Project design document form
(Version 12.0)

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

BASIC INFORMATION	
Title of the project activity	EL PORVENIR I Wind Farm
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	10
Completion date of the PDD	27/10/2022
Project participants	Compañía Eólica de Tamaulipas S.A. de C.V.
Host Party	Mexico
Applied methodologies and standardized baselines	ACM0002 Version 12.3.0, “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” Standardized baseline Not Applicable
Sectoral scopes	Energy industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions	83,362 tCO2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The purpose of the project activity is the generation of renewable electric energy in Mexico through the construction and operation of a 54 MW wind farm in the municipality of Reynosa, in Tamaulipas State.

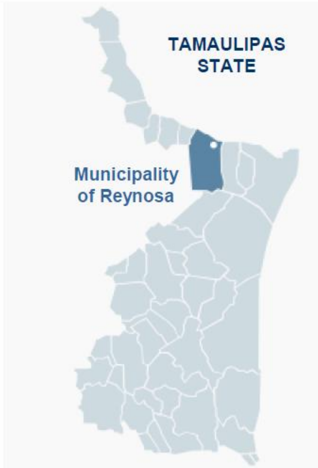


Figure 1. General focus of the area where the wind farm will be constructed

The project activity will increase the percentage of renewable sourced power in Mexico grid, promoting the growth of renewable capacity and diversifying the Mexican generation mix, significantly contributing to the sustainable development of the region. This represents a quite important solution, as the Mexican electric generation mix is greatly weighted towards fossil fuels.

The power plant will have an operating life of 20 years.

Commencement of the construction of the wind farm started on September 2012, test operations started February 22, 2014 and official start of operations was March 1st, 2014.

The promoter will be using a self-consumption scheme.

In accordance with ACM0002, 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.

Since the project activity is the installation of a new grid-connected renewable power plant (greenfield-plant), the baseline scenario consists of: “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”

The annual average expected emission reduction is 83,362 tCO_2e and the total GHG emissions are 618,534 tCO_2e for the chosen crediting period.

An Interconnection Authorization was obtained on November the 4th 2008 from the CFE (Electricity Federal Commission, Comisión Federal de Electricidad) to get access to the grid.

The Mexican environmental permit MIA (Manifestación de Impacto Ambiental) was obtained on September the 19th 2008 for the entire Project (phase I and phase II, mentioned before) from SEMARNAT (The Secretary of the Environment and Natural Resources or Secretaría de Medio Ambiente y Recursos Naturales).

As mentioned before, the Project activity will contribute to sustainable development. The contributions are summarized as follows:

- **Environmental improvement**

The EL PORVENIR I wind farm Project will reduce greenhouse gas emissions compared to a business- as-usual scenario, by displacing fossil-fuel based electricity. In addition, it will reduce other pollutants (CO, NOx, SO2) resulting from the power generation industry in Mexico.

Specifically, some advantages of wind energy are:

- Free, abundant, and inexhaustible resource.
- Clean energy, since CO2 emissions are in existent in the operating phase.
- Provides a barrier against the volatility of fossil fuel prices.
- Supplying security–Avoiding the dependence on fossil fuels.
- Modulate and quite fast installation.

- **Social and economic improvement**

The Project activity will create local employment during the project construction and operation period and, in this sense, will require training workers. Likewise, skills will easily be transferred to other wind power projects that are being developed in the area.

Specifically, during the construction of the wind farm and later for its operation and maintenance, it is planned to hire the field owners and their families, and afterwards the inhabitants of Reynosa municipality or other nearest municipalities.

It is forecasted to hire 250 qualified and non-qualified persons during the construction phase and 10 for the operation and maintenance phase. Furthermore land lease will provide an additional monthly income to landowners. This income will represent a high percentage of the landowner's income, because of the limited salary they receive.

In addition, another indirect social benefit of the project will be the improvement and fitting-out of the infrastructure (roads, etc.), making the mobility inside the affected area easier for its inhabitants.

- **Technological development**

The project will help to stimulate the growth of the wind power industry in Mexico and will serve as a demonstration for wider application of wind power technology and other projects for clean renewable electricity generation in local and national level.

A.2. Location of project activity

The Project will be located in Tamaulipas State, in the northeastern part of Mexico. It is situated in the municipality of Reynosa, with 526,888 habitants in 2005, according to INEGI (Instituto Nacional de Estadística, Geografía e Informática) data.

The wind turbines will be installed within an area in the ejido EL PORVENIR I that lies in a perimeter defined by the following WGS 84 coordinates:

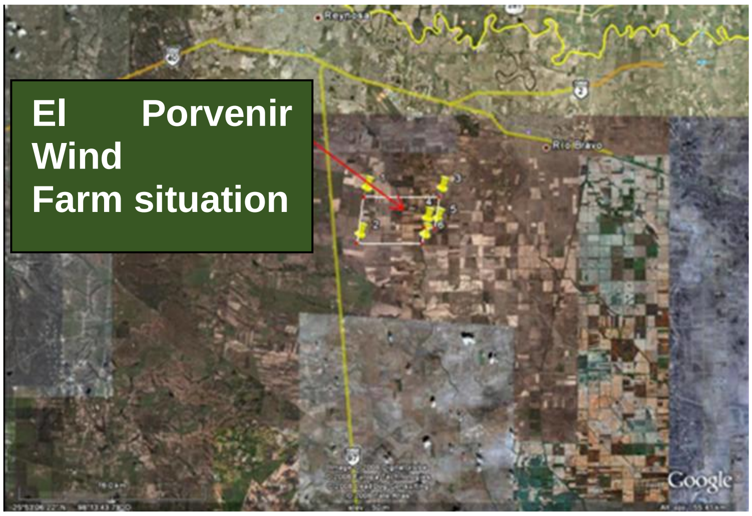
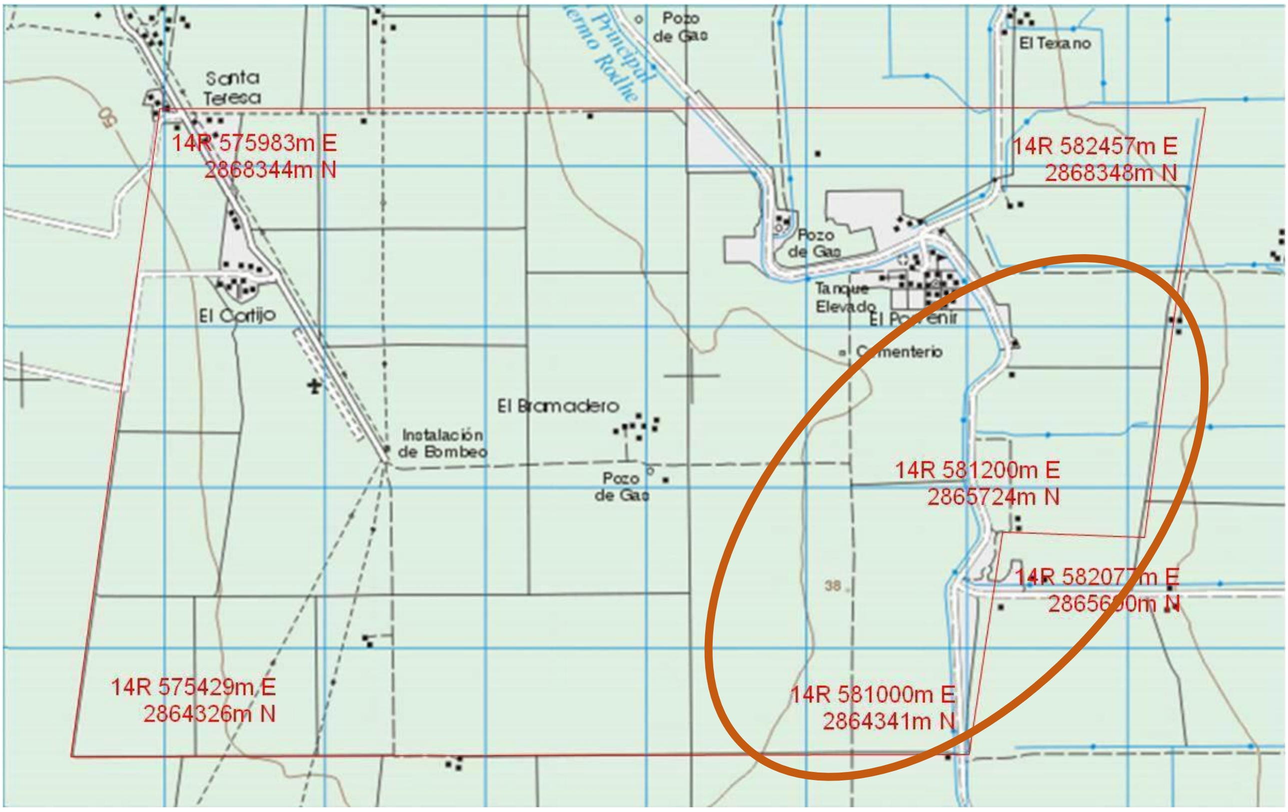


Figure 2 and Table 1. Coordinates defining the perimeter where the wind turbines will be installed.



The Project site has a total area of 420 hectares. Nevertheless, the total area occupied by installed wind turbines platforms (1,856 m2 each), access roads (104,364 m2) and substation (10,000 m2) will only occupy a space of 16.45 hectares (4% of total area).

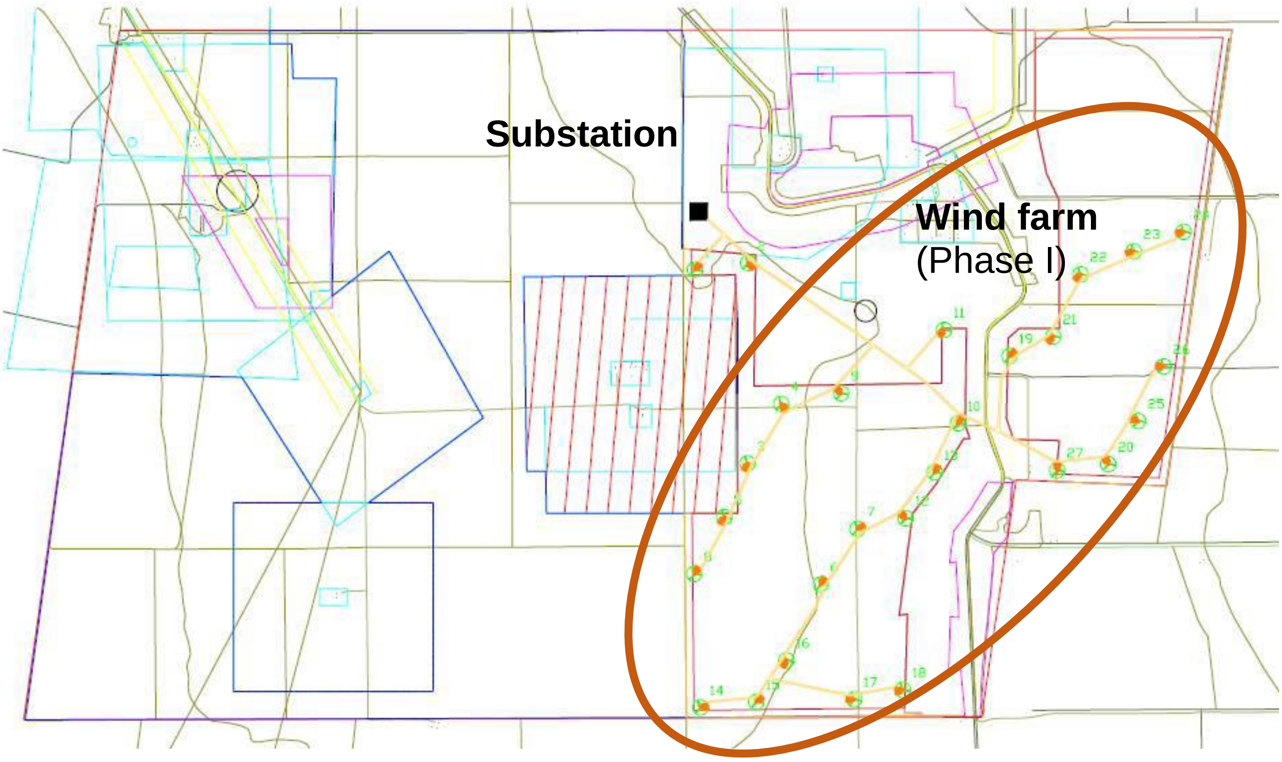


Figure 3 and 4. Location of the wind farm turbines

Coordinates of each wind turbine are shown next:

WTG	UTM East (m)	UTM North (m)
501	579316	2867755
502	579542	2867967
503	580441	2867967
504	580636	2868236
401	579321	2866968
402	579626	2867043
403	579909	2867160
404	580213	2867230
405	581223	2867497
301	579439	2866324
302	579782	2866319
303	580080	2866405
304	580378	2866490
305	580718	2866494
306	580955	2866685
307	581572	2866720
201	579330	2865235
202	579527	2865554
203	579851	2865611
204	580193	2865612
205	580505	2865694
206	580791	2865805

207	581484	2866104
208	581846	2866060
101	579355	2864415
102	579641	2864524
103	579949	2864596
104	580208	2864744
105	580496	2864854
106	580778	2864981

In WGS84 reference system

A.3. Technologies/measures

The Project will have a total installed capacity of 54 MW and is expected to generate 154.15 GWh per year.

The capacity of each wind turbine will be 1.8 MW. A total number of 30 machines will be installed.

The Vestas V100-1.8 MW wind turbine is a pitch regulated upwind turbine with active yaw and a three-blade rotor. The turbine has a rotor diameter of 100 m with a nominal capacity of 1.815 MW, and is able to operate the rotor at variable speed (RPM), helping to maintain the output at or near rated power. The hub supports the 3 blades and transfers the reaction forces to the main bearing. The hub structure also supports blade bearings and pitch cylinder. The generator is a 3-phase asynchronous generator with wound rotor, which is connected to the Vestas Converter System (VCS) via a slip ring system. The generator is an air-to-air cooled generator with an internal and external cooling circuit. The turbine is controlled and monitored by the System 3500 controller hardware and Vestas controller software.

The expected operational lifetime is 20 years.

