | 30,900 Envasa (Maquila Carbon) | 45,200 Celsur (carbon) | 63,200
Choice of data or Measurement methods and procedures	Official statistical data
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	NCV_{bunker}
Unit	GJ/t
Description	Net calorific value (energy content) per mass unit of bunker
Source of data	IPCC. 2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	40.4
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	NCV_{diesel}
Unit	GJ/t
Description	Net calorific value (energy content) per mass unit of diesel
Source of data	IPCC. 2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	43.0
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	NCV_{coal}
Unit	GJ/t
Description	Net calorific value (energy content) per mass unit of coal
Source of data	IPCC. 2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	28.2
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	ρ_{diesel}
Unit	g/mL
Description	Diesel density
Source of data	IPCC. 2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	0.85
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to convert official data from volume to mass units in the grid´s emission factor estimation.
Additional comment	

Data / Parameter	ρ_{bunker}
Unit	Kg/L
Description	Bunker density
Source of data	IPCC. 2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	0.94
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to convert official data from volume to mass units in the grid´s emission factor estimation.
Additional comment	

Data / Parameter	ρ_{coal}
Unit	Kg/m^3
Description	Coal density
Source of data	http://www.engineeringtoolbox.com/classification-coal-d_164.html
Value(s) applied	673
Choice of data or Measurement methods and procedures	
Purpose of data	Used to convert official data from volume to mass units in the grid´s emission factor estimation.
Additional comment	

Data / Parameter	$EF_{CO2, diesel}$
Unit	Kg CO_2/TJ
Description	CO_2 emission factor per unit of energy of diesel
Source of data	IPCC. 2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	74,100
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	$EF_{CO2, bunker}$
Unit	Kg CO_2/TJ
Description	CO_2 emission factor per unit of energy of bunker
Source of data	IPCC.2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	77,400
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	$EF_{CO2, coal}$
Unit	Kg CO_2/TJ
Description	CO_2 emission factor per unit of energy of coal
Source of data	IPCC.2006. Guidelines for National Green House Gas Inventories.
Value(s) applied	94,600
Choice of data or Measurement methods and procedures	IPCC default value
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	$EF_{grid,OMsimple,2007,2008,2009}$
Unit	tCO_2/MWh
Description	Operating Margin emission factor of the Grid
Source of data	• ENEE, National Power Utility's web page[69] • Information provided directly by personnel from ENEE
Value(s) applied	0.6621
Choice of data or Measurement methods and procedures	Calculated with the latest published official statistical data
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	This parameter is fixed for the whole crediting period.

Data / Parameter	$EF_{grid,BM,2007,2008,2009}$
Unit	tCO_2/MWh
Description	Build Margin emission factor of Grid
Source of data	• ENEE, National Power Utility's web page http://www.enee.hn/publicaciones.htm • ENEE's Planning Department
Value(s) applied	0.6381
Choice of data or Measurement methods and procedures	Calculated with the latest published official statistical data
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	This parameter is fixed for the whole crediting period.

Data / Parameter	$EF_{grid,CM,2007,2008,2009}$
Unit	tCO_2/MWh
Description	Combined Margin emission factor of the Grid
Source of data	Calculated as the weighted average of BM and OM
Value(s) applied	0.6561
Choice of data or Measurement methods and procedures	Calculated with the latest published official statistical data, using the default weights for wind projects w_{OM} = 0.75 and w_{BM} = 0.25
Purpose of data	Used to estimate Baseline Emissions
Additional comment	This parameter is fixed for the whole crediting period.

[69] http://www.enee.hn/Estadisticas2009/estadisticasPDF_2009/CUA35_2009.pdf
http://www.enee.hn/Estadisticas2009/estadisticasPDF_2009/CUA33_2009.pdf

Data / Parameter	**Installed capacity**
Unit	MW
Description	The installed capacity
Source of data	Project Developer
Value(s) applied	126
Choice of data or Measurement methods and procedures	The project will consist of 63 turbines with a capacity of 2MW each.
Purpose of data	
Additional comment	

Data / Parameter	**Contracted capacity**
Unit	MW
Description	The maximum contracted capacity from the project by the ENEE
Source of data	Power Purchase Agreement (PPA)
Value(s) applied	124
Choice of data or Measurement methods and procedures	The power purchase agreement No 049-2008 between ENEE and EEHSA establishes the maximum wind generated energy capacity that ENEE will buy from this project is 124MW, nevertheless the Project Developer is installing an additional 2MW for maintenance situations and contingencies.
Purpose of data	
Additional comment	This value is used for reference purposes only.

Data / Parameter	$\eta_{m,y}$
Unit	%
Description	Average net energy conversion efficiency of power unit *m* in year *y*
Source of data	Power Purchase Agreement (PPA)
Value(s) applied	39
Choice of data or Measurement methods and procedures	Default value provided in *Tool to calculate the emission factor for an electricity system* (Version2.2.0), in Table 1 from Annex 1 for most conservative Coal generation technology on New units after 2000.
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	w_{OM}
Unit	%
Description	Weighting of operating margin emissions factor
Source of data	Tool to calculate the emission factor for an electricity system.
Value(s) applied	75
Choice of data or Measurement methods and procedures	Default value mentioned in the *Tool to calculate the emission factor for an electricity system* (Version2.2.0)
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

Data / Parameter	w_{BM}
Unit	%
Description	Weighting of build margin emissions factor
Source of data	Tool to calculate the emission factor for an electricity system.
Value(s) applied	25
Choice of data or Measurement methods and procedures	Default value mentioned in the Tool to calculate the emission factor for an electricity system.
Purpose of data	Used to estimate the grid´s emission factor
Additional comment	

B.6.3. Ex ante calculation of emission reductions

The *ex-ante* emission reductions calculations are as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions in year *y* (tCO_2/yr)
BE_y Baseline emissions in year *y* (tCO_2/yr)
PE_y Project emission reductions in year *y* (tCO_2/yr)

Project Emissions

According to ACM0002 v12.2.0, there are no expected project emissions related to the generation of electricity from a wind power project. Therefore, $PE_y = 0$.

Therefore: $ER_y = BE_y$

Baseline Emissions

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

Where:

BE_y Baseline emissions in year y (tCO_2/yr)

$EG_{PJ,y}$ 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/yr)

$EF_{grid,CM,y}$ 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" (tCO_2/MWh).

The combined margin emission factor ($EF_{grid,CM,y}$) is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$), and the Build Margin emission factor ($EF_{grid,BM,y}$), using the formula $EF_{grid,CM,y} = EF_{grid,OM,y} \, x \, w_{OM} + EF_{grid,BM,y} x \, w_{BM}$ (refer to **Section B.6.1** for more details).

The Operating Margin is estimated to be 0.6621tCO_2/MWh and the Build Margin is estimated to be 0.6381tCO_2/MWh, therefore the baseline emission factor or combined margin ($EF_{grid,CM,y}$) is 0.6561tCO_2/MWh[70].

And, as the Project activity is the installation of a new grid-connected wind farm at a site where no wind farm was operated prior to the implementation of the Project activity,

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

Where:

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

The expected electricity supplied annually to the grid (EG_y) is estimated to be 345,970 MWh/year in its initial phase (102 MW capacity) and 420,876 once the full capacity (126 MW) is in place[71]. Nevertheless, net electricity generation will be adjusted *ex-post* according to the actual monitored data. Thus, with a baseline emission factor ($EF_{grid,CM,y}$) of 0.6561CO_2/MWh, baseline emissions (BE_y) equal 226,978 tCO_2e/year during the first phase and 276,137 tCO_2/year once full capacity is reached. This results in an average of 262,688 emission reductions per year throughout the project´s crediting period. Please see table below for summary of values used and the results of the calculation.

[70] Refer to Annex 3 for the detailed calculation of the operating margin (OM) and the build margin (BM).

[71] Expected electricity from "Energy Yield Assessment for Cerro de Hula Wind Farm, Honduras" report and calculated for 100MW. This report was elaborated in May 2010 by Mott MacDonald for the US Export-Import Bank. A study dated 19/07/2013 from the same source was prepared for the additional 24 MW capacity. Note that in both cases (i.e. before and after the expansion) 2 MW of the capacity are being left as backup capacity. Thus, for the initial phase the published estimate is 345,970 MWh/yr, whereas the value used for emission reduction calculation is 345,970 MWh/yr x 100 MW/102 MW. Likewise, for the second phase the calculation is (352,889 + 74,775) MWh/yr x 124 MW /126 MW = 420,876 MWh/yr

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
2012 (10.5 months – 15th Feb to 31st Dec)	198,617	0	0	198,617
2013	226,991	0	0	226,991
2014[72]	232,480	0	0	232,480
2015	276,137	0	0	276,137
2016	276,137	0	0	276,137
2017	276,137	0	0	276,137
2018	276,137	0	0	276,137
2019	276,137	0	0	276,137
2020	276,137	0	0	276,137
2021	276,137	0	0	276,137
2022 (1.5 months – Jan to 14th Feb)	35,837	0	0	35,837
Total	2,626,880	0	0	2,626,880
Total number of crediting years	10 years			
Annual average over the crediting period	262,688	0	0	262,688

[72] The additional 24 MW are expected to be operational in December 2014. According to the energy yield assessment for the capacity expansion (see p. 15), out of the total 74,775 MWh of the entire year, 8,366 MWh are expected to be produced in December. Likewise, monthly estimates for January (7,918 MWh) and one half of February (50% x 6,947 MWh) corresponding to the 24 MW capacity addition were used to adjust the original estimate for 2022.

