Project design document form

(Version 11.0)

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

BASIC INFORMATION	
Title of the project activity	Coega IDZ Windfarm
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the PDD	18
Completion date of the PDD	08/07/2021
Project participants	Electrawinds Africa and Indian Ocean Islands (Pty) Ltd CO2logic Electrawinds NV
Host Party	South Africa
Applied methodologies and standardized baselines	ACM0002: "*Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources",* Version 20.0 ASB0040-2018 Standardized baseline: Grid emission factor for Southern African Power Pool, version 1.
Sectoral scopes	1: Energy industries (renewable/ non-renewable sources)
Estimated amount of annual average GHG emission reductions	5,429 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Description of project

The project will see Electrawinds Africa and Indian Ocean Islands (Pty) Ltd install a wind turbine with a capacity of 1.8 MW.

Electricity generation will occur in phases. Phase 1 entails a 1.8 MW turbine. The installed 1.8 MW turbine is the only turbine commissioned during the first crediting period.

The electricity of the 1.8 MW is purchased by PowerX[1], an electricity trader, which on-sells the electricity to third parties through the grid. The Renewable Energy Certificates are purchased by BHP Billiton. The full project construction stretches over several months, with a first turbine of 1.8 MW erected in October 2010.

Phase 2 entails construction of further turbine/s, which may become operational in the second crediting period. The second crediting period starts on 1 August 2020. The addition of the further turbine/s may be included in the PDD during the second crediting period, using the process for applying for post registration changes.

Purpose

The purpose of the project is to use the winds kinetic energy to generate electrical power in South Africa. The renewable energy project will help reduce GHG emissions versus the high growth, coal- dominated business-as-usual energy production scenario.

The Coega IDZ is South Africa's premier location for new industrial investments. The CDC aims to provide a competitive investment location and a total business solution for its customers as well as ensuring sustainable economic development in the region. This project will establish Coega first commercial private wind farm. The project will demonstrate tangible progress towards the development of renewable energy sources in the Eastern Cape.

Technology

Considering the wind potential, the average wind speed, the wind frequency, the wind direction, the environmental aspects, and the topography of the surrounding land the project participant engineers selected a V90-1.8 turbine technology.

Project boundary

The project boundary is inclusive of wind turbines and the electricity metering system associated with the respective turbines.

Baseline scenario

The electricity generated from the wind farm will displace grid-based electricity. The South African electricity grid is emissions intensive (approximately 91% of electricity is generated in thermal power stations[2]). The reduction in electricity consumed from the grid will result in a reduction in greenhouse gas emissions, as well as the negative impacts associated with coal mining.

Emission Reductions from anthropogenic sources

[1] Formerly known as Amatola Green Power. The company was rebranded PowerX in 2016 (http://www.powerx.energy/who-we-are-history.html).

[2] https://www.usaid.gov/powerafrica/south-africa.

The project will displace the electricity generated from thermal power stations feeding into the region. The zero Greenhouse Gas emissions related to the power production from wind will help abate anthropogenic GHG emissions generated by fossil fuel based thermal power stations. The project will help reduce 38,003 tonnes of CO_2e over the chosen 7 years in the second crediting period as well as SO_2 and NO_X emissions. Additionally, the project will improve air quality and local livelihoods, promote sustainable renewable energy industry development.

A.2. Location of project activity

The Project wind park is located in the Coega Industrial Development Zone near Port Elizabeth in South Africa. The Coega Industrial Development Zone is 1km north of Joost Park and approximately 3km to the east of Motherwell. When driving along the M2 from Port Elizabeth towards the Colcheser the project can be found approximately 800m to the East of junction 764.

Figure 1

Figure 2 (Source: Google Earth)

Figure 3 and 4 illustrate the location.

Figure 3 (Source: Google Earth)

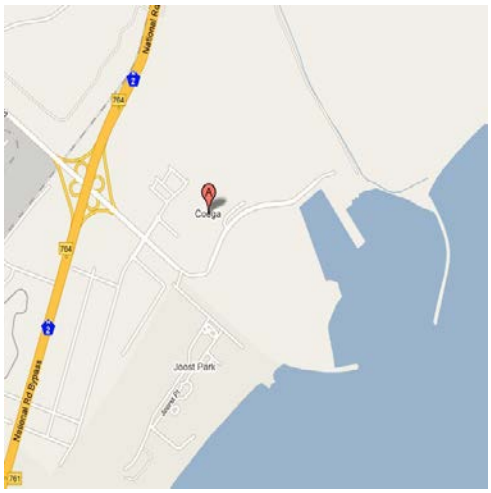


Figure 4 (Source: Google Earth)

The exact Project location for the installed turbine at the start of the second crediting period is:

No.	Y (m)	Y_Longitude_d	X (m)	X_Latitude_dms
WTG1	-62 680,00	25.80985	3 736 580,00	-33.75399

A.3. Technologies/measures

One turbine was installed at the start of the second crediting period: a 1.8 MW Vestas V90 turbine. The rotor of the V90-1.8 turbine is a three-blade construction, mounted upwind of the tower. The revolutionary blades are made from carbon fiber and other lightweight materials. The V90-1.8 MW is equipped with VCUS™ (Vestas Converter Unity System), which ensures a constant and consistent output to the grid. Along with the turbine's pitch control, VCUS™ also ensures energy optimization, low-noise operation and reduced load on the gearbox and other key components. Other VCUS™ advantages include effective fault ride through and complete variable speed capability. The turbine is designed for safe and convenient maintenance.