The 54 MW will be evacuated by a new 13.9 km long 138 kV transmission line, from the Project to the substation of *Aeropuerto*. The transmission line's Environmental Impact Assessment (EIA) is included inside the project's EIA.

The plant load factor (32%) fulfils "Guidelines for the reporting and validation of plant load factors" version 01[1].

[1] Option b): The plant load factor determined by a third party contracted by the project participants.

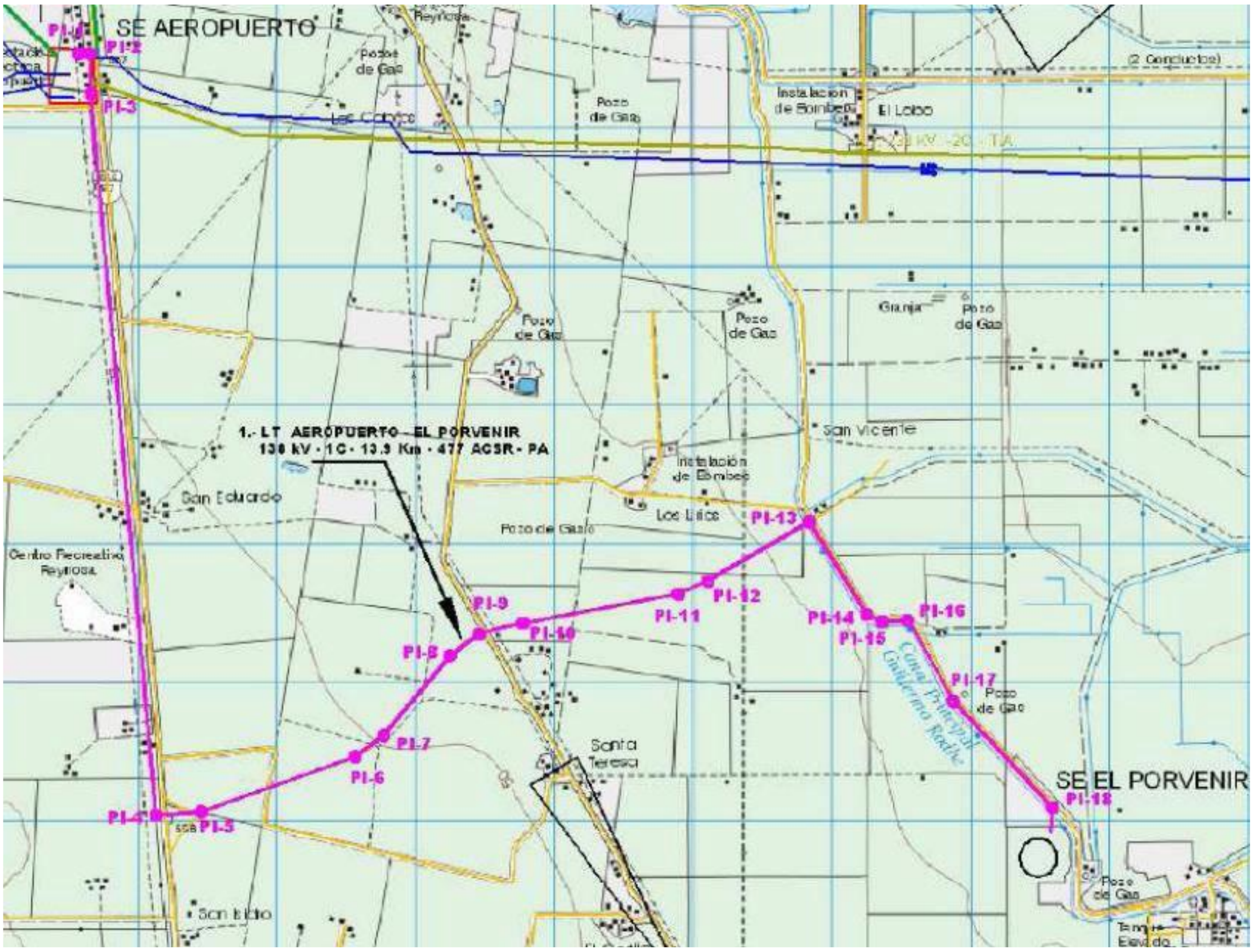


Figure 5. Location of the transmission line

Prior to the start of the implementation of the project activity, there was no power generation unit at the site. The same electricity output by the proposed project activity would have otherwise been generated by the operation of the National Grid connected power project.

The development of the Project will help to promote application of wind turbines in Mexico, an environmentally sound technology which will contribute to sustainable development. The technological transfer and the local hiring for the electrical and mechanical maintenance will also be an important contribution to the sustainable development in this area. Section A.1 provides detailed information.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Mexico (Host)	Compañía Eólica de Tamaulipas S.A. de C.V.	No

Table 2. Project participants involved

Compañía Eólica de Tamaulipas S.A. de C.V. is the Mexican society that will develop and operate the project.

A.5. Public funding of project activity

No public funding is used for this project activity.

A.6. History of project activity

The proposed CDM project activity is neither registered as a CDM project activity nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA).

The proposed CDM project activity is not a project activity that has been deregistered.

The proposed CDM project activity is not a CPA that has been excluded from a registered CDM PoA.

The registered CDM project activity or a CDM under a registered CDM PoA whose crediting period has or has not expired does not exist in the same geographical location as the proposed CDM project activity.

A.7. Debundling

Not applicable.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

The approved consolidated baseline methodology applied in the Project activity is ACM0002 Version 12.3.0, valid from 2nd March 2012: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” in conjunction with methodological tools: “Tool for the demonstration and assessment of additionality” Version 06.0.0. and “Tool to calculate the emission factor for an electricity system” Version 02.2.1.

B.2. Applicability of methodologies and standardized baselines

The proposed project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power was operated prior to the implementation of the project activity (greenfield plant):


Figure 6 and 7: Pictures taken at the wind farm location. Evidence of the Greenfield characteristic of the power plant.

The project activity meets all applicability conditions of methodology ACM0002 (version 12.3.0) which are listed as follows:

1. *"The project activity is the installation, capacity addition, retrofit or replacement of a 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":*

   The project activity is the installation of a new wind power plant.

2. *"In the case of capacity additions, retrofits or replacements: 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":*

   The project is not a capacity addition, retrofit or replacement, so it doesn't need to consider this applicability condition.

3. *"In case of hydro power plants, one of the following conditions must apply: The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m2":*

   The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.

4. *"In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m2 all the following conditions must apply: The power density calculated for the entire project activity using equation 5 is greater than 4 W/m2; Multiple reservoirs and hydro power plants located at the same river and where are designed together to function as an integrated project1 that collectively constitute the generation capacity of the combined power plant; Water flow between multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; Total installed capacity of the power units, which are driven using water from the reservoirs with power density lower than 4 W/m2, is lower than 15MW;Total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m2,*

is less than 10% of the total installed capacity of the project activity from multiple reservoirs":

The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.

5. *"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 reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4W/m2":*

   The Project is a new grid-connected wind power plant, therefore: the Project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity; the Project is not a biomass fired power plant; the Project is not a hydro power plant. The project does not need to consider this applicability condition.

6. *"In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is. the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance":*

   The project is not a capacity addition, retrofit or replacement, so it doesn't need to consider this applicability condition.

Therefore, the methodology ACM0002 v. 12.3.0 is applicable to the proposed project activity as all the applicability criteria are met.

The project does not apply a standardized baseline.

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

According to ACM0002, 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.

A flow diagram of the project boundary is shown next:

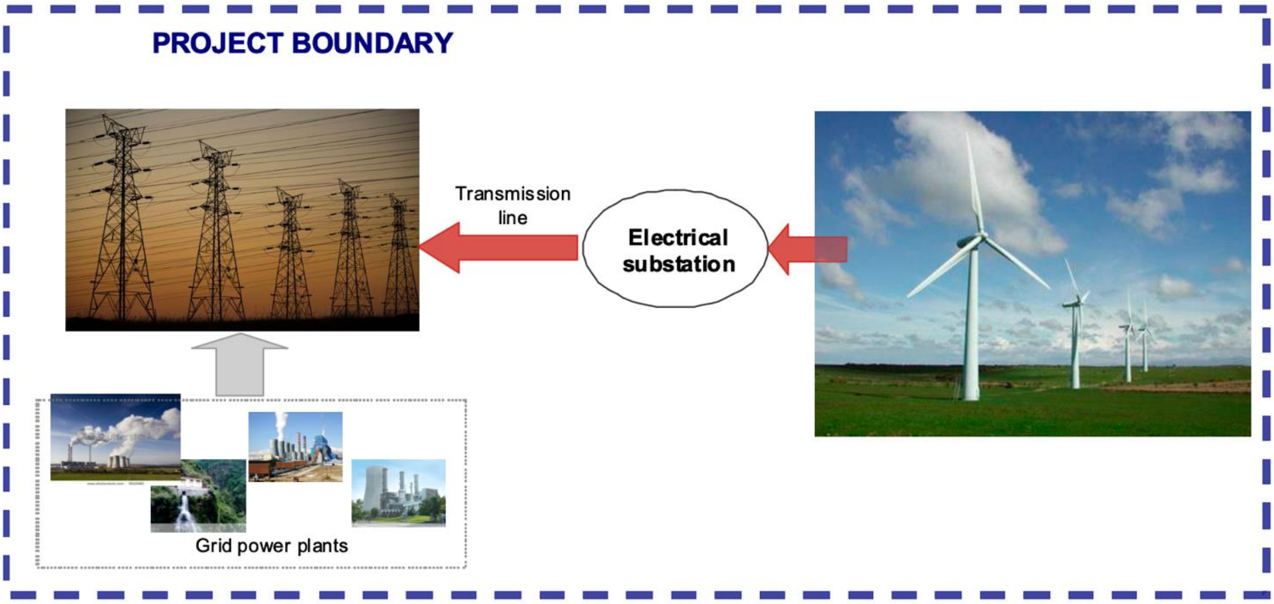


Figure 8. Project boundary

The sources and types of GHG included in the different project boundaries covered by ACM0002 methodology are listed in the next table.

There are no greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed CDM project activity which are expected to contribute more than 1% of the overall expected average annual emissions reductions and are not addressed by the applied methodology.

Source		GHG	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source. CO2 emissions are taken into account in emissions reductions estimations.
		CH_4	No	According to methodology it is a minor emission source and hence is considered in estimations.
		N_2O	No	According to methodology it is a minor emission source and hence is considered in estimations.
Project activity	For geothermal power plants, fugitive emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam	CO_2	No	Excluded by the methodology as the Project Activity is not a geothermal power plant.
		CH_4	No	
		N_2O	No	
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Excluded by the methodology as the Project Activity is not a solar thermal power plant or a geothermal power plant.
		CH_4	No	
		N_2O	No	
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Excluded by the methodology as the Project Activity is not a hydro power plant.
		CH_4	No	
		N_2O	No	

Table 3. Sources and gases included in the project boundary

B.4. Establishment and description of baseline scenario

According to the Baseline Methodology procedure of the Methodology ACM0002 V.12.3.0, as the project activity is the installation of a new grid-connected renewable power plant (greenfield-plant), the baseline scenario would be the following: “Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system (version 02.2.1)”

The project focuses on an electricity sector which is dominated by combined cycle and thermal power plants, powered mainly by natural gas and fuel. According to the planning documents “Prospectiva del sector eléctrico 2009-2024”, prepared by National Energy Ministry (Secretaría de Energía or “SENER”), this situation is expected to continue for the combined cycle at least for the duration of the almost first part of the crediting period of the EL PORVENIR I Project. Nevertheless, the thermal power is expected to decay and be exceeded by the hydro power plants from 2012 until 2024, as is shown next:

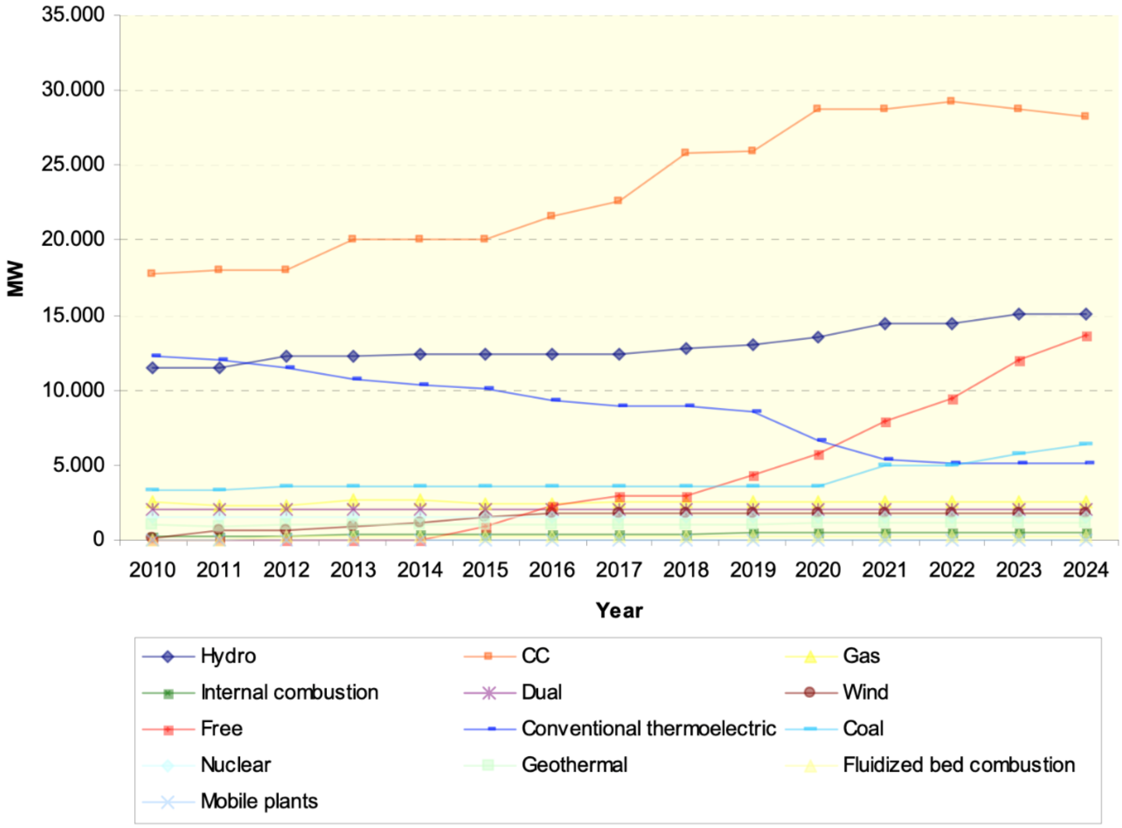


Figure 9. Evolution of the different power unit's types. Source: SENER, "Pespectiva del sector eléctrico 2009-2024" (table 37, page 140).