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

<table>
<tr><td>Data / Parameter</td><td>$EG_{facility,y}$</td></tr>
<tr><td>Unit</td><td>MWh/yr</td></tr>
<tr><td>Description</td><td>Quantity of net electricity generation supplied by the project plant/unit to the grid in year y</td></tr>
<tr><td>Source of data</td><td>Electricity meter reading</td></tr>
<tr><td>Value(s) applied</td><td>First phase (up to 31/10/2014): 345,970 MWh/yr
Second phase (from 01/12/2014 onwards): 420,876 MWh/yr
Ex-ante values applied for the purpose of estimating emission reduction potential:
<table>
<tr><th>Year</th><th>Generation MWh</th></tr>
<tr><td>2012</td><td>302,723</td></tr>
<tr><td>2013</td><td>345,970</td></tr>
<tr><td>2014</td><td>354,336</td></tr>
<tr><td>2015</td><td>420,876</td></tr>
<tr><td>2016</td><td>420,876</td></tr>
<tr><td>2017</td><td>420,876</td></tr>
<tr><td>2018</td><td>420,876</td></tr>
<tr><td>2019</td><td>420,876</td></tr>
<tr><td>2020</td><td>420,876</td></tr>
<tr><td>2021</td><td>420,876</td></tr>
<tr><td>2022</td><td>54,622</td></tr>
</table></td></tr>
<tr><td>Measurement methods and procedures</td><td>Monitoring comprises two metering points, one before each of the two transformers to which the plant delivers its output. Two bidirectional meters will be installed at each metering point, a main meter and a back-up meter. The bidirectional meters will measure both electricity generated (imports) that is being imported to the grid and discount electricity that is consumed by the project (exports). The quantity of net electricity supplied to the grid results from the addition of the net electricity determined at each monitoring point. The data will be read primarily from the main meters; however if an anomaly is detected in the data of one of the main meters, the data of the respective back-up meter will be used instead. The frequency of the readings will be done on a monthly basis.</td></tr>
<tr><td>Monitoring frequency</td><td>Monthly basis</td></tr>
<tr><td>QA/QC procedures</td><td>Meter readings will be checked for completeness on a monthly basis and cross checked with the sales invoices. Meters will be calibrated according to manufacturer´s specifications.</td></tr>
<tr><td>Purpose of data</td><td>Baseline emissions</td></tr>
<tr><td>Additional comment</td><td>Data will be archived by means of electronic and paper backup for the full crediting period, plus two year years after the end of the crediting period or the last issuance of CERs, whichever occurs later.</td></tr>
</table>

B.7.2. Sampling plan

N/A

B.7.3. Other elements of monitoring plan

This section details the steps taken to monitor the GHG emissions reductions from the Cerro de Hula Wind Project in Honduras.

Electricity supplied to the grid by the project will be monitored at two Metering Points through a Metering System, each of which is comprised by a pair of bi-directional meters. Initially, the Metering Points will be located before each of the two power transformers at the interconnecting substation (*Cerro de Hula*). The total quantity of net electricity supplied to the grid results from the addition of the net electricity determined at each metering point. An Operating Committee, established by both the Project Developer and the power utility, can define additional/alternate Metering Points if necessary. Maintenance of the Metering System is the responsibility of the project developer, who will conduct maintenance of said system only in the presence of representatives of the national power utility.

There will be two pairs of independent bidirectional meters at Cerro de Hula substation – each pair is comprised by a main and a back-up meter. The data will be read primarily from the main meter at each Metering Point. If an anomaly is detected in the data of the main meter, the data of the respective back-up meter will be used instead as agreed between the project developer and the power utility. Representatives of the project developer and the power utility will read the meters each month as per the procedure agreed between them. These readings would be used to prepare a sales invoice and the invoiced value shall be used to calculate emission reductions. The meter reading/invoice will be readily accessible for DOE.

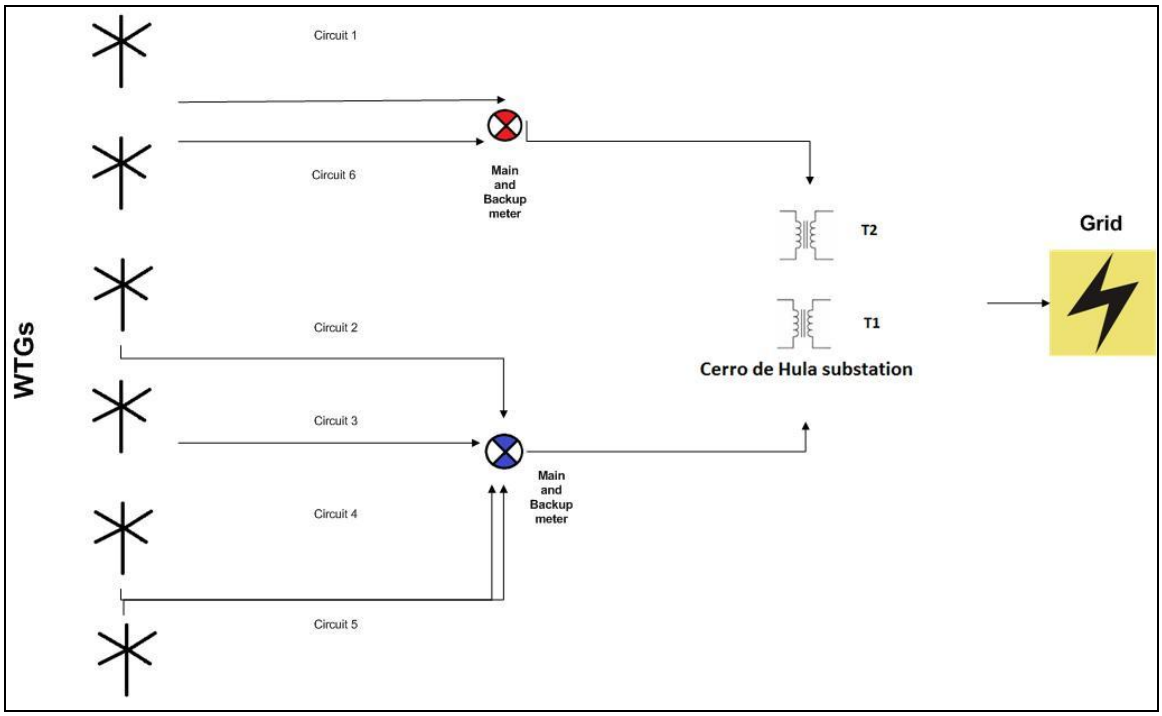


Figure 5: Flow diagram for the metering system

Calibration of Meters and Metering

The accuracy and frequency of calibration for the meters is established by the manufacturer´s specifications. Calibration test records will be maintained for verification. Testing must be conducted by a qualified independent laboratory.

The metering arrangements and the required quality control procedures to ensure accuracy are defined between the project developer and the power utility. The precision class, requirements for meters and metering transformers, data recording and communication system, commissioning and periodic testing of the metering system, would be agreed between project developer and the power utility.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

This baseline and monitoring methodology application study was completed on 17/01/2012 by EcoSecurities International Limited, from United Kingdom of Great Britain and Northern Ireland.

- Phone: + 52 1 55 3334 5346
- E-mail: paola.moreno@ecosecurities.com
- Webpage: www.ecosecurities.com

The entity above is not considered a project participant.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

24th June 2010[73] - Date when the contract with the turbine supplier was signed.

C.1.2. Expected operational lifetime of project activity

The expected lifetime of the Project activity is at least 20 years and 0 months[74].

C.2. Crediting period of project activity

C.2.1. Type of crediting period

[73] Equipment Purchase Agreement signature date

[74] From tech provider (GAMESA)
http://www.mercer.k12.pa.us/highschool1/teacher/bchess/General%20Science/GAMESA%202007-6.pdf (pg 27)

Fixed

C.2.2. Start date of crediting period

The crediting period will start on 15/02/2012 or the date of registration whichever occurs the latest.