The average lifetime of a turbine is expected to be 20-25 years[3]. The monitoring equipment in the project boundary comprises a primary and a secondary electricity meter and controllers which are located within the substation for the turbine. The electricity meters are owned and maintained by the Nelson Mandela Bay Municipality and measure incoming and outgoing electricity. The primary meter is used for invoicing purposes. The meter will be calibrated as per the manufacturer's specifications or failing specifications, calibrated as per the national standard. The raw data obtained from the primary electricity meter is logged and recorded on the Municipality's SILK system. This system is operated and controlled by the Nelson Mandela Bay Municipality and thus the project participants extract this raw data for billing purposes from the online system.

The project is a new Greenfield renewable plant and is not a capacity addition, retrofit or replacement to an existing plant. Hence, there were no electricity generation technologies/ measures existing prior to the implementation of the project activity at the same site.

The baseline scenario of this wind turbine power plant is the South African National Electricity Grid, which is primarily run off coal-based electricity. Thus, the renewable energy generated by the wind power plant provides alternative electricity generation source to the fossil-fuel intensive electricity that would have been used instead.

A.4. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
South-Africa (host)	Electrawinds Africa and Indian Ocean Islands (Pty) Ltd	No
Belgium	CO2logic	No
Belgium	Electrawinds NV	No

A.5. Public funding of project activity

There is no public funding from an annex 1 country involved in the project activity.

[3] https://www.twi-global.com/technical-knowledge/faqs/how-long-do-wind-turbines-last

A.6. History of project activity

The Coega Wind Farm project activity is neither registered as another CDM project activity nor included as a component project activity in a registered CDM programme of activities. Additionally, the proposed CDM project activity is not a project activity that has been deregistered.

A.7. Debundling

Not applicable.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines

As per the paragraph 279 (a) of the CDM project standard for project activities, Version 02.0, the PDD references valid version of the methodologies and methodological tools applied in the registered PDD, that is, the latest version at the time of the submission of the request for renewal of crediting period.

The large-scale methodology ACM0002: "Grid-connected electricity generation from renewable sources", Version 20.0[4], has been employed in the project activity in the second crediting period.

Furthermore, the project makes use of the following tools in the second crediting period, which are referenced in ACM0002, Version 20.0:

- TOOL05 "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)[5].
- TOOL11 "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 03.0.1)[6].

ACM0002 version 20.0 also references other tools. However these are not relevant for the project activity in its second crediting period. Paragraph 279 of the CDM project standard for project activities, Version 02.0, requires that the revised PDD entail updates to the sections of the PDD relating to the baseline, estimated greenhouse gas emission reductions or net anthropogenic greenhouse gas removals, the monitoring plan and the crediting period. Hence, tools related to assessing additionality and the baseline scenario are not required in the revised PDD for the second crediting period.

The PDD does however utilise the following standardized baseline in the second crediting period.

- Standardized Baseline: Grid emission factor for the Southern Africa power pool (ASB0040-2018, Version 01.0).

All tools and the methodology referenced throughout the PDD refer to the corresponding version number stated in this section of the PDD for each tool and methodology.

B.2. Applicability of methodologies and standardized baselines

The project meets the applicability conditions of the selected methodology, standardized baseline and tools as demonstrated in the following tables.

[4] Available at: https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG.

[5] Available at: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf.

[6] Available at: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf.

Table 1: Applicability as per ACM0002

	Applicability Criteria	Applicability to Project
1.	As per paragraph 3 of ACM0002: This methodology is applicable to grid-connected renewable energy power generation project activities that: a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plants/units; d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) (e) Involve a replacement of (an) existing plant(s)/unit(s).	The project complies because it: a) Is a new grid-connected, Greenfield renewable plant; b) Does not involve a capacity addition to an existing plant; c) Does not involve a retrofit of an existing operating plants/units; d) Does not involve a rehabilitation of (an) existing plant(s)/unit(s); e) Does not involve a replacement of (an) existing plant(s)/unit(s).
2.	As per paragraph 4 of ACM0002: The methodology is applicable under the following conditions: a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The project: a) Is a wind power plant and hence complies; b) Not applicable: the project is a new Greenfield renewable plant and is not a capacity addition, retrofit or replacement to an existing plant.
3.	As per paragraph 5 of ACM0002: In case of hydro power plants, one of the following conditions shall apply: a) The project activity is implemented in existing single or multiple	Not applicable: the project is a new Greenfield renewable plant and is not a hydro power plant.