So that, CC and hydro are expected to be the dominating types of power plants during the crediting period. Production percentages for wind power plants are shown below for the years 2008 to 2024, as a forecast:

Type of power plants (MW)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Hydro	11,343	11,433	11,523	11,523	12,273	12,273	12,365	12,365	12,365	12,365	12,785	13,017	13,527	14,427	14,427	15,037	15,037
CC	16,912	17,312	17,778	18,012	18,012	20,077	20,077	20,077	21,617	22,651	25,797	25,880	28,679	28,679	29,219	28,730	28,286
Gas	2,653	2,734	2,496	2,334	2,334	2,742	2,654	2,476	2,433	2,538	2,538	2,538	2,538	2,538	2,538	2,538	2,538
Internal combustion	213	213	213	224	281	323	334	420	420	420	420	513	513	513	521	521	521
Dual	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
Wind	86	86	187	593	593	897	1,201	1,505	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,809
Free	0	0	0	0	0	0	0	954	2,317	2,946	2,946	4,347	5,747	7,860	9,391	12,037	13,632
Conventional thermoelectric	12,866	30,556	12,202	12,052	11,452	10,702	10,402	10,086	9,343	8,925	8,925	8,609	6,689	5,421	5,121	5,121	5,121
Coal	2,600	2,600	3,278	3,278	3,608	3,608	3,608	3,608	3,608	3,608	3,608	3,608	3,608	5,008	5,008	5,708	6,408
Nuclear	1,365	1,365	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561
Geothermal	938	965	965	917	976	976	1,006	1,006	1,006	1,006	1,016	1,016	1,091	1,091	1,091	1,091	1,091
Fluidized bed combustion	0	0	0	0	300	300	300	300	300	300	300	300	300	300	300	300	300
Mobile plants	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
TOTAL (MW)	**51,079**	**69,367**	**52,306**	**52,597**	**53,493**	**55,562**	**55,611**	**56,461**	**58,882**	**60,232**	**63,808**	**65,301**	**68,165**	**71,310**	**73,089**	**76,556**	**78,407**
Wind percentage (%)	**0.17**	**0.12**	**0.36**	**1.13**	**1.11**	**1.61**	**2.16**	**2.67**	**3.07**	**3.00**	**2.84**	**2.77**	**2.65**	**2.54**	**2.48**	**2.36**	**2.31**

Table 4. Source: SENER, "Prospectiva del sector eléctrico 2009 – 2024" (Table 37, page 140)

The forecast shown in the Table above is based on expected future energy demand, as well as planned infrastructure investment. To meet Mexico's projected electricity demand growth, CFE plans to add 27,328 MW in generation capacity between 2008 and 2024.

Therefore, the "business as usual" scenario is based on CCGT burning natural gas (more than 35% in 2024), which offers lower investment costs.

B.5. Demonstration of additionality

The *EL PORVENIR I* Project will reduce anthropogenic GHG emissions by supplying zero GHG emission power, which will displace fossil fuel-fired electricity generation. Operation of the wind farm, which uses a non-GHG emitting technology, will displace marginal electricity generated on the Mexican Grid primarily generated through the combustion of fossil fuels. Consequently, anthropogenic GHG emissions will be avoided, specifically, 618,534 tons of CO2 e during the first crediting period.

The development of wind farms has encountered economic and financial challenges (for example, there are no feed-in tariffs or incentives for sales of energy from renewable sources like in other countries), institutional barriers and legal and regulatory framework with an incipient maturity level, and lack of information and organizational structure and therefore at present the Project is not a very attractive alternative in the business-as-usual ("BAU") scenario. In other words, the *EL PORVENIR I* Project would only be developed and built if it were registered as a CDM project.

According to "*Prospectiva del sector eléctrico 2009-2024*", an official document issued by the Mexican government, wind power installations will comprise 2.31% of the total power installed within the Mexican energy system in 2024 according to official long-term planning estimates. The Mexican energy system will be until 2020 mainly based on combined cycle, hydro and thermal power plants, with the 42%, 20% and 10% of the generated energy in 2020, respectively.

It also has to be noted that the contribution of wind power to the power generation system is very unlikely to happen if these plants does not receive some sort of direct or indirect financial support, eg. In the form of CERs for CDM projects.

Analysis of the additionality of the project

Wind energy in Mexico would be the perfect complement to CDM projects because of its added value. This statement is fairly obvious since wind farms are being developed as CDM projects in Mexico. It can be concluded that wind energy is not a particularly attractive proposition in the business-as-usual scenario.

Over this section, "Tool for the Demonstration and assessment of additionality" Version 06.0.0 has been applied following the steps defined:

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

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

According to the methodology of ACM0002, baseline scenario of a new grid-connected renewable power plant project activity is "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".

Therefore, the continuation of the current situation without undertaking project activity or other alternatives is clearly more attractive than the project activity since it does not require a significant upfront investment.

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

CFE is Mexico's state-owned utility. The country's Public Electricity Service Act (*Ley del Servicio Público de la Energía Eléctrica*) was amended in December 1992, allowing private participation in such generation activities as described in article 36 from *Ley del Servicio Público de Energía Eléctrica* [2]

- **Independent Production** (*Producción Independiente*): There are large generation projects sponsored by CFE in which the developer builds and operates the power plant. All energy is sold to CFE at a fixed price under a long term PPA and new plants must be included in CFE expansion plans.
- **Self-consumption** (*Autoabastecimiento*): The producer generates power for its own consumption. The power generator may share the ownership of the production company, joining with a number of consumers. Likewise, energy not used by the consumer has to be sold to CFE at a fixed price. It is worth mentioning that most of non-independent production private generation in Mexico has been developed under this scheme.
- **Cogeneration** (*Cogeneración*): It is the power generation combined with steam or other thermal energy production for Self-consumption. To develop a project under this scheme, it is a requirement that the efficiency of the whole system (i.e., electricity and thermal energy) is higher than that each part independently. The ownership structure of cogeneration facilities is similar to Self-consumption projects.
- **Small energy producers** (*Pequeña producción*): These are power plants smaller than 30 MW, located in specific areas determined by SENER, and which production must be sold to CFE.

Nowadays, renewable projects promoted by private investors can only be developed under independent production or self-consumption schemes. In this case, the Project will be developed under the self- consumption production scheme.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without an additional funding that may be derived from the CDM project activities. Accordingly, an investment analysis was performed and taken into consideration to back up the conclusion reached from the barrier analysis, carried out in step.

Sub-step 2a. Determine appropriate analysis method

Since the proposed project will earn revenues from not only CDM but also electricity sales, related the simple cost analysis method is not appropriate.

Investment comparative analysis method is only applicable to the case that alternative baseline scenario is similar to the proposed projects, so that comparative analysis can be conducted. The alternative baseline scenario of the proposed project is to supply electricity from the Mexican grid rather than a new investment project. Therefore, Option II is not an appropriate method either.

The proposed project will use benchmark analysis method (Option III) based on Equity IRR.

Sub-step 2b.- Option III. Apply benchmark analysis

According to the “Tool for the Demonstration and assessment of additionality” Version 06.0.0, a benchmark analysis has been done by comparing after taxes expected returns on equity benchmark to the after-taxes equity IRR.

The financial indicator for this analysis is the equity IRR, which is one of the most commonly used parameters to determine the investment decision.

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[2] It can be found at: https://www.senado.gob.mx/comisiones/energia/docs/marco_LSPEE.pdf

According to the “Guidelines on the assessment of the investment analysis” (version 05), in cases of projects which could be developed by an entity other than the project participants, the benchmark should be based on parameters that are standard in the market. For these cases, the cost of equity should be determined either by:

a) Selecting the values provided in Appendix A of these guidelines; or by
b) Calculating the cost of equity using best financial practices, based on data sources that can be clearly validated by the DOE, while properly justifying all underlying factors.

In this project option (a) has been chosen.

Considering that the project belongs to group 1 “Energy Industries”, the default value for the expected return on equity in Mexico provided by “Guidelines on the assessment of the investment analysis” (version 05)” is 11.2%. This is a real term after taxes value, and it will be used as a benchmark.

As equity IRR is calculated in nominal terms, taking into account inflation rates, real term benchmark value is converted to nominal values by adding the inflation rate, according to the “Guidelines on the assessment of the investment analysis” (version 05). The inflation rate used for equity IRR calculation is 3.35%, according to a third-party study. So, benchmark used for demonstration of additionality is calculated as follows:

Nominal value = [(1 + Real value) * (1 + Inflation Rate)] – 1

Nominal value = [(1+11.2%) * (1+3.35%)] – 1 = 14.93%

So, nominal term after taxes benchmark is then 14.93%.

Based on this benchmark, calculation and comparison of financial indicator are carried out in sub-step 2c.

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

Calculation and comparison of financial indicator of the Project is implemented according to “Tool for the Demonstration and assessment of additionality” (version 0.6.0.0) and “Guidelines on the Assessment of Investment Analysis” (version 05).

Estimations on basic parameters for calculation of EL PORVENIR I equity IRR are shown herein under. More detailed data of the economic issues of the project can be found in the financial model. All evidences provided are considered applicable at the time of the investment decision (01/06/2010).

Parameter	Value	Source
Installed capacity (MW)	54	• Wind study “ESTUDIO El Porvenir 30-03-2010.pdf”
Estimated output (GWh/year)	154.15	• Wind study “ESTUDIO El Porvenir 30-03-2010.pdf”
Initial Price (€/kWh)	0.07601	• ENERGY COSTS BY SECTOR MEXICO 2004 - 2009 “Justificacion Tarifa.pdf”. (Equivalent to average calculated cost of 1.41 MXN/kWh for 2010 with a 15% discount,obtaining 1.20 MXN/kWh)
Annual Income (€/year)	11,716,503	• Wind study “ESTUDIO El Porvenir 30-03-2010.pdf” • ENERGY COSTS BY SECTOR MEXICO 2004 – 2009 “Justificacion Tarifa.pdf”

Total Investment (€)	83,549,789	• Contrato Suministro de Aerogeneradores Vestas • Contrato Nuevo Santander_CETSA • Contrato Isolux_Cetsa
Average annual O&M expenses (€/year)	2,369,227	• Wind turbines supply proposal "Oferta suministro, montaje y mantenimiento El Porvenir" – Updated for turbine number
Income Tax	28%	• LEY DEL IMPUESTO SOBRE LA RENTA "Ley del Impuesto Sobre la Renta.pdf"
Expected CER price (USD/tCO2)	14	• Point Carbon

Table 5. Financial general parameters data of El Porvenir project

The following table shows the Equity IRR of El Porvenir Wind Farm in comparison to the market benchmark for return on equity:

Financial Parameter	Equity IRR	Market Financial benchmark
Without CERs sales	7.76 %	14.93%

Table 6. Financial parameters of El Porvenir project

Without the sales of CERs the after taxes Equity IRR is 7.76 % which is lower than the financial benchmark. Thus, the Project is not considered to be financially attractive.

However, taking into account the additional revenues from CDM, the after taxes Equity IRR is 9.67% The project is considered more attractive with than without CER revenues.

<u>Sub-step 2d. Sensitivity Analysis</u>

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions and is a frequently used method for assessing the perceived uncertainties by identifying the potential changing ranges of some key elements and potential impacts of such changes on the economic model of the Project.

According to the UNFCCC "Guidelines on the Assessment of Investment Analysis" (v. 05) variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. For this project, four parameters were selected as sensitive factors to check out the financial attractiveness: construction investment, electricity price, operation and maintenance cost and electricity generation.

These parameters fluctuated within the range of -10% to +10%, according to the Guidelines. This range is considered reasonable for this project as:

- Electricity price:

Electricity price estimated for the El Porvenir Wind Farm is coherent with prices used for other wind farm registered PDD in México. The value determined in this project is not expected to increase more than 10% as only one registered project in Mexico has reached this limit (103 USD/MWh) and the average electricity price is lower.

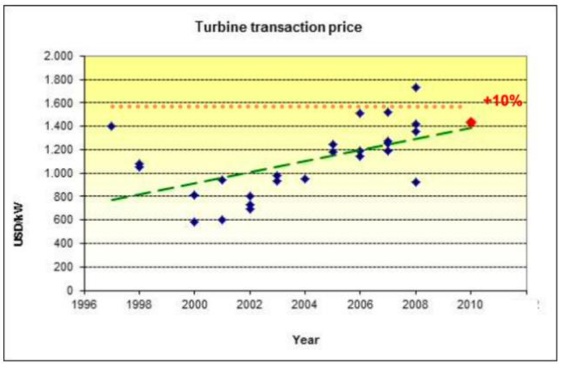
Registered Wind Farm PDD in Mexico Capacity	Capacity (MW)	Generation (MWh)	Electricity price (USD/MWh)
Oaxaca I Wind Farm	102	374,748	66
Piedra Larga Wind Farm	90	365,850	68

Eléctrica del Valle de México Wind Farm	68	291,465	103
Fuerza Eólica del istmo Wind Farm	50	213,963	80
Bii Stinu Wind Energy Project	164	641,240	61
Santo Domingo Wind Energy Project	160	686,560	61
La Ventosa Wind Energy Project	102	376,000	
Eurus Wind Farm	251	989,475	69
Average	-	-	73
Range	-	-	[61-103]
El Porvenir Wind Farm	54	154,155	93
Rate exchange used for El Porvenir costs conversion (USD/€) 1.2222 Source: Bank of Canada (http://www.bankofcanada.ca/rates/exchange/10-year-converter/). Average exchange rate of June 2010.			

Table 7. Electricity price for registered wind farm projects in Mexico. Source: UNFCCC

Also, the value for electricity price is not expected to decrease more than 10% as the lower the price is, the less conservative is the estimation regarding the additionality of the project.