C.2.3. Length of crediting period

10 Years and 0 months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

According to host country regulation Qualitative Environmental Analysis must be presented and approved in order to get the Environmental License[75]. This study was carried out by *AMBITEC S.A. de C.V. Ambiente y Tecnología* in September 2008, the main environmental impacts will occur during construction since the wind farm will produce clean electricity by using a renewable energy, roads and infrastructure near the project area will be improved, employment opportunities will increase, in addition it is envisaged the quality of life will be improved and there will not be erosion in the project area.

Identified environmental impacts[76]	Measures taken
• Impacts on biophysical aspects during construction • Impacts on environmental quality during the use of machinery, loading and unloading of materials, transportation, material storage. • Dust during construction • Noise levels during construction • Waste generation from construction • Waste generation from staff	• Land characteristics defined and land use managed in accordance with the Municipal plans of Santa Ana and San Buenaventura, and agreements with property owners. • Collecting solid waste within the project area by installing disposal containers, in case equipment maintenance is performed , proper sealing or containment action should be taken • Controlling dust/particulate matter by misting water in work areas and covering truck material loads with tarps • Providing proper PPE (personal protective equipment), including noise reduction equipment for workers, and keeping the community informed about stages when noise is expected to increase significantly[77] • Collecting and disposing of construction

[75] The original Environmental License was granted on 06/12/2012. The approval for the incremental 24 MW was granted 08/02/2013.

[76] Qualitative Environmental Analysis carried out by *AMBITEC S.A. de C.V. Ambiente y Tecnología.in September 2008*

[77] Additionally for noise control during operation, Gamesa has developed the Gamesa NRS® noise control system, which permits programming the noise emissions according to criteria such as date, time or wind direction. This achieves the goals of local regulation compliance as well as maximum production.

	waste at the appropriate disposal centre • Use of portable latrines during construction, furthermore during operation the control room will have septic tanks) • Environmental monitoring during the construction and operation phases.

D.2. Environmental impact assessment

Most of the project's impacts were identified as minor in the Qualitative Environmental Analysis. The noise from the wind turbines is considered to be within acceptable parameters. The G87-2.0 MW wind turbine is supplied in different low-noise versions: 104 dB (A), 103dB (A), 102dB (A), 101dB (A)[78], and all of them comply with the IEC standard IEC 61400-11[79]. Also the project developer hired an external consultant company to assess the acoustic impact of the proposed Cerro de Hula Wind Project[80].

Considering that the project will not be located near densely populated areas, there will not be a negative impact for human environment. Additionally, the project will conduct post-construction noise monitoring and has developed several strategies known as "The Good Neighbour Agreement"[81], a Complaint Resolution Procedure and an Infrastructure Relocation Plan that aim to respond to and resolve any conflicts arising from sound level excesses throughout the project area due to the operation or construction of the Cerro de Hula Wind Project. Through these plans the Project developer intends to appropriately mitigate any sound level excesses.

Furthermore the project will contribute to sustainable development for the local and national area, and the project is expected to have an overall positive impact on the local and global environment. All negative environmental impacts are subject to mitigation measures and monitoring as described above.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The stakeholder consultation was carried out in the two municipalities where the project will be located, on 22nd November 2008 in the Municipal Room in San Buenaventura Municipality; and on 23rd November 2008 in the multi-use room in Santa Ana Municipality.

The event was properly announced by:

[78] GAMESA

[79] Gamesa *Design, Calculation & Compliance Report Noise Emission Analysis for G8X Wind Turbines, please* refer to *Appendix A* of "Environmental Sound Survey and Acoustic Assessment Cerro de Hula Wind Farm, Tegucigalpa, Honduras."

[80] *Cerro de Hula Wind Farm Project Environmental Sound Survey and Acoustic Assessment Tegucigalpa, Honduras* was prepared by Howe Gastmeier Chapnik Limited, a consulting engineering firm specializing in environmental and industrial noise control, vibration and architectural acoustics. (http://www.hgcengineering.com/profile.htm)

[81] The Good Neighbor Agreement was developed to communicate information on the project and potential impacts, including noise, as some people were unable to attend open town hall meetings held by EESHA. The agreement was signed by most of the residences in the project area.

- Personal invitations to the community, local authorities, non-governmental organisations and educative centres
- Radio Sabana Grande inviting the communities
- Web page of Mesoamerica Energy

The stakeholder consultation was led by the project developer and included a brief description of the project and its benefits, and the following topics were discussed: climate change; how the project is mitigating climate change through the Kyoto Protocol and Clean Development Mechanism, and the estimation of emissions reductions.

After the presentation was given, a session for comments followed. There were no negative comments made by the participants in the meeting. During the event, the following set of questions was given to the attendees to answer:

1. Did you know about Climate Change and its effects?
2. Did you know about the Kyoto Protocol and the efforts to fight Climate Change?
3. Did you know Mesoamerica Energy – Energía Eólica de Honduras is implementing an electricity generation project in San Buenaventura and Santa Ana Municipalities, and such project will not pollute the air, and will not emit greenhouse gases?
4. Do you think these types of actions would be carried out by other industries?
5. Do you agree that Mesoamerica Energy – Energía Eólica de Honduras carry out this type of projects?
6. Should authorities incentivise these types of actions?
7. What is your opinion of a company which is taking measures to fight Climate Change?
8. What benefits can be expected for the surrounding areas?

Results of the questions above can be found in **Appendix B.**

E.2. Summary of comments received

Overall, positive comments and observations were provided by participants of the public forum. However, during the public consultation stakeholders raised various questions regarding the project, and the Project Developer provided comments, as follows:

<u>In San Buenaventura</u>

1. Mayor asked why the Project's PPA in the Official Journal has not been published yet.
    a. Project Developer explained that there are logistics issues with the National Printing Office; however the PPA is already approved by the Congress.
2. Mayor wondered how the communities would receive money as part of selling certified emission reductions, and what the market value of a CER is.
    a. Project Developer answered that the company will make donations through a local development program. In the current carbon market the price of a CER depends on the project stage, but it is around €16.
3. A representative of the community wondered if jobs will be created.
    a. Project developer explained they have committed themselves to hire local people when the activities do not require specialized staff.
4. A representative of the community wondered if the education will be financially supported.
    a. Project developer explained the company is planning to implement an adult education program.
5. A member of the local community wondered what the possibilities are that the United Nations accepts the project.
    a. CDM consultant (EcoSecurities) answered it is very likely that the Project will be registered.

<u>In Santa Ana</u>

6. A representative of the community wondered if the electric installation could damage the agricultural production and if it is possible that wind turbines cause cancer.
    a. Project developer explained that the agricultural production will not be damaged by turbines installation, and the wind turbines do not cause cancer.
7. A representative of the community wondered if the electricity produced by the project will be supplied locally or nationally.
    a. Project developer answered the electricity produced by the project will be sold to ENEE through the Sistema Interconectado Nacional (*SIN*)[82]
8. A representative of the community wondered about the difference between electricity produced in a hydroelectric plant and the electricity produced in a wind farm.
    a. Project developer explained that there is no difference between electricity produce by a hydroelectric plant and by a wind farm, other than the source of energy to produce it (wind or water); however the environmental impacts of a hydroelectric plant are higher than the impacts caused by a wind farm.
9. A representative of the community wondered if the site has more capacity than 100 MW.
    a. Project developer answered, the site has a potential higher than 100 MW and the company (Energía Eólica the Honduras) has the land rights for 50 years.

E.3. Report on consideration of comments received

No negative comment was provided by the participants.

SECTION F. Approval and authorization

Respective LoAs were provided from the Honduran DNA on August 5, 2011 and the UK´s DNA on 12/10/2011. Both documents are readily available on the UNFCCC website for the Cerro de Hula Wind Project.

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[82]Referred as “the Grid” throughout the document

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

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Energía Eólica de Honduras, S.A.
Street/P.O. Box	1km de El Cruce, carretera a San Buenaventura Santa Ana, Francisco Morazán
Building	EEHSA
City	
State/Region	Santa Ana, Francisco Morazan
Postcode	
Country	Honduras
Telephone	(504) 2777-0804
Fax	(504) 2264-0044
E-mail	cdm@mesoamericaenergy.com
Website	www.mesoamericaenergy.com
Contact person	
Title	President
Salutation	Mr.
Last name	Gallegos
Middle name	
First name	Jay
Department	
Mobile	(506) 8831-5500
Direct fax	(506) 2228-9300
Direct tel.	(506) 2228-9930
Personal e-mail	lumana@mesoamericaenergy.com

Appendix 2. Affirmation regarding public funding

THIS PROJECT WILL NOT RECEIVE ANY PUBLIC FUNDING.

Appendix 3. Applicability of methodology and standardized baseline

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

NATIONAL INTERCONNECTED SYSTEM

PERIOD 2002-2009

	PLANT	TECHNOLOGY	PRIVATE/ STATE	ANNUAL ELECTRICITY PRODUCTION (GWh)							ANNUAL ELECTRICITY PRODUCTION (MWh)					Operation start date	
				2003	2004	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009		
IMPORTS	Nicaragua	Various		19.3	12.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
	Costa Rica	Various		106.2	218.9	26.0	0.0	0.0	0.4	0.0	26,000.0	0.0	0.0	400.0	0.0	-	
	Panamá	Various		91.9	62.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	
	El Salvador	Various		78.8	37.6	12.9	2.9	0.8	33.7	0.1	12,900.0	2,900.0	800.0	33,700.0	100.0	-	
	Guatemala	Various		0.0	5.9	0.0	1.1	0.0	6.5	0.0	0.0	1,100.0	0.0	6,500.0	0.0	-	
	Others (Regional Market)	Various		35.4	55.4	19.4	3.3	11.8	4.7	0.6	19,400.0	3,300.0	11,800.0	4,700.0	600.0	-	
	TOTAL IMPORTS			**331.6**	**392.2**	**58.3**	**7.3**	**12.6**	**45.3**	**0.7**	**58,300.0**	**7,300.0**	**12,600.0**	**45,300.0**	**700.0**	-	
HYDROS	Cañaveral	HYDROELECTRICITY	State	172.9	149.8	120.8	185.9	164.5	152.0	192.3	120,809.3	185,900.0	164,500.0	152,000.0	192,300.0	1964	
	Río Lindo	HYDROELECTRICITY	State	540.5	467.4	383.0	586.3	520.6	474.5	591.7	382,952.3	586,300.0	520,600.0	474,500.0	591,700.0	1971	
	El Níspero	HYDROELECTRICITY	State	36.9	29.6	83.7	91.3	55.7	34.2	42.8	83,713.3	91,300.0	55,700.0	34,200.0	42,800.0	1982	
	El Cajón	HYDROELECTRICITY	State	955.5	702.4	1,004.3	1,038.6	1,236.3	1,298.6	1,689.0	1,004,271.4	1,038,600.0	1,236,300.0	1,298,600.0	1,689,000.0	1985	
	Santa María del Real	HYDROELECTRICITY	State	0.5	6.0	4.8	3.8	2.6	5.1	3.2	4,772.8	3,800.0	2,600.0	5,100.0	3,200.0	1986	
	Nacaome	HYDROELECTRICITY	State	31.6	16.2	50.0	32.4	42.7	41.8	20.6	50,017.5	32,405.1	42,700.0	41,800.0	20,600.0	2002	
	Las Nieves	HYDROELECTRICITY	Private	1.5	1.2	1.4	1.5	1.0	1.3	1.0	1,375.2	1,513.9	1,000.0	1,300.0	1,000.0	2002	
	Zacapa	HYDROELECTRICITY	Private	0.7	0.0	0.5	3.0	2.4	3.1	3.1	500.0	3,036.4	2,400.0	3,100.0	3,100.0	2005	
	La Esperanza	HYDROELECTRICITY	Private	0.5	1.9	3.6	23.8	35.0	44.6	31.5	3,572.0	23,828.0	35,000.0	44,600.0	31,500.0	2003[a]	
	Babilonia (Energisa)	HYDROELECTRICITY	Private	0.0	17.6	29.9	30.6	30.2	32.7	23.7	29,897.8	30,605.9	30,200.0	32,700.0	23,700.0	**2004**	
	Yojoa	HYDROELECTRICITY	Private	0.0	0.0	1.1	1.3	1.9	2.2	2.8	1,085.7	1,300.0	1,900.0	2,200.0	2,800.0	2005	
	Río Blanco	HYDROELECTRICITY	Private	0.0	9.2	33.3	38.4	34.4	35.0	38.8	33,280.3	38,372.2	34,400.0	35,000.0	38,800.0	2004	
	Cececapa (Congelsa)	HYDROELECTRICITY	Private	0.0	0.0	1.6	18.9	14.6	16.4	17.0	1,600.3	18,935.9	14,600.0	16,400.0	17,000.0	2005	
	Cuyamapa	HYDROELECTRICITY	Private	0.0	0.0	0.0	14.0	50.3	52.5	53.6	0.0	14,000.0	50,300.0	52,500.0	53,600.0	2007	
	Cuyamel	HYDROELECTRICITY	Private	0.0	0.0	0.0	0.0	17.6	38.9	33.9	0.0	0.0	17,600.0	38,900.0	33,900.0	2007	
	Cortecito	HYDROELECTRICITY	Private	0.0	0.0	0.0	0.0	1.6	21.8	20.4	0.0	0.0	1,600.0	21,800.0	20,400.0	2007	
	Las Glorias	HYDROELECTRICITY	Private	0.0	0.0	0.0	0.0	2.8	20.6	5.1	0.0	0.0	2,800.0	20,600.0	5,100.0	2007	
	San Carlos	HYDROELECTRICITY	Private	0.0	0.0	0.0	0.0	0.0	15.8	16.5	0.0	0.0	0.0	15,800.0	16,500.0	2008	
	Coronado	HYDROELECTRICITY	Private	0.0	0.0	0.0	0.0	0.0	0.0	9.6	0.0	0.0	0.0	0.0	9,600.0	2009	
	TOTAL HYDRO			**1,740.5**	**1,461.3**	**1,717.8**	**2,069.9**	**2,214.2**	**2,281.1**	**2,796.6**	**1,717,847.8**	**2,069,897.3**	**2,214,200.0**	**2,291,100.0**	**2,796,600.0**	-	
BIOMASS	Aysa	BIOMASS	Private	2.5	1.3	1.6	0.3	1.2	0.0	0.0	1,600.0	268.8	1,200.0	0.0	0.0	1998	
	La Grecia	BIOMASS	Private	17.8	36.8	28.0	35.9	30.3	20.7	25.7	28,000.0	35,942.2	30,300.0	20,700.0	25,700.0	2002	
	Cahsa (Azucarera Hondureña)	BIOMASS	Private	0.0	0.0	18.2	27.1	42.5	39.4	43.8	18,200.0	27,107.3	42,500.0	39,400.0	43,800.0	**2005**	43,800.0
	Azunosa (Inversiones Hondureñas)	BIOMASS	Private	0.0	0.0	7.0	10.1	12.1	13.4	11.1	7,000.0	10,136.1	12,100.0	13,400.0	11,100.0	2004	
	Tres Valles	BIOMASS	Private	0.0	0.0	21.4	26.5	21.5	22.3	22.0	21,400.0	26,506.3	21,500.0	22,300.0	22,000.0	2004	
	Chumbagua	BIOMASS	Private	0.0	0.0	0.0	0.0	3.8	8.3	9.6	0.0	0.0	3,800.0	8,300.0	9,600.0	**2007**	9,600.0
	Ecopalsa	BIOMASS	Private	0.0	0.0	0.0	0.0	2.5	2.9	0.1	0.0	0.0	2,500.0	2,900.0	100.0	**2007**	100.0
	Celsur	BIOMASS	Private	0.0	0.0	0.0	0.0	0.0	78.3	43.9	0.0	0.0	0.0	78,300.0	43,900.0	2008	
	TOTAL BIOMASS			**20.3**	**38.1**	**76.2**	**100.0**	**113.9**	**185.3**	**156.2**	**76,200.0**	**99,960.7**	**113,900.0**	**185,300.0**	**156,200.0**	-	
	TOTAL LCMR			**1,760.8**	**1,439.4**	**1,794.0**	**2,169.9**	**2,328.1**	**2,476.4**	**2,952.8**	**1,794,047.8**	**2,169,858.0**	**2,328,100.0**	**2,476,400.0**	**2,952,800.0**	-	
THERMAL	Santa Fe	DIESEL	State	4.5	1.5	0.0	0.00	0.00	0.20	0.00	0.0	0.0	0.0	200.0	0.0	1994	
	La Puerta	DIESEL	State	16.8	7.7	6.6	0.8	0.2	2.2	0.1	6,647.1	800.0	200.0	2,200.0	100.0	1970	
	La Puerta - MEX	DIESEL	State	10.4	3.4	0.0	0.3	0.1	0.6	0.0	0.0	284.6	100.0	600.0	0.0	1994	
	Elcosa	DIESEL	Private	458.3	442.0	129.6	168.3	244.1	142.6	142.6	129,600.0	168,300.0	244,100.0	142,600.0	142,600.0	1994	
	La Ceiba	DIESEL	State	0.0	0.0	0.0	63.1	51.2	0.0	28.9	0.0	63,148.6	51,200.0	0.0	28,900.0	1974	
	Emce La Ceiba	DIESEL	Private	0.0	0.0	0.0	0.0	0.0	33.5	2.6	0.0	0.0	0.0	33,500.0	2,600.0	**2008**	2,600.0
	Emce II (Emce Choloma)	DIESEL	Private	360.9	380.7	180.6	145.9	169.6	210.6	69.7	180,598.7	145,908.8	169,600.0	210,600.0	69,700.0	1999	
	Lufussa I	GAS TURBINE	Private	170.5	66.6	20.5	8.3	3.8	13.3	0.7	20,487.6	8,311.3	3,800.0	13,300.0	700.0	1995	
	Lufussa Convenio ENEE	GAS TURBINE	Private	0.0	0.0	0.0	0.0	0.0	40.8	55.1	0.0	0.0	0.0	40,800.0	55,100.0	**2008**	
	Lufusa II (Lufussa Valle)	DIESEL	Private	520.0	460.9	189.7	154.6	219.4	271.4	99.2	189,672.3	154,629.7	219,400.0	271,400.0	99,200.0	1999	
	Lufussa III	DIESEL	Private	0.0	404.2	1,842.2	1,805.3	1,822.0	1,742.9	1,680.5	1,842,200.8	1,805,252.0	1,822,000.0	1,742,900.0	1,680,500.0	**2004**	
	Enersa	DIESEL	Private	0.0	534.4	1,165.9	1,379.2	1,375.7	1,507.2	1,320.9	1,165,910.2	1,379,228.7	1,375,700.0	1,507,200.0	1,320,900.0	**2004[b]**	1,320,900.0
	Enersa (exceso de 30MWH)	DIESEL	Private	0.0	0.0	0.0	0.0	0.0	0.0	59.0	0.0	0.0	0.0	0.0	59,000.0	**2009**	
	Laeisz TO.	DIESEL	Private	0.0	15.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**2004**	
	Laeisz	DIESEL	Private	191.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0	2002*	
	Laeisz NACO	DIESEL	Private	0.0	7.6	27.3	30.9	6.6	0.0	0.0	27,308.8	30,902.3	6,600.0	0.0	0.0	2004*	
	Cemcol	DIESEL	Private	343.8	270.2	16.4	0.0	0.0	0.0	0.0	16,400.0	0.0	0.0	0.0	0.0	2002*	
	Nacional de Ingenieros MF	DIESEL	Private	0.0	132.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2002*	
	Nacional de Ingenieros LP	DIESEL	Private	110.7	95.5	1.4	0.0	0.0	0.0	0.0	1,400.0	0.0	0.0	0.0	0.0		
	Nacional de Ingenieros CTE	DIESEL	Private	61.8	48.5	10.5	0.3	3.7	11.7	6.0	10,500.0	300.0	3,700.0	11,700.0	6,000.0		
	Ampac	DIESEL	Private	0.3	0.1	0.2	0.0	0.0	0.0	0.0	176.4	0.0	34.7	0.0	0.0	1993	
	Elcatex	DIESEL	Private	0.0	60.4	42.0	13.3	6.4	5.2	3.2	42,013.2	13,280.8	6,400.0	5,200.0	3,200.0	**2004**	
	Envasa (Maquila Carbon)	DIESEL	Private	0.0	0.0	0.0	0.0	0.0	6.9	45.2	0.0	0.0	0.0	6,900.0	45,200.0	**2008**	45,200.0
	Green Valley (Park Dale)	DIESEL	Private	0.0	0.0	0.0	0.0	30.7	25.0	30.9	0.0	0.0	30,700.0	25,000.0	30,900.0	**2007**	30,900.0
	Celsur (carbon)	COAL	Private	0.0	0.0	0.0	0.0	0.0	0.0	63.2	0.0	0.0	0.0	0.0	63,200.0	**2009**	63,200.0
	TOTAL THERMAL			**2,249.5**	**2,931.9**	**3,632.9**	**3,770.3**	**3,933.5**	**4,014.1**	**3,607.8**	**3,632,920.1**	**3,770,346.8**	**3,933,534.7**	**4,014,100.0**	**3,607,800.0**		
	TOTAL TOTAL			**4,341.9**	**4,763.5**	**5,485.3**	**5,947.5**	**6,274.2**	**6,535.8**	**6,561.3**	**5,485,267.8**	**5,947,504.8**	**6,274,234.7**	**6,535,800.0**	**6,561,300.0**	**BM (Set of five plants that have been built most recetly)**	**1,516,300.0**
			% LCMR	**40.6%**	**30.2%**	**32.7%**	**36.5%**	**37.1%**	**37.9%**	**45.0%**	**32.7%**	**36.5%**	**37.1%**	**37.9%**	**45.0%**	**% of total Grid generation**	**23.1%**