- Construction investment:
  The main cost for the construction of a wind farm is the purchase and installation of turbines, which usually represents the 70-80% of the total investment costs. Those costs increased a 7% per year from 2001 to 2007, according to AEE study[3], due to an increase in raw material price, demand, etc. The next graph, based on the United States Environmental Protection Agency (EPA) data, ratifies the before mentioned increasing tendency of the construction investment in the last years.



However, according to a public official study[4] estimations, during the next decade, a stabilization in investment cost is foreseen due to technological development, standardization, know how development, among other factors. This stabilization would eventually reduce total investment cost by less than 5% between 2010 and 2012, when the wind farm is expected to be constructed.

[3] Source: The wind energy economy ("La economía de la energía eólica", http://www.tech4cdm.com/userfiles/Sesion3_eol_ecu_La_economia_de_la_energia_eolica.pdf)

[4] Source: Technological evolution and renewable energy cost perspective ("Evolución tecnológica y prospectiva de costes de energías renovables". Estudio técnico PER 2010-2011. IDAE. http://www.idae.es/index.php/mod.documentos/mem.descarga?file=/documentos_11227_e2_tecnologia_y_costes_7d24f737.pdf)

Taking into account the before mentioned context, a range of +/-10% is considered to be reasonable for the sensitivity analysis variation.

- Operating expenses:

Operating expenses can be divided into variable and fixed costs (turbine and electric substation maintenance, land renting, staff hiring, insurance, etc.). Both have been almost constant in real terms during the last decade[5] and are expected to follow the same trend in the next decade, according to public official study[6].

According to this framework, a variation of +/- 10% in the sensitivity analysis seems reasonable for this parameter.

- Electricity production:

Electricity generation has been estimated through the wind study carried out by the Project Participant. The variation in the estimated output is related to the uncertainty and reliability of the wind measurements. In this project uncertainty has been minimized by carefully choosing wind sensor type, sensor location and height of the measurement. Also, wind measurement mast, installed in 2008 following the IEC recommendations, is well exposed, without surrounding obstacles which provides high quality and availability to the recorded data as the site has not significant relief. For output estimation, official software and methods have been used for modelling and data treatment and evaluation. These considerations made when studying wind resources at the site, indicate low uncertainty in the estimation of energy production.

Also, electricity production is directly related to wind speed. In order to determine the most adequate range of variation of energy production, variation of wind speed can also be used.

According to annual average wind speed data recorded by the reference measurement tower of the airport of McAllen (provided by the wind study from Enhol), standard deviation provides an idea of the dispersion of those data in relation to an average:

McAllen Airport	
Year	Wind Speed (m/s)
1997	-
1998	4.73
1999	4.62
2000	4.83
2001	4.62
2002	4.63
2003	4.17
2004	4.41

[5] Source: Renewable Energy Plan ("Plan de Energías Renovables" (PER) 2011-2020. IDAE. http://www.idae.es/index.php/mod.documentos/mem.descarga?file=/documentos_11227_PER_2011-2020_def_93c624ab.pdf)

[6] Source: Technological evolution and renewable energy cost perspective ("Evolución tecnológica y prospectiva de costes de energías renovables". Estudio técnico PER 2010-2011. IDAE. http://www.idae.es/index.php/mod.documentos/mem.descarga?file=/documentos_11227_e2_tecnologia_y_costes_7d 24f737.pdf)

2005	4.3
2006	4.57
2007	4.09
2008	4.65
2009	-

The obtained wind speed variability is 5.2%.

According to a reference public study[7] the relation between the variation of wind speed and the variation of energy production is between 1.7 and 2 depending on the site project characteristics. Then, energy production inter-annual variation associated to a dispersion of 5.2% in wind speed is 8.8-10.4%.

This result is in line with variation obtained from the calculated total production uncertainty (+/- 8.9%), and then it is demonstrated that it can be considered reasonable to use a range of +/-10% for sensibility analysis of electricity production.

Moreover, the input values that are used have been carefully studied and so an increase or decrease of 10% in these key input parameters is highly unlikely to occur.

The different after-taxes Equity IRR values obtained in this sensitivity analysis is shown next:

Financial Parameters	**Fluctuations**				
	-10%	**-5%**	**0%**	**5%**	**10%**
Construction Investment	10.10%	8.94%	7.76%	6.54%	5.21%
Electricity Price	3.54%	5.97%	7.76%	9.25%	10.56%
Electricity Production	3.54%	5.97%	7.76%	9.25%	10.56%
Operating Expenses	8.26%	8.01%	7.76%	7.51%	7.24%

Table 8. Sensitivity analysis

Also, the variation of the parameters needed to reach benchmark has been calculated:

Financial Parameters	**Variations to reach benchmark**
Construction Investment	-32%
Electricity Price	34%
Electricity Productions	34%
Operating Expenses	N/A

Table 9 Variations of main financial parameters to reach benchmark

As variation of main financial parameters is not expected to surpass the range of -10% to +10%, as it was explained before, those parameters are not expected to vary as for reaching benchmark.

The price of the tCO_2 in organized markets has been selected as sensitive indicator for sensitive analysis of financial attractiveness. When this parameter fluctuates within the range of 0 to 24 USD/tCO_2, the financial parameters varies to different extent:

Financial	**Fluctuations**

[7] Source: http://www.gl-garradhassan.com/assets/downloads/Regional_Inter-annual_Variability_of_Wind_Production_across_the_US.pdf

Parameters					
Price of tCO2 (USD/t)	**0**	**8**	**14**	**18**	**24**
Equity IRR (%)	7.76%	8.90%	9.67%	10.17%	10.86%

Table 10. Sensitivity analysis

The revenue obtained from the CER will improve the financial feasibility of the Project. The increase in the IRR will provide an incentive to overcome existing barriers.

Step 3. Barrier analysis

N/A

Step 4. Common practice analysis

According to the “Tool for the demonstration and assessment of additionality” version 06.0.0 (EB 65) an analysis of any other activities that are operational and that are similar to the proposed project activity is provided next.

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

According to the tool, projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Hence, similar projects to El Porvenir Wind Farm would be any operating wind farms located in Mexico with a capacity similar to 54 MW.

According to “Prospectiva del sector eléctrico 2011-2025” (p 195, Table 5), among the main power plants operating in 2010, only one wind farm (La Venta) was operating in Mexico with a capacity of 85 MW. Also, according to the document page 144, the next wind farms would be finished or under construction until 2013: Oaxaca I with 101 MW, Oaxaca II, III and IV with 304 MW and La Venta III with 101 MW.

According to UNFCCC web page, Oaxaca I, II, III and IV have already been registered as CMD projects and will receive carbon credits benefits. According to the tool, other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis.

On the other hand, La Venta (85 MW) and La Venta III (101 MW) have not been considered as CDM projects. Although La Venta and La Venta III wind farms are in the same country, have similar technology and are not CDM project activities, their capacities are respectively 57% and 87% higher than the capacity of El Porvenir Wind farm (54 MW). Hence, La Venta and La Venta III will not deliver the same output than El Porvenir wind farm project and cannot be considered of a similar scale. Moreover, La Venta III project was developed under a national large scale renewable energy program (“Proyecto de Energías Renovables a Gran Escala” PERGE) consisting of helping Mexico to develop the initial experience required for implementing renewable energy applications connected to the grid with a commercial base. Therefore, a grant was stated by FMAM of about 25.35 million USD for helping to the construction of this 101 MW wind farm, and hence this project had not the same access to financing that El Porvenir wind farm which is not included in PERGE program and has not been given this economic support.

Of the other wind energy projects that were expected to be developed between 2009 and 2014, all projects were registered as CDM projects or had significantly higher capacity and should not be considered of the same scale.

Other projects expected from 2009 - 2014	Expected Installed Capacity	Status
BiiNeeStipa (Cisa-Gamesa)	26.35 MW	Registered
La Mata-La Ventosa (EVM)	67.50 MW	Registered
Fuerza Eólica del Istmo (FE)	50.00 MW	Registered
Eurus (Cemex/Acciona)	250 MW	Registered
La Venta III (CFE/Iberdrola)	100 MW	Registered
Los Vergeles (GSEER)	161 MW	Discontinued
BiiNeeStipaII (Cisa-Gamesa)	288 MW	Registered
Demex (Renovalia)	227.5 MW	Registered (Piedra Larga)
BiiStinú (Eoliatec del Istmo)	164 MW	Registered
Santo Domingo (Eoliatec del Pacífico)	160 MW	Started March 2013
Fuerza Eólica del Istmo (Peñoles)	30 MW	Registered
Oaxaca I (Reomex)	101 MW	Registered
Oaxaca II, III y IV (Acciona)	304.2 MW	Registered
Vientos del Istmo (Preneal México)	395.9 MW	Not developed
Unión Fenosa Generación México	227.5 MW	Started 2014

Table 11. Wind energy projects in México

The rest of power plants in operation in Mexico are hydropower, gas turbine, combined cycle, geothermal power plants, which are not similar technologies as the energy source is not the wind in any of those cases.

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

As discussed before, no similar options are occurring in Mexico. Hence, the proposed project activity is additional.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

The baseline scenario represents the electricity that would have otherwise been generated by the operation of the grid-connected power plants and by the addition of new generation sources. To calculate the emission reductions, the “Tool to calculate the emission factor for an electricity system” version 02.2.1 is used.

Step 1. Identify the relevant electricity systems

The Mexican electricity system (Sistema Electrico Nacional, SEN) is formed by the Interconnected National System (Sistema Interconectado Nacional, SIN) and two isolated grids (Baja California and Baja California Sur) [8].

El Porvenir wind farm project will deliver the generated electricity to the main grid "Sistema Interconectado Nacional" (SIN). Nevertheless, data for the SIN grid are not always available by their own, so data from the global system SEN have been used at some points.

There are no imports to the grid within the boundaries of Mexico, but there are electricity imports and exports with electricity systems in other countries by means of nine electric interconnections with the Unites States of America, Belize and Guatemala. Specifically imports come from the US and exports go to EUA, Belize and Guatemala, being most of it received or exported through the Baja California isolated grid.

Therefore, SIN imports and exports data are given in table below:

	2004	**2005**	**2006**	**2007**	**2008**	**% of total generation**
Exports (GWh)	236	254	227	240	255	0.12%
Imports (GWh)	8	12	9	11	11	0.01%
Net Exchange (GWh)	228	242	218	229	244	0.11%

Table 12. Electricity imports and exports. Source: SENER, "Prospectiva del sector eléctrico 2009-2024" (table 17, page 94)

According to ACM0002, the emission factor for imports from connected electricity systems located in other countries is 0 tCO_2/MWh. Furthermore, electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the baseline emission factors.

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

Two options are provided in the "Tool to calculate the emission factor for an electricity system" version 02.2.1 to calculate the operating margin and build margin emission factor:

- **Option I:** Only grid power plants are included in the calculation.
- **Option II:** Both grid power plants and off-grid power plants are included in the calculation.

According to information provided by SENER, off-grid plants in Mexico (mostly photovoltaic plants) are not significant compared to the electricity generation capacity of the public service and self-consumption grid-connected plants. The installed capacity of the off-grids plants is considered to be very low. Therefore, option I is chosen for operating margin and build margin emission factor calculation.

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

The "Tool to calculate the emission factor for an electricity system" (version 02.2.1) provides four methods to calculate the operating margin. For the EL PORVENIR I Project, option (a) "Simple OM" has been chosen because:

i. sufficient data is not available for using the Dispatch Data Analysis option, and

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[8] Source: SENER, "Prospectiva del sector eléctrico 2009-2024" p 123, among others.

ii. low-cost/must-run resources in Mexico have represented less than 50% of total grid generation over the most recent years (see table below), as well as in long-term projections of hydroelectricity production.

	2004	2005	2006	2007	2008	Average
Fuel-oil	31.8%	29.7%	23.1%	21.3%	18.37%	
Combined Cycle	34.6%	33.5%	40.5%	44.2%	45.72%	
Renewable + Hydro	15.2%	15.9%	16.5%	14.9%	19.59%	
Coal	8.6%	8.4%	8.0%	7.8%	7.54%	
Dual (coal + fuel oil)	3.8%	6.5%	6.2%	5.8%	2.92%	
Turbogas	1.3%	0.6%	0.7%	1.1%	1.19%	
Nuclear	4.4%	4.9%	4.8%	4.5%	4.16%	
Diesel	0.3%	0.4%	0.4%	0.5%	0.52%	
Low-cost/must-run	**19.6**	**20.9%**	**21.3%**	**19.4%**	**23.7%**	**21.0%**
Net generation (GWh)	**190,258**	**199,167**	**205,878**	**211,454**	**215,276**	

Table 13. Percentage of electricity generation by energy source. Source: SENER "*Prospectiva del sector eléctrico 2009-2024"* (table 21, page 110)

As shown in the table above, the average share of low-cost/must run generation (e.g.; hydro, geo/wind and nuclear plants) for the last four years has been 21%, significantly below 50%. Furthermore, hydroelectricity production, which now represents 16.5% of total generation in 2008 is forecasted to increase to a level of 7% but to decrease around 3% of total generation by 2024. Thus, the fraction of low-cost/must run generation is expected to decrease.

The Simple OM emission factor can be calculated using either of the two following data vintages for year(s):

- Ex-ante option: A 3-year generation weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex-post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

Ex-ante option has been chosen because the yearly statistics provided by SENER needed to calculate the OM ex-post are normally published more than one year after the end of the reporting year, leading to large delays between emission reduction and monitoring, verification and issuance of CER. It has been also chosen due to the simplicity of the project development and also for the emission reduction verification.

Step 4: Calculate the operating margin (OM) emission factor according to the selected method.

The Simple OM Emission Factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. It has been calculated following the "Option B" mentioned in the Step 4 of the "Tool to calculate the emission factor for an electricity system" (version 02.2.1).

Option B is used because:

a) total net electricity generation of all power plants serving the system as well as the fuel types and total fuel consumption of the project electricity system are available; conversely, data for option A are not; and
b) only nuclear and renewable power generation are considered as low-cost/ must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
c) off-grid power plants have not been included in the calculation (see Option I chosen in Step 2).