CDM registered projects
Sample group

LCMR resources constitute less than 50% of total grid generation in average of the five most recent years

Operating Margin calculation (OM)

PLANT NAME	STATE/ PRIVATE	FUEL	Fuel consumption (1,000 galons)			Fuel consumption (m^3/year)			Fuel consumption (t/year)		
			2007	2008	2009	2007	2008	2009	2007	2008	2009
Santa Fe	State	DIESEL	1.30	22.70	0.3	4.92	85.93	1.25	4.18	73.04	1.06
Emce La Ceiba	State	BUNKER	3,432.29	2,204.73	1,999.62	12992.63	8345.81	7569.37	12213.07	7845.06	7115.21
		DIESEL	204.63	177.62	141.90	774.61	672.36	537.15	658.42	571.51	456.58
La Puerta & La Puerta MEX[1]	State	DIESEL	61.40	368.40	23.58	232.42	1394.55	89.27	197.56	1185.36	75.88
Elcosa	Private	BUNKER	14,901.16	8,710.02	9,119.28	56407.01	32971.01	34520.22	53022.59	30992.75	32449.01
		DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Emce II	Private	BUNKER	10,274.97	12,561.79	4,037.29	38894.98	47551.54	15282.80	36561.29	44698.45	14365.83
		DIESEL	315.83	342.04	170.16	1195.55	1294.76	644.13	1016.21	1100.55	547.51
Lufussa I	Private	DIESEL	192.596	1,074.693	109.401	729.06	4068.15	414.13	619.70	3457.93	352.01
Lufussa (convenio ENEE)*	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lufussa II (Lufussa Valle)	Private	BUNKER	13,186.21	16,681.70	6,161.67	49915.22	63147.09	23324.45	46920.31	59358.27	21924.99
		DIESEL	28,476.23	3,417.56	615.00	107794.23	12936.87	2328.03	91625.10	10996.34	1978.82
Lufussa III	Private	BUNKER	99,973.59	97,012.51	93,687.20	378441.13	367232.22	354644.56	355734.66	345198.29	333365.88
		DIESEL	19.30	20.76	3.75	73.06	78.59	14.20	62.10	66.80	12.07
Enersa	Private	BUNKER	82,232.66	88,993.50	78,223.17	311284.42	336876.97	296106.85	292607.35	316664.36	278340.44
		DIESEL	259.52	379.24	89.91	982.39	1435.58	340.35	835.03	1220.24	289.29
Enersa (exceso de 30MWH)**	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Laeisz NACO	Private	DIESEL	489.24	0.00	0.00	1851.97	0.00	0.00	1574.18	0.00	0.00
Cemcol	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nacional de Ing.	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nacional de Ing. CEIBA	Private	DIESEL	300.6	883.70	450.4	1137.74	3345.17	1704.97	967.08	2843.39	1449.23
Ampac [2]	Private	DIESEL	NA	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00
Elcatex [2]	Private	BUNKER	NA	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00
Green Valley [3]	Private	DIESEL	1,836.29	1,504.84	2,009.08	6951.11	5696.44	7605.19	5908.45	4841.97	6464.41
Envasa	Private	DIESEL	NA	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00
Celsur	Private	CARBON	NA	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00
Nicaragua		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Costa Rica		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Panamá		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
El Salvador		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Guatemala		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others (Regional Market)		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PLANT NAME	STATE/ PRIVATE	FUEL	Heat flow (GJ/year)			Emissions (tCO_2/year)			Emissions factor (tCO_2/MWh)		
			2007	2008	2009	2007	2008	2009	2007	2008	2009
Santa Fe	State	DIESEL	179.86	3140.70	45.52	13.33	232.73	3.37	0.00	1.16	0.00
Emce La Ceiba	State	BUNKER	493408.05	316940.45	287454.33	38189.78	24531.19	22248.97	0.79	0.00	0.82
		DIESEL	28311.95	24574.93	19632.83	2097.92	1821.00	1454.79			
La Puerta & La Puerta MEX[1]	State	DIESEL	8495.11	50970.63	3262.87	629.49	3776.92	241.78	2.10	1.35	2.42
Elcosa	Private	BUNKER	2142112.80	1252106.91	1310939.98	165799.53	96913.07	101466.75	0.68	0.68	0.71
		DIESEL	0.00	0.00	0.00	0.00	0.00	0.00			
Emce II	Private	BUNKER	1477075.93	1805817.21	580379.69	114325.68	139770.25	44921.39	0.69	0.68	0.67
		DIESEL	43697.22	47323.55	23542.79	3237.96	3506.68	1744.52			
Lufussa I	Private	DIESEL	26646.96	148691.05	15136.37	1974.54	11018.01	1121.60	0.52	0.83	1.60
Lufussa (convenio ENEE)*	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lufussa II (Lufussa Valle)	Private	BUNKER	1895580.56	2398073.92	885769.44	146717.94	185610.92	68558.55	2.00	0.81	0.75
		DIESEL	3939879.26	472842.57	85089.41	291945.05	35037.63	6305.13			
Lufussa III	Private	BUNKER	14371680.25	13946010.88	13467981.71	1112368.05	1079421.24	1042421.78	0.61	0.62	0.62
		DIESEL	2670.29	2872.29	518.84	197.87	212.84	38.45			
Enersa	Private	BUNKER	11821336.97	12793239.96	11244953.67	914971.48	990196.77	870359.41	0.67	0.66	0.66
		DIESEL	35906.35	52470.42	12439.66	2660.66	3888.06	921.78			
Enersa (exceso de 30MWH)**	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Laeisz NACO	Private	DIESEL	67689.67	0.00	0.00	5015.80	0.00	0.00	0.76	0.00	0.00
Cemcol	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nacional de Ing.	Private	DIESEL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nacional de Ing. CEIBA	Private	DIESEL	41584.51	122265.88	62316.72	3081.41	9059.90	4617.67	0.00	0.00	0.00
Ampac [2]	Private	DIESEL	0.00	0.00	0.00	23.73	0.00	0.00	0.68	0.00	0.68
Elcatex [2]	Private	BUNKER	0.00	0.00	0.00	4572.55	3715.20	2286.28	0.71	0.71	0.71
Green Valley [3]	Private	DIESEL	254063.16	208204.80	277969.82	18826.08	15427.98	20597.56	0.61	0.62	0.68
Envasa	Private	DIESEL	0.00	0.00	0.00	0.00	4719.60	30916.80	0.00	0.68	0.68
Celsur	Private	CARBON	0.00	0.00	0.00	0.00	0.00	43046.78	0.00	0.00	0.68
Nicaragua		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Costa Rica		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Panamá		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
El Salvador		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Guatemala		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Others (Regional Market)		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Operating Margin			
Year	Total emissions	Total generation	OM
	tCO_2/yr	MWh/yr	tCO_2/MWh
2007	2,826,649	3,946,135	0.7163
2008	2,608,860	4,059,400	0.6427
2009	2,263,273	3,608,500	0.6272
		AVERAGE	**0.6621**

Build Margin			
Recent plants	Operation start year	MWh/year during 2007	tCO_2/year
Enersa	2004*	1,320,900	871,281
Cahsa (Azucarera Hondureña)	2005	43,800	0
Chumbagua	2007	9,600	0
Ecopalsa	2007	100	0
Green Valley (Park Dale)	2007	30,900	20,598
Envasa (Maquila Carbon)	2008	45,200	30,917
Celsur (carbon)	2009	63,200	43,047
SUM		1,513,700.00	965,842.34
Build Margin (tCO_{2e}/MWh)			**0.6381**

Combined margin (tCO_2e/MWh)		
Margin	Weights	tCO_2e/MWh
OM	75%	0.6621
BM	25%	0.6381
CM	0.6561	

Summary of ex-ante ERs calculation			
Parameter	Value	Units	Source
Net Yield 100MW	345,970	MWh/year	Calculated
CEF	0.6561	tCO2/MWh	Calculated
Annual ERs flow	226,978	ERs/year	Calculated
Monthly Ers flow	18,915	ERs/month	Calculated
Capacity Factor	39.5%	%	CdH Energy Yield assessment (Mott Macdonald)

Appendix 5. Further background information on monitoring plan

Monitoring information has been described in detail on section B.7.2.

Appendix 6. Summary of post registration changes

Version 10 – 13/03/2015	- The final layout of the Project requires two transformers at the substation. As the metering points are located next to the transformers, this implies that the project now uses two pairs of bi-directional meters instead of only one. - A correction was made in Section B.6.2 regarding the installed capacity (126 MW) and the number of WTG (63) that mistakenly was left unchanged in version 9 of the PDD.
Version 9 – 07/11/2013	- Post Registration Changes to reflect increased capacity of the project from 102 MW to 126 MW as explained in sections A and B of the PDD. The proposed change is estimated to be operational on 2014-12-01. - Update of project participants to coincide with the MoC in place, submitted to UNFCCC on 08/07/2013 and valid as of 18/07/2013 - Adaptation to latest PDD template (ver. 4.1). Minor editorial revisions to adjust content to the template´s requirements were

	introduced.
Version 8 - 17/01/2012	Registered PDD

Description of the changes in Version 10:

Background

The Cerro de Hula Wind Project (the Project) was developed by the company "Energía Eólica de Honduras, S.A. (EEHSA)", a subsidiary of Globeleq Mesoamerica Energy (GME). The Project is located in the Municipalities of Santa Ana and San Buenaventura, Department of Francisco Morazán, 24 km South of Tegucigalpa in Honduras.

The Project is the first wind farm interconnected to the National Interconnected System of Honduras. Initially, the project was registered as a 102 MW wind farm comprised by 51 wind turbines; however, the capacity of the project was ultimately increased to a total of 126 MW (consisting of 63 wind turbines of 2 MW each) and therefore a revised PDD was submitted to the Executive Board. These changes were approved on 17/02/2014.

Additional changes in the project design (respect to the ones approved in the current version of the PDD) had to be introduced in order to handle the increased capacity of the wind farm. While the original design comprised a single transformer at the substation, the final layout requires two. As the metering points are located next to the transformers, this implies that the project now uses two pairs of bi-directional meters instead of only one. The nature of this change, as well as its implications on the plant as a CDM project, is the topic of the following notes.

Description of changes: changes in the metering system

As described above, the project will require two transformers instead of one in order to handle its expected output. As metering points are located next to the transformers, two pair of meters will be required instead of one and therefore the monitoring plan has to be updated to reflect this change. As the modification can be deemed as a "Permanent change in the monitoring plan", a revised PDD has been prepared.

Under normal operation of the plant, the project uses both transformers. In case of failure / maintenance of either of the transformers, the project will direct all its output to the remaining, operational one; however, the total output under this scenario will be limited to 100 MW only to align with the transformer's capacity.

The additional pair of bi-directional electricity meters were installed and verified. The provider of the new electricity meters is Power Logic and the model for both the main (MMED-1) and back-up (MMED-2) meters are ION 8650, series number MW-1308A261-01 and MW-1310A906-01 respectively.

The original meters implemented by the project were also model ION 8650 with the series number MW-1111A186-01 for MMED-1 and MW-1111A188-01 for MMED-2.

As clarified earlier, the new electricity meters are part of the expansion required at the Cerro de Hula Substation in order to adequately handle all the energy coming from the wind farm. A total of two transformers of 100MVA, 230kV have been installed. The new transformer (code T630) and its metering system were tested for a period of 24 hours on the 8th of August 2014. The grid authority (ENEE) verified the new electricity meters (MMED-1 & MMED-2) on the 25th of August 2014[83]. The verification was held by the certified lab from the Metering Unit of the Instituto Costarricense de

[83] Evidence available to the DOE if requested.

Electricidad (ICE). The meter's verification was successful and found to be in compliance with the existing contracts.

Table 1: New meters installed

Meter	Model	Series Number	Installed Seal
MMED-1	ION 8650	MW-1308A261-01	164574
MMED-2	ION 8650	MW-1310A906-01	164575

The data recording, accuracy and calibration, quality control procedures, requirement for meters, communication system and periodic testing of the metering system are not affected by the modifications mentioned in this document. These changes to the metering system don't have any effects on the energy production of the project or to the WTGs, thus the project location and emission reductions won't be affected by the changes.

A summary of the main items behind the change in capacity is presented in the table below:

Table 2: Summary of the main items behind the changes in the PDD

Item	Description
Change description?	1. Addition of a main and back-up bi-directional electricity meters (MMED-1 & MMED-2). The model of both meters is ION 8650 and the series number for MMED-1 is MW-1308A261-01 and for MMED-2 is MW-1310A906-01. 2. Installation and commissioning of the transformer T630 of 100MVA, 230kV. Both of these additions don't affect the location of the project nor the emission reductions.
When did the change take place?	The change was approved on 25/08/2014 by the grid authority.
Reason for the change?	Required to handle the project's full capacity after the expansion.
Known prior to registration?	The changes took place on 25/08/2014, AFTER the project registration date (24/4/12) and after the approval of version 9 of the PDD (17/02/2014).
Impact on project´s operation / ability to deliver ERs?	No impact on project's operation or ability to deliver ERs.

Impact on the eligibility of the project

This section discusses any potential impacts of the changes in terms of five elements concerning the project eligibility:

(i) *Additionality*

The additionality of the project is not affected since the electricity generation and financial analysis are not modified by the changes mentioned in this report.

(ii) Scale

The scale of the project does not change as the project was already a large scale project.