Option B addresses the calculation based on data on fuel consumption and net electricity generation of each power plant/unit, resulting in the equation below.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{co2,i,y}}{EG_y} (\mathrm{t}CO_2\ e)/MWh)$$

Where:

$EF_{grid}, OM_{simple,y}$	is the simple operating margin CO2 emission factor in year y (tCO2/MWh);
$FC_{i,y}$	refers to the amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit);
$NCV_{i,y}$	refers to the net calorific value (energy content) of fossil fuel type i in year y (TJ/Gg);
$EFCO_{2,i,y}$	refers to the CO2 emission factor of fossil fuel type i in year y (tCO2/GJ);
EG_y	refers to the net electricity generated and delivered to the grid by all power sources serving the system, not including low cost/ must run power plants/units, in year y (MWh);
i	refers to all fossil fuel types combusted in power sources in the project electricity system in year y.
y	refers to the relevant year as per the data vintage chosen in step 3.

The parameters that are used for calculating the Operating Margin are obtained as follows:

- The $FC_{i,y}$ factor can be found in SENER's official documents "Prospectiva del sector eléctrico 2007-2016", "Prospectiva del sector eléctrico 2008-2017", and private communication with SENER for 2008 data. As fuel consumption official published data are given in TJ, NCV data are considered to be already included in the fuel consumption values provided.
- The EG_y factor has been obtained from the "Prospectiva del sector eléctrico 2009-2024" SENER's official publication.
- The $EF_{CO2,i,y}$ factors can be found in the "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2 (Energy), Chapter 1 (Introduction).

The calculation of the operating margin includes electricity imports to the grid.

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

In terms of vintage data, one of the following two options must be chosen:

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

Option 2. Update the Build Margin emission factor annually, ex-post, for the first crediting period, including those units built up to the year of registration of the project activity or, if information up to the year of registration is no yet available, including those units built up to the latest year for which information is available. For the second crediting period, the BM emission factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the Build Margin emission factor calculated for the second crediting period should be used.

Option 1 has been chosen, due to the same reasons why the OM was decided to be calculated ex-ante.

In accordance with the "Tool to calculate the emission factor for an electricity system", no capacity additions from retrofits are included in the calculation of the Build Margin emission factor.

The sample group of power units m used to calculate the Build Margin has been determined as per the procedure of the mentioned tool, which is shown next:

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

b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh).

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

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

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

   Otherwise:

d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEGSET_{sample\text{-}CDM}$, in MWh);

   If the annual electricity generation of that set comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEGSET_{sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the Build Margin. Ignore steps (e) and (f).

   Otherwise:

e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

f) The sample group of power units *m* used to calculate the Build Margin is the resulting set ($SET_{sample-CDM>10yrs}$).

Once followed paragraphs (a), (b) and (c), it was found that $SET_{\geq 20\%}$ had a larger production than $SET_{5-units}$, so $SET_{\geq 20\%}$ is considered the sample set (SET_{sample}). As none of the plants started supplying electricity to the grid more than 10 years ago, the sample group of power units m used to calculate the Build Margin is the resulting set: $SET_{\geq 20\%}$.

The BM emission factor has been addressed following the equation below, as indicated by the "Tool to calculate the emission factor for an electricity system" (version 02.2.1).

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

Where:

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

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

Where:

$EF_{EL,m,y}$	refers to the CO2 emission factor of power unit m in year y (tCO2/MWh)
$EF_{CO2,m,i,y}$	refers to the average CO2 emission factor of fuel type i used in power unit m in year y (tCO2/GJ)
$\eta_{m,y}$	average net energy conversion efficiency of power unit m in year y (%).
y	refers to the most recent historical year for which power generation data is available.

Step 6: Calculate the combined margin (CM) emissions factor.

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

a) Weighted average CM; or
b) Simplified CM.

As the simplified CM calculation option requirements are not fulfilled by this project, option (a) ***Weighted average CM*** is chosen:

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

Where:

$EF_{grid,BM,y}$	= Build Margin CO2 emission factor in year y (t CO_2/MWh)
$EF_{grid,OM,y}$	= Operating Margin CO2 emission factor in year y (t CO_2/MWh)
W_{OM}	= Weighting of Operating Margin emissions factor (%)
W_{BM}	= Weighting of Build Margin emissions factor (%)

The following default values should be used for W_{OM} and W_{BM} :

- Wind and solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;
- All other projects: W_{OM} = 0.5 and W_{BM} = 0.5 for the first crediting period, and W_{OM} = 0.25 and W_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to the “Tool to calculate the emission factor for an electricity system” (version 02.2.1.)

As the project is a wind farm, during the first crediting period W_{OM} = 0.75 and W_{BM} = 0.25 will be used.

Leakage (LEy)

According to ACM0002 (version 12.3.0), no leakage emissions are considered as potentially emissions sources are neglected.

Emission reductions (ERy)

Emission reductions are calculated as follows:

$ER_y = BE_y – PE_y$

Where:

ER_y = Emission reductions in year y (tCO_2e).
BE_y = Baseline emissions in year y (tCO_2e).
PE_y = Project emissions in year y (tCO_2).

Since the project emissions are zero, the emission reductions (ER_y) are equal to the baseline emission (BE_y). Therefore, $ER_y = BE_y$.

For the calculation of these two terms (BM and OM), official data published by SENER in the “Prospectiva del sector eléctrico” documents have been used. These documents can be accessed at http://www.energia.gob.mx/webSener/portal/publicaciones.html.

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$NCV_{i,y}$
Data unit	MJ/kg
Description	Net calorific value (energy content) of fossil fuel type i in year y. It is the quantity of heat released by the full combustion of a unit of fuel when the water produced is assumed to remain as vapor and the heat is not recovered.
Source of data	SENER (Private communications with SENER, Prospectiva del sector eléctrico 2008- 2017 and Prospectiva del sector eléctrico 2007-2016).
Value(s) applied	-
Choice of data or measurement methods and procedures	-
Purpose of data	-
Additional comment	As fuel consumption official published data are given in TJ, NCV data are considered to be already included in the fuel consumption values used, and so NCV values are considered to be provided by SENER.

Data/Parameter	$FC_{i,y}$
Data unit	TJ/day
Description	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data	Private communications with SENER for 2008 data. Prospectiva del sector eléctrico 2008-2017, page 148, graph 39, for 2007 data. Prospectiva del sector eléctrico 2007-2016, page 116, graph 40, for 2006 data.
Value(s) applied	**Year** / **Consumed fossil fuel (TJ/day)**: 2008 – 4,329 2007 – 4,527 2006 – 4,407
Choice of data or measurement methods and procedures	Specific data obtained from an official source has been chosen for the fuel consumption.
Purpose of data	-
Additional comment	-

Data/Parameter	$EF_{CO2,i,y}$ and $EF_{CO2,m,i,y}$
Data unit	tCO_2/TJ
Description	CO_2 emission factor of fossil fuel type i used in power unit m in year y
Source of data	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 Vol. 2 of the 2006 IPCC Guidelines on National GHG Inventories.
Value(s) applied	**Fuel type** / **CO_2 emission factor (tCO_2/TJ)**: Fuel oil: 75.5 Natural Gas: 54.3 Natural Gas Liquids: 58.3 Diesel: 72.6 Coal: 87.3
Choice of data or measurement methods and procedures	As there are not available local or country specific values of carbon content per fuel type in Mexico, IPCC world-wide default values have been used.
Purpose of data	-
Additional comment	-

Data/Parameter	($\eta_{m,y}$) Efficiency power plants
Data unit	%
Description	Average net energy conversion efficiency of power unit m in year y
Source of data	SENER, "Prospectiva del sector eléctrico 2009-2024" (table 47, page 159).
Value(s) applied	**Technology** / **Efficiency (%)**: Thermal: 37.6% Gas Turbine: 39.4% Combined Cycle: 51.7% Internal Combustion: 45.1%
Choice of data or measurement methods and procedures	Efficiency for each plant has been considered following the values provided by SENER instead of default values, as the most accurate approximation, for being specific National Electric System data. Nevertheless, as data given by SENER corresponds to the main typical proyects considered for the expansion of the National Electric System of Mexico, the more conservative data for each technology have been chosen
Purpose of data	-
Additional comment	-

Data/Parameter	$EF_{grid\ CM,y}$
Data unit	tCO_2/GWh
Description	Combined margin CO_2 emission factor for the proposed CDM project activity
Source of data	Formula given by the Tool to calculate the emission factor for an electricity system version 02.2.1
Value(s) applied	573.22 tCO_2/GWh
Choice of data or measurement methods and procedures	Ex-ante baseline emission factor. Will be calculated before each 7 years renewable period following the procedure given by the last available version of the Tool to calculate the emission factor for an electricity system
Purpose of data	-
Additional comment	This parameter will be monitored according to the methodology ACM0002.

B.6.3. Ex ante calculation of emission reductions

Calculate the operating margin emission factor (EF_{OM}):

Using the "Tool to calculate the emission factor for an electricity system", data on the specific energy consumption by fuel type is directly taken from SENER's documents "Prospectiva del sector eléctrico 2007-2016", "Prospectiva del sector eléctrico 2008-2017" [9] and private communications with SENER for 2008 data. Data on electricity generation, imports and exports, were taken from "Prospectiva del sector eléctrico 2009-2024" (table 17, page 94).

As fuel consumption data, provided by the Mexican Government official publications, are given in TJ units, NCV factor is already included in the official published used value.

The emission coefficient factor by fuel type is determined in tCO2/TJ, taken from the "2006 IPCC Guidelines for National Greenhouse Gas Inventories", Volume 2 (Energy), Chapter 1 (Introduction), Table 1.4 (Default CO2 emission factors for combustion), Effective CO2 emission factor, 95% confidence interval, lower limit value.

Then, applying the mentioned values, the next annual Operating Margin Emission Factors are obtained:

$$EF_{grid,OMsimple,2006} = \frac{\sum_i FC_{i,2006} \times NCV_{i,2006} \times EF_{CO2,i,2006}}{EG_{2006}} = 676.0tCO_2/GWh$$

$$EF_{grid,OMsimple,2007} = \frac{\sum_i FC_{i,2007} \times NCV_{i,2007} \times EF_{CO2,i,2007}}{EG_{2007}} = 647.4tCO_2/GWh$$

$$EF_{grid,OMsimple,2008} = \frac{\sum_i FC_{i,2008} \times NCV_{i,2008} \times EF_{CO2,i,2008}}{EG_{2008}} = 628.1tCO_2/GWh$$

The 3-year weighted average Operating Margin is calculated below:

[9] Available at http://www.energia.gob.mx/webSener/portal/publicaciones.html

$$EF_{grid,OMsimple,average} = \frac{\sum_i EF_{grid,OMsimple,y} \times EG_y}{\sum_y EG_y} = 650.3tCO_2/GWh$$

Calculate the build margin emission factor (EF_{BM}):

According to the definition and the formulae to calculate the Build Margin, the newer power plants installed in Mexico that comprise the yearly last 20% system generation are those indicated in the following table:

	Power plants characteristics					Gross generation (GWh)	Self-use rate (%)	Net generation (GWh)	Accumulated net generation (%)
	Name of the power plant	Start of operation	Technology *	Fuel	Installed capacity (MW)				
Additions 2008	Humeros	07/04/2008	GEO	-	5.00	39.81	0.0%	40	0.02%
	Ciudad del Carmen	01/05/2008	GT	Diesel	16.00	3.02	1.5%	3	0.02%
	Ciudad del Carmen	01/05/2008	GT	Diesel	17.00	3.20	1.5%	3	0.02%
Additions 2007	Vallejo (LFC)	09/08/2007	GT	Natural Gas	32.00	128.30	1.5%	126	0.08%
	Holbox	01/07/2007	IC	Diesel	0.80	4.59	9.1%	4	0.08%
	Holbox	01/07/2007	IC	Diesel	0.80	4.59	9.1%	4	0.08%
	Tamazunchale (PIE)	21/06/2007	CC	Natural Gas	1,135.00	6,846.35	2.9%	6,648	3.17%
	El Cajón (Leonardo Rodríguez Alcaine)	01/06/2007	HY	-	375.00	914.25	0.0%	914	3.60%
	El Cajón (Leonardo Rodríguez Alcaine)	01/03/2007	HY	-	375.00	914.25	0.0%	914	4.02%
	Coyotepec (LFC)	30/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.08%
	Coyotepec (LFC)	30/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.14%
	Cuautitlán (LFC)	30/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.20%
	Villa de las Flores (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.26%
	Victoria (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.31%
	Remedios (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.37%
	Ecatepec (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.43%
Additions 2006	Atenco (LFC)	2006	GT	Natural Gas	32.00	96.60	1.5%	95	4.48%
	Chihuahua II (El Encino)	2006	CC	Natural Gas	65.30	506.77	2.9%	492	4.71%
	Altamira V (PIE)	2006	CC	Natural Gas	1,121.00	8,699.61	2.9%	8,447	8.63%
	Tuxpan V (PIE)	2006	CC	Natural Gas	495.00	3,841.49	2.9%	3,730	10.36%
	Valladolid III (PIE)	2006	CC	Natural Gas	525.00	4,074.31	2.9%	3,956	12.20%
Additions 2005	Hermosillo	2005	CC	Natural Gas	93.30	675.72	2.9%	656	12.50%
	Ixtaczoquitlan	2005	HY	-	1.60	12.15	0.0%	12	12.51%
	Yecora	2005	IC	Diesel	0.70	4.05	9.1%	4	12.51%
	Botello	2005	HY	-	9.00	68.37	0.0%	68	12.54%
	Rio Bravo IV PIE	2005	CC	Natural Gas	500.00	3,621.23	2.9%	3,516	14.18%
	La Laguna II PIE	2005	CC	Natural Gas	498.00	3,606.74	2.9%	3,502	15.80%
	Holbox	2005	IC	Diesel	0.80	4.63	9.1%	4	15.81%
Additions 2004	El Sauz	2004	CC	Natural Gas	128.00	494.25	2.9%	480	16.03%
	Tuxpan (Pdte. Adolfo Lopez Mateos)	2004	GT	Natural Gas	163.00	239.06	1.5%	235	16.14%
	San Lorenzo Potencia	2004	GT	Natural Gas	266.00	390.11	1.5%	384	16.32%
	Rio Bravo III PIE	2004	CC	Natural Gas	495.00	1,911.36	2.9%	1,856	17.18%
	Chicoasén (Manuel Moreno Torres)	2004	HY	-	900.00	2,799.16	0.0%	2,799	18.48%
Additions 2003	Transalta Campeche	2003	CC	Natural Gas	252.00	1,787.00	2.9%	1,735	19.28%
	Naco Nogales	2003	CC	Natural Gas	258.00	2,090.00	2.9%	2,029	20.23%
								43,544.52	

<u>NOTE:</u>

*Technology (CC: Combined Cycle; HY: Hydro; GT: Gas Turbine; IC: Internal Combustion; TH: Thermal, Simple Cycle)

Table 14. Latest generation of the newest power plants covering 20% of the system generation from 2008 backwards. Source: SENER, “Prospectiva del sector eléctrico 2009-2024”, “Prospectiva del sector eléctrico 2008-2017”, “Prospectiva del sector eléctrico 2007-2016”, “Prospectiva del sector eléctrico 2006-2015”, “Prospectiva del sector eléctrico 2005-2014”, “Prospectiva del sector eléctrico 2004-2013”, Private communications with CFE and CFE 2003 Annual Report.