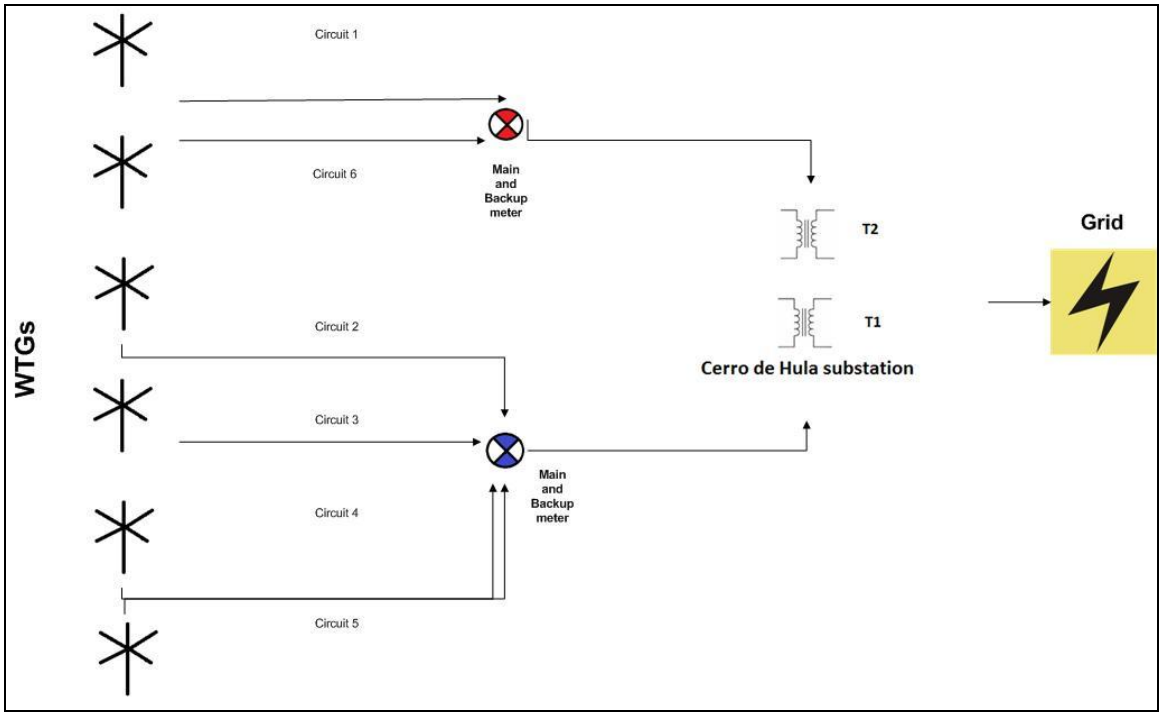
(iii) Applicability and application of approved baseline methodology under which the project has been registered (or the later version of the methodology)

All justifications for the applicability of the methodology (ACM0002 version 12.2) provided in section B.2 of the original PDD are not affected by these changes.

(iv) Compliance of the monitoring plan with the applied monitoring methodology

The compliance of the monitoring plan with the applied monitoring methodology is not affected. However, the additions of MMED-1 & MMED-2 as well as the new transformer affect/changes the monitoring plan. The WTGs will deliver their energy to the 1st transformer via circuits 2, 3, 4 and 5 and to the 2nd transformer via circuits 1 and 6. In case of failure and/or maintenance works at one of the transformers, the energy will be delivered to the functional one; however, under this scenario (i.e. only one operational transformer) the capacity will be limited to 100 MW by the SCADA system.

Figure 1: Flow diagram for the metering system



Thus, the revised monitoring plan contemplates the measurement of the generation from both metering points.

(v) Level of accuracy of the monitoring compared with the requirements contained in the registered monitoring plan

No changes in the accuracy levels of monitoring instruments are contemplated in the changes to this Project. Thus, the accuracy and completeness in the monitoring process is not reduced as a result of the revision.

Conclusions

As can be seen from the analysis in the previous sections, the revisions to the project do not affect any CDM requirements or have any consequences in terms of additionality, eligibility nor accuracy and completeness of the monitoring.

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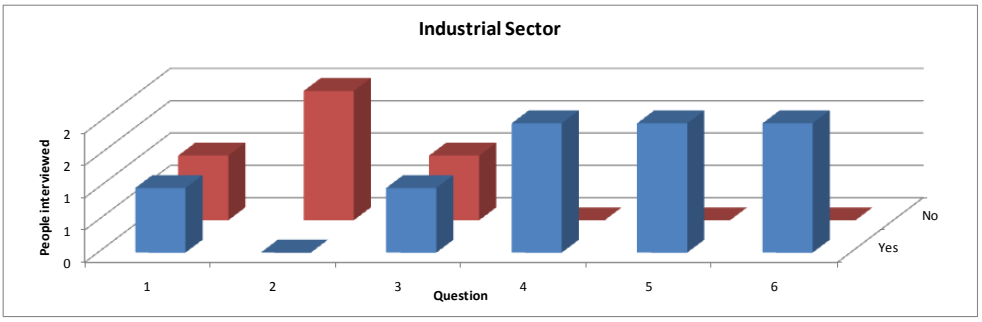
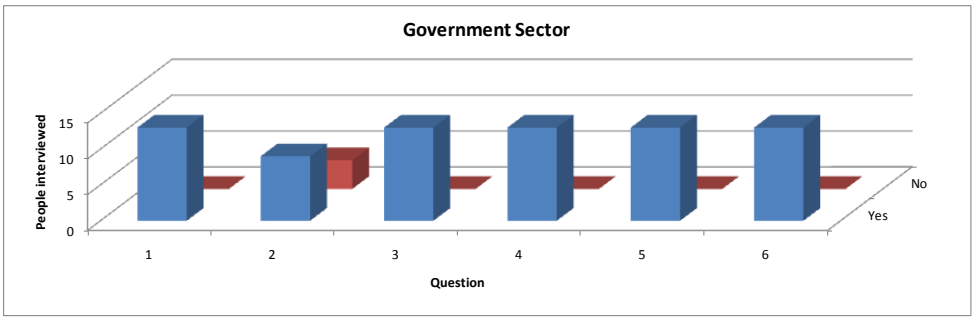
Appendix A

RESULTS OF QUESTIONNAIRE FROM STAKEHOLDERS´ CONSULTATION

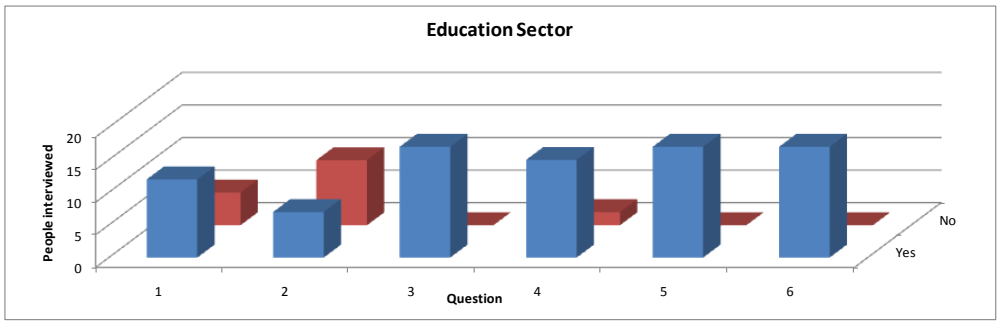
Question	Industrial sector	
	Yes	No
1	1	1
2	0	2
3	1	1
4	2	0
5	2	0
6	2	0



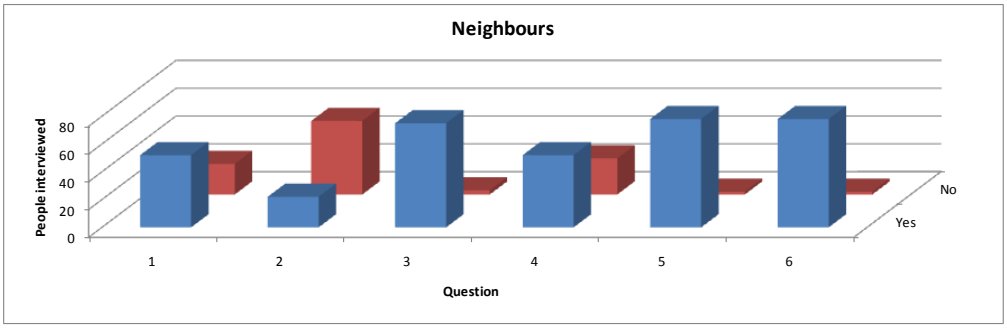
Question	Government sector	
	Yes	No
1	13	0
2	9	4
3	13	0
4	13	0
5	13	0
6	13	0