Data of “Name of the power plant”, “Start of operation”, “Technology” and “Installed capacity” have been obtained from SENER “Prospectiva del sector eléctrico 2009-2024” (table 18, page 96), “Prospectiva del sector eléctrico 2008-2017” (table 19, page 101), “Prospectiva del sector eléctrico 2007- 2016” (table 19, page 77), “Prospectiva del sector eléctrico 2006-2015” (table 13, page 57), “Prospectiva del sector eléctrico 2005-2014” (table 14, page 51) and “Prospectiva del sector eléctrico 2005-2014” (table 9, page 44).

Plants included in Baja California and Baja California Sur isolated grids have been excluded as well as CDM registered projects.

Data for “Fuel” and “Gross generation” have been obtained from private communications with CFE. For the selection of the type of fuel for each plant, the most conservative option has been chosen when different fuels were being used. This is the case of Internal Combustion plants that use fuel oil and diesel, where diesel with a more conservative emission factor has been chosen. Also, for 2003 additions, CFE 2003 Annual Report (available at http://www.cfe.gob.mx/QuienesSomos/publicaciones/Paginas/Publicaciones.aspx) has been used.

Data for “Self-use rate” have been obtained from SENER “Prospectiva del sector eléctrico 2009-2024” (table 47, page 159). There, most conservative data given by technology have been chosen.

The Build Margin emission factor for the year 2008 is determined as follows:

$$EF_{grid,BM,2008} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} = 341.9 tCO_2/GWh$$

Calculate the baseline emission factor EFCM

The baseline emission factor is calculated as the weighted average of the Operating Margin and the Building Margin emission factors. In the case of wind projects, the default weight for W_{OM} is 0.75 and for W_{BM}, 0.25 (owing to their intermittent and non-dispatchable nature).
Thus, the obtained ex-ante baseline emission factor which applies for the first crediting period is:

$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM} = 650.3 \times 0.75 + 341.9 \times 0.25 = 573.2\ tCO_2$ /GWh

Calculate the baseline emissions

Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, and are calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (tCO2)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{grid,CM,y}$ = Combined margin CO2 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” (tCO2/MWh)

According to the ACM0002 version 12.3.0 methodology, the EL PORVENIR I project is considered as a Greenfield renewable energy power plant, then:

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

Where:

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

Then, $BE_y = EG_{facility,y} \times EF_{grid,CM,y}$ = 154.15 GWh × 573.2tCO_2 / GWh = 88,362 tCO_2

Calculate the emissions reductions

The emission avoided by the project activity should be calculated as the difference between the baseline emissions (BE_y), and project emissions (PE_y). Since it is not required to consider project emissions in the case of wind to electricity and no emissions due to leakage are caused by the project activity, the emission reductions are, directly, the baseline emissions.

Estimated yearly emission reductions calculated as of the first crediting period credits income are the baseline emission factor multiplied by the energy generation.

$$\text{Estimated \_ Emission \_ Reductions}_y = BE_y - PE_y = 88{,}362 \text{ tCO}_2\text{ e}$$

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

Total emission reductions during the crediting period are **618,534 tCO_2e** (See Annex 3)

Estimation of emission reductions:

Year	Baseline emissions ($t\ CO_2e$)	Project emissions ($t\ CO_2e$)	Leakage ($t\ CO_2e$)	Emission reductions ($t\ CO_2e$)
September 2013	29,454	0	0	29,454
2014	88,362	0	0	88,362
2015	88,362	0	0	88,362
2016	88,362	0	0	88,362
2017	88,362	0	0	88,362
2018	88,362	0	0	88,362
2019	88,362	0	0	88,362
August 2020	58,908	0	0	58,908
Total	618,534	0	0	618,534
Total number of crediting years				
Annual average over the crediting period	88,362	0	0	88,362

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{facility,\ y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Project activity site
Value(s) applied	154,148 MWh
Measurement methods and procedures	Installation of electricity meters at the wind farm substation. Measurements registered at real time with a data updating each 2-3 seconds. Data sent to the wind farm’s software (SCADA), each 2-3 seconds.

Monitoring frequency	The measured amount of electricity shall be collected daily, weekly and monthly.
QA/QC procedures	Cross check measurements results with record for sold electricity.
Purpose of data	-
Additional comment	Electricity supplied by the EL PORVENIR I Project to the national grid. To be checked by sales receipts. As per ACM0002 v. 12.3.0, archived data will be kept during the crediting period and two years after the end of the last crediting period by means of electronic and paper backup. This parameter will be monitored according to the methodology ACM0002. This parameter will be monitored according to the methodology ACM0002.

B.7.2. Sampling plan

Data and parameters to be monitored in section B.7.1 above are not determined by a sampling approach.

B.7.3. Other elements of monitoring plan

The project meets the applicability criteria under the monitoring methodology, ACM0002 Version 12.3.0 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources". This methodology is designed, among other things, for power plants using wind resources.

For this purpose and in accordance with monitoring methodology, the information that needs to be monitored shall include the electricity generation from the proposed project activity.

Electricity generation data will be obtained from the CFE (*Comisión Federal de Electricidad*) power meters located at the Project substation of *Aeropuerto*. The CFE will deliver to *Compañía Eólica de Tamaulipas S.A. de C.V.* detailed information about the hourly generated energy. Those aspects are regulated in the interconnection for renewable energy sources official model contract. The project activity's annual electricity dispatched to the grid ($EG_{facility,y}$) will be monitored in accordance to the monitoring requirements of the ACM0002 methodology, by continuous measurements by electricity meters and at least monthly recording.

The meters installed at the wind farm substation will register measurements at real time with a data updating each 2-3 seconds. Those data will be sent to the wind farm's software, Supervisory Control and Data Acquisition (SCADA).

The precision class of the energy meters will be 0.2 S and will comply with IEC 62052-11.

Monitored data will be sent to the Control Center. There the staff will be responsible for the checking monitored data by comparing the measured electricity generation with the electricity bill to avoid possible discrepancies. Emission reductions ex-post calculation will also be carried out in the Control Center, by applying the formula:

Annual emission reduction = (project activity's annual monitored electricity dispatched to the grid) * (CO2 emission factor ex-ante of the estimated baseline)

The grid emission factor will be calculated ex-ante before each 7 years renewable period.

The monitoring reports will be written as well.

The main activities of the Control Center are listed next:

- Real-time supervision of all wind farm infrastructure (wind turbine, substation, communication).

- Coordinate maintenance activities.
- Supervision of information sent to CENACE.
- Coordination between departments (Operations, Safety and Health, Market).
- Study, analysis and evaluation of alarms, with the purpose of detecting possible equipment failure.
- Reporting.
- Real-time management of wind farm production, assuring immediate action towards incidents and follow up of said incidents to reduce repair times.
- Optimization of production forecasts to improve power output.

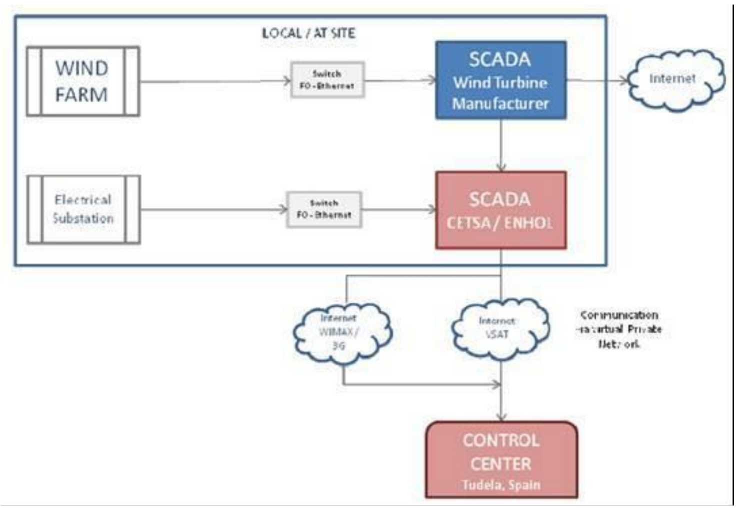

Figure 10. Communications Network Layout

The monitoring and supervision of the wind farm is headed by the market department with support of the Operations Department. The market department is the one constantly monitoring from its control center in Tudela, Spain the above-mentioned tasks to ensure maximum wind farm utilization. The department's organization chart is as follows:

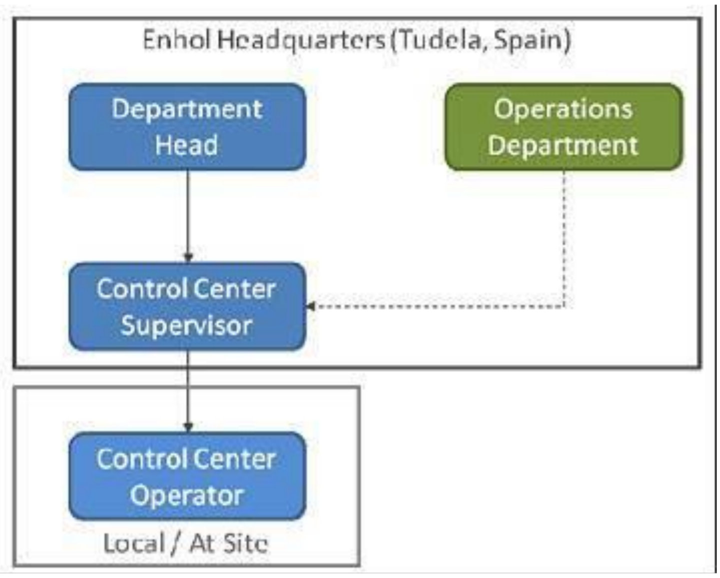

Figure 11. Organization Chart

Further details are discussed in Annex 4.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity
24/11/2012 (estimated date for the signature of the turbines supply contract)

C.2. Expected operational lifetime of project activity
The project activity is expected to have a lifetime of 20 years from its commissioning date.

C.3. Crediting period of project activity

C.3.1. Type of crediting period
Renewable

C.3.2. Start date of crediting period
22/02/2014

C.3.3. Duration of crediting period
The crediting period will be 7 years, renewable

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts
According to the EIA, the environmental protection actions to carry out are listed next, by phase:

a) Preparation and construction stage
- Enclosure of the land that will be affected by preparation for the construction in order to diminish the area affected by vegetation lost species mobility, etc.
- Restitution of the vegetation cover in areas previously altered.
- Find alternatives for the design of the location of the infrastructure in order to avoid it to alter the present pathways.
- Restitution of the topographical original aspect of the land.
- Compensation of the compactation effects in other areas.
- Payment to the farmers in a proportional quantity to the piece of land used.

b) Operation and maintenance stage
- *Compañía Eólica de Tamaulipas* will elaborate an environmental surveillance plan (Plan de vigilancia ambiental) to establish control measures that will be executed. The promoter will carry out a half-yearly report to the SEMARNAT Delegation.
- Also, some requirements related to solid wastes will be fulfilled for its suitable disposal.

c) Abandonment of the site stage
- *Compañía Eólica de Tamaulipas* will notify the corresponding authority of the site abandonment with three months beforehand. For this, it will be presented, for its approbation, the set of activities of restoration, retirement and/or alternative use of project area; also, the infrastructure required for the construction of the plant will be removed and dismantled.

Compañía Eólica de Tamaulipas S.A. de C.V. will elaborate an environmental surveillance plan which will guarantee the fulfilment of all the proposed prevention, protection, control, mitigation, restoration and compensation approved measures. This plan will allow the ex-post evaluation of the of the implemented measures in order to prove their validity and the necessity of adding additional measures.

The surveillance method will be based on the selection and monitoring of some indicators, that will provide a way of measuring the achievement of the established environmental objectives. The Plan will specify procedures and activities that will be applied, and the expected time that their implementation would require.

D.2. Environmental impact assessment

The Environment Impact Assessment was approved by SEMARNAT on September 2008. According to the Environmental Impact Assessment (EIA), the project is environmentally viable.

The EL PORVENIR I wind farm project does not cause any fragmentation of any ecosystem, and neither exceed the lifting capacity of the atmosphere where it is expected to be located, since the air is the raw material used by the wind farm. Also, the project does not make any of the species to be declared as threatened nor in extinction danger. The project fits into the binding environmental regulations.

The project will not cause negative modifications in the development tendency that is still registered in the Environmental System where it will be situated and even if it will occupy some land, the affected space related to the influence area is very reduced (hardly 0.27%).

According to the MIA (Manifestación de Impacto Ambiental), the promoter will deliver a half-yearly report to SEMARNAT for its analysis and evaluation.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

This chapter describes the stakeholders that were informed about the EL PORVENIR I Project and the process followed.

In order to guarantee the right to social participation and allow the involvement of the general public in the evaluation of the Project, SEMARNAT (the Secretary of the Environment and Natural Resources or *Secretaría de Medio Ambiente y Recursos Naturales)* have made the EL PORVENIR I Project's EIA and MIA available for public scrutiny. No inquiries, complaints, comments have been received so far.

In addition, the following tables list the stakeholders contacted and presented with questionnaires during the course of this stakeholder analysis. Stakeholders were divided in three groups: (1) local land owners; (2) local government representatives; and (3) national federal government institution, research centres or NGO representatives.

Along the course of the "El Porvenir" project planning land owner's stakeholder group has been approached in numerous occasions individually and in small groups. In 27 May 2010 a participatory workshop was organized to be held in Reynosa, Tamaulipas with double purpose; first review land leasing contract details and, secondly, acknowledge of wind energy generation benefits.

Not all land owners attended the workshop (see table 16). Questionnaires were implemented to the workshop participating land owners after clarifying doubts in property leasing terms, and answers were then provided verbally. When asked about the positive implications of a wind energy generation projects outside the economic benefits from leasing their land, the participation of land owners lacked concentration on personal understanding of environmental, economic or sustainable development advantages over other types of wing energy generation.

Name	Age	Education Level
Jesús Briano Montoya	68	Elementary
Rafael López Sánchez	55	No
Celia de los Santos Castillo	54	Bachelor
José Carmen Torres Terán	65	Elementary
Omar Perales Cavazos	45	Middle School
Guillermo Vázquez Chávez	66	High School
Daniel De los Santos Zúñiga	39	Middle School
José Paz Gutiérrez Morales	45	Middle School
Miguel Ángel Avalos	51	MBA
Ramiro De los Santos Vela	75	Elementary
Gerardo Erasto De los Santos Peña	74	Elementary
Carlos Delgado De los Santos	58	Elementary

Table 15. List of Land Right Holders

The second and third set of stakeholders was contacted differently. The first step was the constitution of a list of potential stakeholders (see consultant's project proposal) as a multidisciplinary list. These representatives would have to agree in participating in the analysis. These stakeholders were contacted or approached directly on 19 and 30 April 2010, through institutional directories (telephone or email) providing a brief explanation of the importance of their opinion in the context of the "El Porvenir" project and the general concepts of wind energy generation.

Personal interviews were implemented to each of the participating stakeholder applying a questionnaire with simple but specific questions.

Entity	Position	Person
CFE (Comisión Federal de Electricidad)	Responsible for environmental and archaeological heritage of the CFE construction Bureau	M. C.Francisco Javier Hernández Álvarez
C.R.E. (Comisión Reguladora de Energía)	Commissioner	M. C. Rubén Filemón Flores García
CEJA A.C. Centro de Estudios Jurídicos y Ambientales A. C.	Director.	Lic. Salvador Muñuzuri Hernández
UNAM, Instituto de Ingeniería	Investigator	Dr. Cesar Ángeles Camacho

ITESO (Instituto Tecnológico y de Estudios Superiores de Occidente)	The academic research projects Unit Coordinator	Dr. Oscar Humberto Castro Mercado
LUPA-A (Laboratorio de Urbanismo Planeación Ambiental y Arquitectura)	Director.	Dr. Jorge Ponce
Greenpeace México A.C.	The climate and energy campaign coordinator	Lic.Gustavo Ampugnani
ITESO (Instituto Tecnológico y de Estudios Superiores de Occidente)	Social Habitat management graduate Coordinator	Dr. Alejandro Mendo Gutiérrez
UAM-I (Universidad Autónoma Metropolitana Iztapalapa)	Head of Department of process engineering	Dr. José Juan Ambriz García
SENER (Secretaría de Energía)	Deputy Director of alternative and renewable energies	Ing. Eduardo Porta Pérez Martín

Table 16. List of Stakeholders of the Entities in Research

E.2. Summary of comments received

In general, *Compañía Eólica de Tamaulipas S.A. de C.V*. has received positive opinions coming from stakeholders.

From the land right Holders (or Ejidatarios), the 100% were convinced that this initiative will bring individual and local benefits and improvements. The project is also considered a way of diversification for land use and an economic help.

The interviewed stakeholders (Gustavo Ampugnani from Greenpeace, Alexander Mendo Gutiérrez from ITESO, John Ambriz García from UAM-Joseph and Mr. Eduardo Porta Pérez Martin from SENER) manifested that they were convinced that it is important to encourage this type of projects that bring environmental benefits.

80% of respondents believe that the regulation in Mexico lacks to comply with all the requirements of renewable energy development. In opinion of researcher Cesar Angeles Camacho, from the Engineering Institute of the UNAM: “I differ on the premise that there is adequate regulation in Mexico to promote renewable energy. There are still many issues to include and others to be reformed”.

70% of respondents agree that wind power generation provides many benefits. For instance, the group agrees that economic, social, environmental and labour aspects are positive variables during the development and implementation of these projects.

Compañía Eólica de Tamaulipas S.A. de C.V. received the next comments:

- In general, the interviewed persons think that the CDM structure for carbon credits provides an important financial incentive for continuing with the implementation of clean technologies in energy.
- They believe the advantages of wind energy projects are that it is a none polluting and endless source of energy that stops the consumption of fossil fuel resources helping in reducing the negative effects of climate change. The clean electricity generated provides industrial and technological development for the country.
- In this way, Mr. Salvador Muñuzuri Hernández, Main Director at CEJA ONG said that “CEJA supports this kind of projects to promote the natural resources conservation and sustainable development with an alternative technological development”.

- On the other hand, the disadvantages mentioned related to the use of type of energy are: the social general unknowledge about it's correct way of working, the lack of national and local clean energies promotion strategies. They also pin-pointed the non constant generation of energy because of the unstable characteristics of the wind.
- They mentioned the lower rate of accidents and bird death and that the visual impact is negligible.

E.3. Consideration of comments received

According to the Environmental Authorization and the feedback that will be received from the environmental authorities, the EL PORVENIR I Project's developers will elaborate an Environmental Management Plan, which will incorporate all the proposed prevention, protection, control, mitigation, restoration and compensation measures, and the determining statements in the decision issued by SEMARNAT.

The Plan will specify procedures and activities that will be applied, and the expected time that their implementation would require. Waste management and disposal will be registered as well, and a copy will be presented to the competent entity.

Moreover, the Project developer will continue considering all received suggestions and informing landowners regularly on the progress of the Project.

SECTION F. Approval and authorization

The letters of approval from Parties that wish to be involved in the project activity are available in the CDM website. *Compañia Eólica de Tamaulipas SA de CV* is authorized.

Appendix 1. Contact information of project participants

Organization name	COMPAÑÍA EÓLICA DE TAMAULIPAS, S.A. de C.V.
Country	Mexico
Address	Bosque de Duraznos 61-9C, zip: 11700, Ciudad de Mexico, Mexico
Telephone	+52 5565990600
Fax	
E-mail	mdl.elporvenir@gemex.mx
Website	-
Contact person	Jesús Gilberto Martínez Croda

Appendix 2. Affirmation regarding public funding

N/A

Appendix 3. Applicability of methodologies and standardized baselines

- *Fuel Consumption:*

	2006			
	Fuel share	Fuel consumption (FCi,y) [TJ]	CO2 emission factor (EFCO2,i,y) [tCO2/TJ]	CO2 emission [tCO2]
Fuel oil	32.0%	514,738	75.5	38,862,689
Natural Gas	41.0%	659,508	54.3	35,811,260
Natural Gas Liquids	6.0%	96,513	58.3	5,626,725
Diesel	1.0%	16,086	72.6	1,167,811
Coal	20.0%	321,711	87.3	28,085,370
Total	100.0%			109,553,855

Table 18. Fuel consumption per fuel type during year 2006 Source: SENER, "Prospectiva del sector eléctrico 2007-2016" (page 116, graphics 40) and IPCC Guidelines 2006 (Volume 2: energy, chapter 1: introduction, table 1.4.10.[10]).

	2007			
	Fuel share	Fuel consumption	CO2 emission factor	CO2 emission

[10] http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

		(FCi,y) [TJ]	(EFCO2,i,y) [tCO2/TJ]	[tCO2]
Fuel oil	28.9%	477,531	75.5	36,053,560
Natural Gas	46.7%	771,650	54.3	41,900,583
Natural Gas Liquids	5.3%	87,575	58.3	5,105,612
Diesel	0.5%	8,262	72.6	599,805
Coal	18.5%	305,686	87.3	26,686,359
Total	99.9%			110,345,919

Table 19. Fuel consumption per fuel type during year 2007. Source: SENER, "Prospectiva del sector eléctrico 2008-2017" (page 148, graphics 39) and IPCC Guidelines 2006 (Volume 2: energy, chapter 1: introduction, table 1.4).

	2008			
	Fuel share	Fuel consumption (FCi,y) [TJ]	CO2 emission factor (EFCO2,i,y) [tCO2/TJ]	CO2 emission [tCO2]
Fuel oil	27.8%	439,241	75.5	33,162,691
Natural Gas	47.2%	745,512	54.3	40,481,322
Natural Gas Liquids	10.7%	168,995	58.3	9,852,412
Diesel	0.7%	10,402	72.6	755,221
Coal	13.7%	216,007	87.3	18,857,394
Total	100.0%			103,109,041

Table 20. Fuel consumption per fuel type during year 2008. Source: SENER, private comunication and IPCC Guidelines 2006 (Volume 2: energy, chapter 1: introduction, table 1.4).

- *Generation by sources:*

	2004	2005	2006	2007	2008	% of total generation
Exports (GWh)	236	254	227	240	255	0.12%
Imports (GWh)	8	12	9	11	11	0.01%
Net Exchange (GWh)	228	242	218	229	244	0.11%

Table 21. Electricity imports and exports. Source: SENER, "Prospectiva del sector eléctrico 2009-2024" (table 17, page 94)

Mexico energy mix	2004	2005	2006	2007	2008

Fuel-oil	31.8%	29.7%	23.1%	21.3%	18.37%
Combined Cycle	34.6%	33.5%	40.5%	44.2%	45.72%
Renewable + Hydro	15.2%	15.9%	16.5%	14.9%	19.59%
Coal	8.6%	8.4%	8.0%	7.8%	7.54%
Dual (coal + fuel oil)	3.8%	6.5%	6.2%	5.8%	2.92%
Turbogas	1.3%	0.6%	0.7%	1.1%	1.19%
Nuclear	4.4%	4.9%	4.8%	4.5%	4.16%
Diesel	0.3%	0.4%	0.4%	0.5%	0.52%
National Public Service generation (GWh)	208,634	218,971	225,079	232,552	235,871
Net generation (GWh)	190,258	199,167	205,878	211,454	215,276

Table 22. Generation by sources during years 2004 to 2008 Source: SENER, "Prospectiva del sector eléctrico 2009-2024" (table 21, page 110).

%	**2004**	**2005**	**2006**	**2007**	**2008**
Renewable + Hydro + Nuclear	19.6%	20.9%	21.3%	19.4%	23.7%
Others	80.4%	79.1%	78.7%	80.6%	76.3%

GWh	**2004**	**2005**	**2006**	**2007**	**2008**
Renewable + Hydro + Nuclear	37,255	41,585	43,815	41,022	51,117
Others	153,003	157,582	162,063	170,432	164,159
Total	190,258	199,167	205,878	211,454	215,276

Table 23. Generation by sources in % and GWh, during years 2004 to 2008. Source: SENER, "Prospectiva del sector eléctrico 2009-2024" (table 21, page 110).

According to these tables, the total percentage of low-cost/must-run generation sources (renewable, hydro and nuclear) was 19.6%, 20.9%, 21.3%, 19.4% and 23.7% in 2004 to 2008, respectively.

	2004	2005	2006	2007	2008
Net generation (GWh), excluding low cost/must run, including imports	153,011	157,594	162,072	170,443	164,170

Table 24. Net generation for non low cost/ must run generation sources including imports of electricity as one power plant.

Total fuel consumption in the years 2006, 2007 and 2008 is 1,608,555 TJ; 1,652,355 TJ and 1,580,158 TJ, respectively:

	2006			
	Fuel share	Fuel consumption (FCi,y) [TJ]	CO2 emission factor (EFCO2,i,y) [tCO2/TJ]	CO2 emission [tCO2]
Fuel oil	32.0%	514,738	75.5	38,862,689
Natural Gas	41.0%	659,508	54.3	35,811,260
Natural Gas Liquids	6.0%	96,513	58.3	5,626,725
Diesel	1.0%	16,086	72.6	1,167,811
Coal	20.0%	321,711	87.3	28,085,370
Total	100.0%			109,553,855
FCy [TJ/day]	4,407			
FCy [TJ/year]	1,608,555			
EFOM	676.0			

Table 25: Fuel consumption per fuel type in 2006. Source: SENER, “Prospectiva del sector eléctrico 2007-2016” (page 116, graphics 40) and IPCC Guidelines 2006 (Volume 2: energy, chapter 1: introduction, table 1.4).

	2007			
	Fuel share	Fuel consumption	CO2 emission factor ($EF_{CO2,i,y}$)	CO2 emission [tCO_2]

		$(FC_{i,y})$ [TJ]	[tCO2/TJ]	
Fuel oil	28.9%	477,531	75.5	36,053,560
Natural Gas	46.7%	771,650	54.3	41,900,583
Natural Gas Liquids	5.3%	87,575	58.3	5,105,612
Diesel	0.5%	8,262	72.6	599,805
Coal	18.5%	305,686	87.3	26,686,359
Total	99.9%			110,345,919
FC_y [TJ/day]	4,527			
FC_y [TJ/year]	1,652,355			
EF_{OM}	647.4			

Table 26: Fuel consumption per fuel type. Source: “Prospectiva del sector eléctrico 2008-2017” (page 148, graphics 39) and IPCC Guidelines 2006 (Volume 2: energy, chapter 1: introduction, table 1.4).

	2008			
	Fuel share	Fuel consumption (FCi,y) [TJ]	CO2 emission factor (EFCO2,i,y) [tCO2/TJ]	CO2 emission [tCO2]
Fuel oil	27.8%	439,241	75.5	33,162,691
Natural Gas	47.2%	745,512	54.3	40,481,322
Natural Gas Liquids	10.7%	168,995	58.3	9,852,412
Diesel	0.7%	10,402	72.6	755,221
Coal	13.7%	216,007	87.3	18,857,394
Total	100.0%			103,109,041
FC_y [TJ/day]	4,329			
FC_y [TJ/year]	1,580,158			
EF_{OM}	628.1			

Table 27: Fuel consumption per fuel type. Source: SENER, private communication and IPCC Guidelines 2006 (Volume 2: energy, chapter 1: introduction, table 1.4)

- ***Operating Margin***

$$EF_{grid,OM,simple,y} = \frac{\sum_m FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y}$$

Therefore:

$$EF_{grid,OM,simple,2006} = \frac{109{,}553{,}885tCO_2}{162{,}072GWh} = 676.0tCO_2/GWh$$

$$EF_{grid,OM,simple,2007} = \frac{110{,}345{,}919tCO_2}{170{,}443GWh} = 647.4tCO_2/GWh$$

$$EF_{grid,OM,simple,2008} = \frac{103{,}109{,}041tCO_2}{164{,}170GWh} = 628.1tCO_2/GWh$$

$$EF_{grid,OM,simple}(ex-ante) = 650.3\ tCO_2/GWh$$

Electricity imports are included in denominator of OM factor calculation.