Question	Education sector	
	Yes	No
1	12	5
2	7	10
3	17	0
4	15	2
5	17	0
6	17	0



Question	Neighbours	
	Yes	No
1	52	22
2	22	53
3	75	3
4	52	26
5	78	2
6	78	2



Question	Other	
	Yes	No
1	44	22
2	20	45
3	64	4
4	56	11
5	68	0
6	68	1

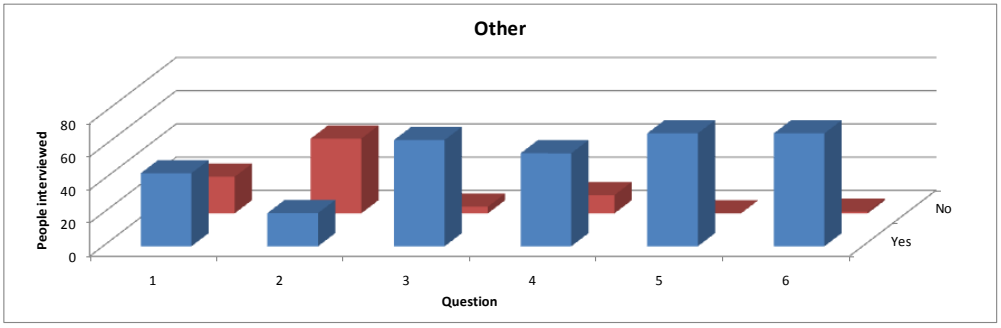


Table 13.Comments received by sector

Question	All sectors	
	Yes	No
1	122	50
2	58	114
3	170	8
4	138	39
5	178	2
6	178	3

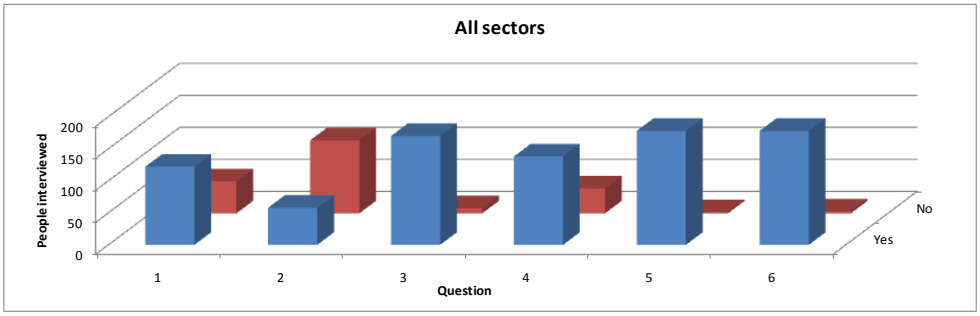


Table 14. Total comments received by question

Comments received on question 7			
It is fine	It is a responsible and serious company	It helps the environment and health	It helps the population
76	13	27	46

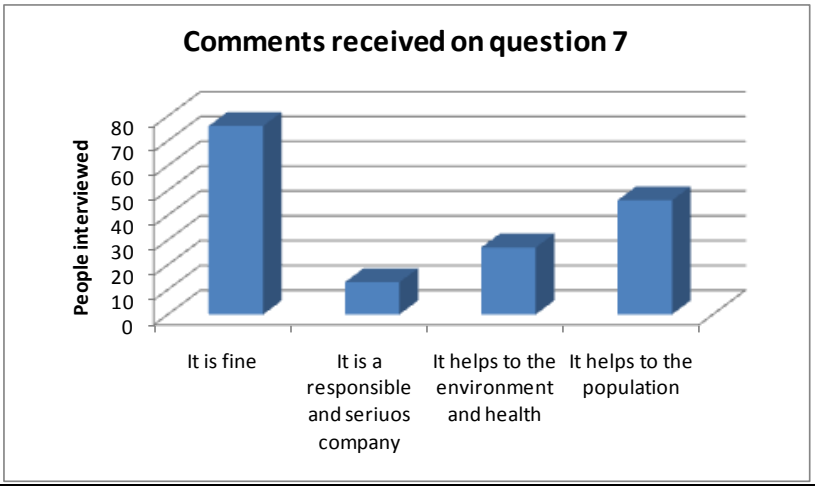


Table 15.Comments received on question 7

Comments received on question 8	
Lighting, new roads, employment opportunities	A better environment
169	6

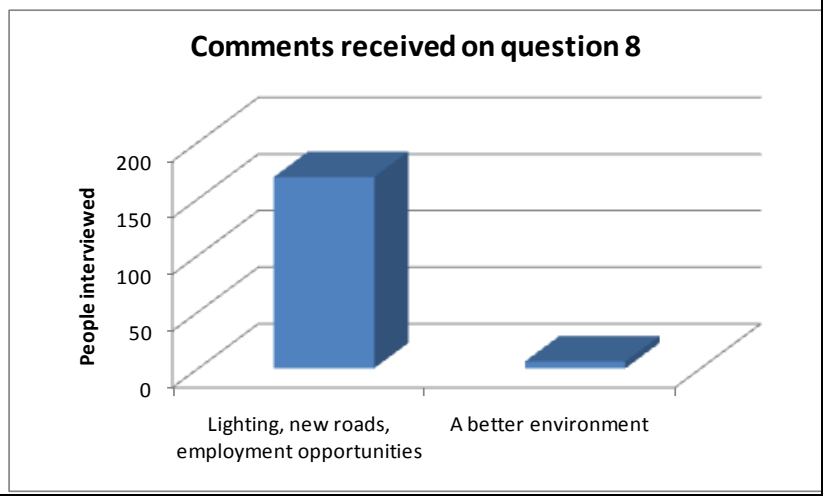
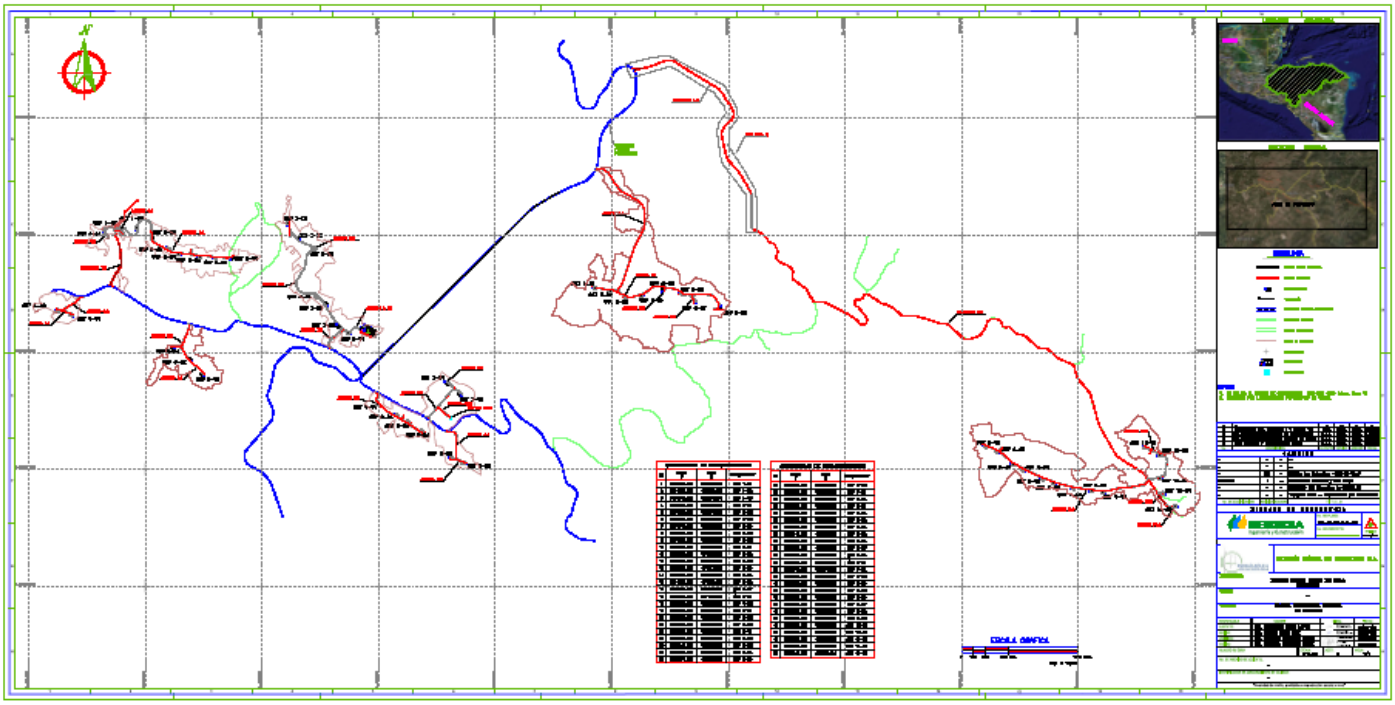


Table 16. Comments received on question 8

Appendix B

PROJECT LAYOUT



Document information

Version	*Date*	*Description*
06.0	9 March 2015	Revisions 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; • Editorial improvement.
05.0	25 June 2014	Revisions 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;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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