- ***Build Margin:***

The factor $EF_{EL,m,y}$ for each power plant has been obtained from:

$$EF_{EL,m,,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{n_{m,y}}$$

Then, multiplying by the corresponding electric generation, and dividing by the generation sum, the Build Margin is obtained.

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} = 341.9tCO_2/GWh$$

	Power plants characteristics					Gross generation (GWh)	Self-use rate (%)	Net generation (GWh)	Accumulated net generation (%)	($\eta_{m,y}$) Efficiency (%)	$EF_{(CO2,m,i,y)}$ [tCO_2/GJ]	$EF_{(EL,m,y)}$ [tCO_2/MWh]	[tCO_2]
	Name of the power plant	Start of operation	Technology *	Fuel	Installed capacity (MW)								
Additions 2008	Humeros	07/04/2008	GEO	-	5.00	39.81	0.0%	40	0.02%	0.0%	0.00	0.00	0
	Ciudad del Carmen	01/05/2008	GT	Diesel	16.00	3.02	1.5%	3	0.02%	39.4%	0.07	0.66	1,969
	Ciudad del Carmen	01/05/2008	GT	Diesel	17.00	3.20	1.5%	3	0.02%	39.4%	0.07	0.66	2,093
Additions 2007	Vallejo (LFC)	09/08/2007	GT	Natural Gas	32.00	128.30	1.5%	126	0.08%	39.4%	0.05	0.50	62,666
	Holbox	01/07/2007	IC	Diesel	0.80	4.59	9.1%	4	0.08%	45.1%	0.07	0.58	2,417
	Holbox	01/07/2007	IC	Diesel	0.80	4.59	9.1%	4	0.08%	45.1%	0.07	0.58	2,417
	Tamazunchale (PIE)	21/06/2007	CC	Natural Gas	1,135.00	6,846.35	2.9%	6,648	3.17%	51.7%	0.05	0.38	2,515,512
	El Cajón (Leonardo Rodríguez Alcaine)	01/06/2007	HY	-	375.00	914.25	0.0%	914	3.60%	0.0%	0.00	0.00	0
	El Cajón (Leonardo Rodríguez Alcaine)	01/03/2007	HY	-	375.00	914.25	0.0%	914	4.02%	0.0%	0.00	0.00	0
	Coyotepec (LFC)	30/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.08%	39.4%	0.05	0.50	62,666
	Coyotepec (LFC)	30/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.14%	39.4%	0.05	0.50	62,666
	Cuautitlán (LFC)	30/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.20%	39.4%	0.05	0.50	62,666
	Villa de las Flores (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.26%	39.4%	0.05	0.50	62,666
	Victoria (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.31%	39.4%	0.05	0.50	62,666
	Remedios (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.37%	39.4%	0.05	0.50	62,666
	Ecatepec (LFC)	04/01/2007	GT	Natural Gas	32.00	128.30	1.5%	126	4.43%	39.4%	0.05	0.50	62,666
Additions 2006	Atenco (LFC)	2006	GT	Natural Gas	32.00	96.60	1.5%	95	4.48%	39.4%	0.05	0.50	47,184
	Chihuahua II (El Encino)	2006	CC	Natural Gas	65.30	506.77	2.9%	492	4.71%	51.7%	0.05	0.38	186,198
	Altamira V (PIE)	2006	CC	Natural Gas	1,121.00	8,699.61	2.9%	8,447	8.63%	51.7%	0.05	0.38	3,196,443
	Tuxpan V (PIE)	2006	CC	Natural Gas	495.00	3,841.49	2.9%	3,730	10.36%	51.7%	0.05	0.38	1,411,454
	Valladolid III (PIE)	2006	CC	Natural Gas	525.00	4,074.31	2.9%	3,956	12.20%	51.7%	0.05	0.38	1,496,996
Additions 2005	Hermosillo	2005	CC	Natural Gas	93.30	675.72	2.9%	656	12.50%	51.7%	0.05	0.38	248,276
	Ixtaczoquitlan	2005	HY	-	1.60	12.15	0.0%	12	12.51%	0.0%	0.00	0.00	0
	Yecora	2005	IC	Diesel	0.70	4.05	9.1%	4	12.51%	45.1%	0.07	0.58	2,134
	Botello	2005	HY	-	9.00	68.37	0.0%	68	12.54%	0.0%	0.00	0.00	0
	Rio Bravo IV PIE	2005	CC	Natural Gas	500.00	3,621.23	2.9%	3,516	14.18%	51.7%	0.05	0.38	1,330,525
	La Laguna II PIE	2005	CC	Natural Gas	498.00	3,606.74	2.9%	3,502	15.80%	51.7%	0.05	0.38	1,325,202
	Holbox	2005	IC	Diesel	0.80	4.63	9.1%	4	15.81%	45.1%	0.07	0.58	2,439
Additions 2004	El Sauz	2004	CC	Natural Gas	128.00	494.25	2.9%	480	16.03%	51.7%	0.05	0.38	181,599
	Tuxpan (Pdte. Adolfo López Mateos)	2004	GT	Natural Gas	163.00	239.06	1.5%	235	16.14%	39.4%	0.05	0.50	116,767
	San Lorenzo Potencia	2004	GT	Natural Gas	266.00	390.11	1.5%	384	16.32%	39.4%	0.05	0.50	190,552
	Rio Bravo III PIE	2004	CC	Natural Gas	495.00	1,911.36	2.9%	1,856	17.18%	51.7%	0.05	0.38	702,279
	Chicoasén (Manuel Moreno Torres)	2004	HY	-	900.00	2,799.16	0.0%	2,799	18.48%	0.0%	0.00	0.00	0
Additions 2003	Transalta Campeche	2003	CC	Natural Gas	252.00	1,787.00	2.9%	1,735	19.28%	51.7%	0.05	0.38	656,586
	Naco Nogales	2003	CC	Natural Gas	258.00	2,090.00	2.9%	2,029	20.23%	51.7%	0.05	0.38	767,916
								43,544.52					14,888,287.69

NOTE:
*Technology (CC: Combined Cycle; HY: Hydro; GT: Gas Turbine; IC: Internal Combustion; TH: Thermal, Simple Cycle)

Table 28. Emission factors calculation results for each considered generation plant, at the newest power plants covering 20% of the system generation from 2008 backwards. Source: SENER, “Prospectiva del sector eléctrico 2009-2024”, “Prospectiva del sector eléctrico 2008-2017”, “Prospectiva del sector eléctrico 2007-2016”, “Prospectiva del sector eléctrico 2006-2015” , “Prospectiva del sector eléctrico 2005-2014” and “Prospectiva del sector eléctrico 2004-2013”, as well as private communications with CFE.

Data for “Efficiency” have been obtained from SENER “Prospectiva del sector eléctrico 2009-2024” (table 47, page 159). There, most conservative data given by technology have been chosen.

The Build Margin is considered to remain constant during the crediting period due to Combined Cycle forecast installation.

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

- *Emission Factor:*

Therefore, the emission factor is calculated as follows:

	September 2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**August 2020**
Emission factor [tCO_2/GWh]	573.22	573.22	573.22	573.22	573.22	573.22	573.22	573.22
Annual generation [GWh]	51.38	154.15	154.15	154.15	154.15	154.15	154.15	102.77
Emission reductions [tCO_2]	*29,454*	*88,362*	*88,362*	*88,362*	*88,362*	*88,362*	*88,362*	*58,908*
Total accumulative reductions (tCO_2)	29,454	117,816	206,176	294,540	382,902	471,264	559,626	618,534

Table 29. Emission reductions estimations

Total cumulative reductions in for first crediting period will be: 618,534 tCO_2.

Appendix 5. Further background information on monitoring plan

A. Measuring and calculation procedure.

1. Measuring

The whole installation will be monitored (turbines, substation, etc.). The measurements obtained are later consolidated in a monthly report.

2. Calculation of electricity generation to be monitored:

$EG_y = G - L$, where:
EG_y: Electricity generation data measured at the substation.
G: Generation of electricity by the project activity.
L: Total transmission losses until the monitoring point.

Measurement and control:

EL PORVENIR I Wind Farm measurement control		
Year:		
A	**B**	**C**
Month	**Electricity generation data measured (GWh)**	**Data validation. Comparison between the measurements and the bill**
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual total		

If some error would be detected, an internal audit will be carried out to verify the data in accordance to the Corrective and Preventive Actions.

The validated data will be registered in this form:

EL PORVENIR I Wind Farm measurement control	
Year:	
Month	**Monthly Generation (GWh)**
January	
February	
March	
April	
May	
June	
July	
August	
September	
October	
November	

December	
Annual total	

Calculation of emission reductions:

EL PORVENIR I Wind Farm measurement control		
Year:		
A	**B**	**C**
Annual validated generation (GWh)	**Emission factor ex-ante (tCO_2/GWh)**	**Emission reductions (tCO_2)**
A	B	A*B

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

1. Monitoring equipment

1.1. Monitoring equipment shall be set up under the "Mexican Law".
1.2. Monitoring equipment shall be authorized through a certificated formal process.
1.3. After set up monitoring equipment shall be calibrated and checked periodically by CFE for accuracy.

2. Monitoring of amount of electricity.

2.1. The amount of electricity transmitted to the grid shall be measured automatically by the established equipment. The measured variables are simultaneously transferred to EL PORVENIR I central control system.
2.2. The measured amount of electricity shall be collected daily, weekly, and monthly and shall be archived in electronic way.
2.3. The collected variables in article 2.2. shall be checked with the energy bill (just in order to have a reference).

3. *Corrective and preventive actions:*

3.1. If the two variables compared in article 2.3. are different, the operation condition of electricity meters and other equipment's shall be examined. In case measurements are improperly operated by the monitoring equipment, internal investigation and correction procedure shall be followed.
3.2. Corrective and preventive actions will be properly documented.

4. Internal audit procedure:

4.1. The Manager of the Operation Department is responsible of the elaboration and execution of the internal audit.
4.2. Internal audit has the purpose of determining if the Monitoring Plan is being properly documented as well as identify any deficiency, disagreement o deviation, providing the application of corrective and preventive actions.
4.3. Internal audit will be implemented at least once per year.

Appendix 6. Summary report of comments received from local stakeholders

N/A

Appendix 7. Summary of post-registration changes

The project applies the following post registration changes:

1. Corrections

The project transmission line has been updated from 12 km long 138 kV to 13.9 km long 138 kV.

2. Change in the project design:

Project is proposing a permanent change to the project design, in accordance to the CDM project standard for project activities, version 03.0, section 8.3.5, due to "the addition of new component that introduces a more advanced version of the same technologies". The change will not modify the installed capacity of the project. The project has decided to install 30 Vestas V100 - 1.8 MW wind turbine generators instead of the original 27 Vestas V100 - 2 MW wind turbine generators.

Wind turbine locations have been updated to the following:

WTG	UTM East (m)	UTM North (m)
501	579316	2867755
502	579542	2867967
503	580441	2867967
504	580636	2868236
401	579321	2866968
402	579626	2867043
403	579909	2867160
404	580213	2867230
405	581223	2867497
301	579439	2866324
302	579782	2866319
303	580080	2866405
304	580378	2866490
305	580718	2866494
306	580955	2866685
307	581572	2866720
201	579330	2865235
202	579527	2865554
203	579851	2865611
204	580193	2865612
205	580505	2865694
206	580791	2865805
207	581484	2866104
208	581846	2866060

101	579355	2864415
102	579641	2864524
103	579949	2864596
104	580208	2864744
105	580496	2864854
106	580778	2864981

All other technical specifications remain constant.

The project participant shall report in the revised PDD the impacts of the proposed or actual changes to the registered CDM project activity on the following:

a) The applicability and application of the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents with which the project activity has been registered;
b) The project boundary and any implications on the inclusion or exclusion of emissions sources and leakage emissions;
c) The compliance of the monitoring plan with the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents;
d) The level of accuracy and completeness in the monitoring of the project activity compared with the requirements contained in the registered monitoring plan;
e) The additionality of the project activity;
f) The scale of the project activity.

The addition of new components does not affect any of the above. The applicability and application of the applied methodologies, the applied standardized baselines and the other applied methodological regulatory documents remains. The monitoring plan has not been modified and continues to be in compliance with the applied methodologies and standardized baselines. The requirements contained in the registered monitoring plan remain the same since it was not updated or modified.

In accordance to the CDM project standard for project activities, version 03.0, section 8.3.5, p 243 “If the proposed or actual changes affect the additionality of the registered CDM project activity [as referred to in paragraph 242(e)], the demonstration of the impacts of the changes on the additionality shall be based on all original input data. In addition, if investment analysis was used, the project participants shall only modify the key parameters in the original spreadsheet calculations affected by the proposed or actual changes to the project activity.”

The investment parameter has been modified. The project continues to comply with the “Tool for the demonstration and assessment of additionality, (version 0.6.0.0) and “Guidelines on the Assessment of Investment Analysis” (version 05).

The scale of the project activity does not change as it is still a large-scale project.

3. Change in the start date of the crediting period:

The start date of the crediting period was changed from 01/09/2013 to 22/02/2014 due to project start delays. Since the change was notified within one year, the project participant was not required to prepare a revised PDD.

The change has been approved by the Board and is available on the project view page. The notification date is not available.

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Document information

Version	*Date*	*Description*
12.0	8 October 2021	Revision to: Improve consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the “CDM project standard for project activities” and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the “CDM project standard for project activities” (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the “Project design document form for small-scale CDM project activities” (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revision to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Make editorial improvement.

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