	reservoirs, with no change in the volume of any of the reservoirs; or b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 W/m2; or c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m2; or d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
4.	As per paragraph 6 of ACM0002: In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation	Not applicable: the project is a new Greenfield renewable plant and is not a hydro power plant.

	capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity.	
5.	As per paragraph 7 of ACM0002: The methodology is not applicable to: a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; b) Biomass fired power plants/units.	Not applicable: the project is a new Greenfield renewable plant and does not involve a fuel switch or biomass fired power plants/units.
6.	As per paragraph 8 of ACM0002: In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	Not applicable: the project is a new Greenfield renewable plant.
7.	As per paragraph 8 of ACM0002: In addition, the applicability conditions included in the tools referred to below apply.	The applicability conditions of the tools that are relevant in the second crediting period are discussed in the following tables.

Table 2: Applicability as per TOOL05

	Applicability Criteria	**Applicability to Project**
1.	As per paragraph 5 of TOOL05: The tool is only applicable if one out of the following three scenarios applies to the	The project complies with Scenario A: electricity is purchased from the grid only, and no captive power plant(s)

	sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	is/are installed at the site of electricity consumption.
2.	As per paragraph 6 of TOOL05: This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	The project complies with Scenario 1: all generated electricity is supplied to the grid.
3.	As per paragraph 7: This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the	The project complies with this criterion: There are no captive renewable power generation technologies installed to provide electricity in the project activity in the baseline scenario or to sources

	baseline scenario or to sources of leakage. The tool only accounts for CO2 emissions.	of leakage. Only CO2 emissions are accounted for.

Table 3: Applicability as per TOOL11

	Applicability Criteria	**Applicability to Project**
1.	As per section I of: This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.	The project activity complies with the applicability criteria of this tool. The steps to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period have been undertaken in section B.4 of this PDD.

Table 4: Applicability as per ASB0040-2018

	Applicability Criteria	**Applicability to Project**
1.	As per paragraph 3 of ASB0040-2018: Clean development mechanism (CDM) project activities and programmes of activities (hereinafter referred as project activities) can apply this standardized baseline under the following conditions: (a) The project activity is implemented in any one of following countries, which are the SAPP member countries, and is connected to the SAPP; (i) Republic of Botswana; (ii) Democratic Republic of Congo; (iii) Kingdom of Lesotho; (iv) Republic of Mozambique; (v) Republic of Namibia; (vi) Republic of South Africa; (vii) Kingdom of Swaziland; (viii) Republic of Zambia, and (ix) Republic of Zimbabwe. (b) The CDM approved methodology that is applied to the project activity requires the determination of CO2 emission factor(s) through the application of the	The project complies with these criteria: (a) The project activity is located in South Africa. (b) The project activity requires the determination of CO2 emission factor(s) through the application of the grid tool. (c) The project activity uses the ex-ante options for both the operating margin and build margin grid emissions factors, as described in the grid tool, and therefore no monitoring or recalculation of the emission factor during the crediting period is required.

	grid tool; (c) The project activity uses the ex-ante options for both the operating margin and build margin grid emissions factors, as described in the grid tool, and therefore no monitoring or recalculation of the emission factor during the crediting period is required.	
2.	As per paragraph 4 of ASB0040-2018: The latest approved and valid values of this standardized baseline are the only values of the CO2 emission factor(s) that shall be applied for the project electricity system in the SAPP member countries listed under sub-para 3(a) above.	The project complies with this criterion. The valid values of ASB0040 are the only values of the CO2 emission factor that shall be applied for the project electricity system in the listed SAPP member countries.

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

The proposed project is the installation of a new grid-connected renewable power plant, and the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources

The project boundary also includes the Southern African Power Pool's electricity system – which comprises the power plants that are physically connected through transmission and distribution lines to supply electricity to the interconnected electricity system of the Southern African Power Pool.

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

	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
		CH_4	No	Minor Emission source
		N_2O	No	Minor Emission source
Project activity	For dry or flash steam geothermal power plants, emissions of CH_4 and CO_2 from noncondensable gases contained in geothermal steam	CO_2	No	Not applicable to wind
		CH_4	No	Not applicable to wind
		N_2O	No	Not applicable to wind
	For binary geothermal power plants, fugitive emissions of CH_4 and CO_2 from noncondensable gases contained in geothermal steam	CO_2	No	Not applicable to wind
		CH_4	No	Not applicable to wind
		N_2O	No	Not applicable to wind
	For binary geothermal power plants, fugitive emissions of hydrocarbons such as n-butane and isopentane (working fluid) contained in the heat exchangers	Low GWP hydrocarbon/ refrigerant	No	Not applicable to wind
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable to wind
		CH_4	No	Not applicable to wind
		N_2O	No	Not applicable to wind
	For hydro power plants, emissions of CH_4 from the reservoir	CO_2	No	Not applicable to wind
		CH_4	No	Not applicable to wind
		N_2O	No	Not applicable to wind

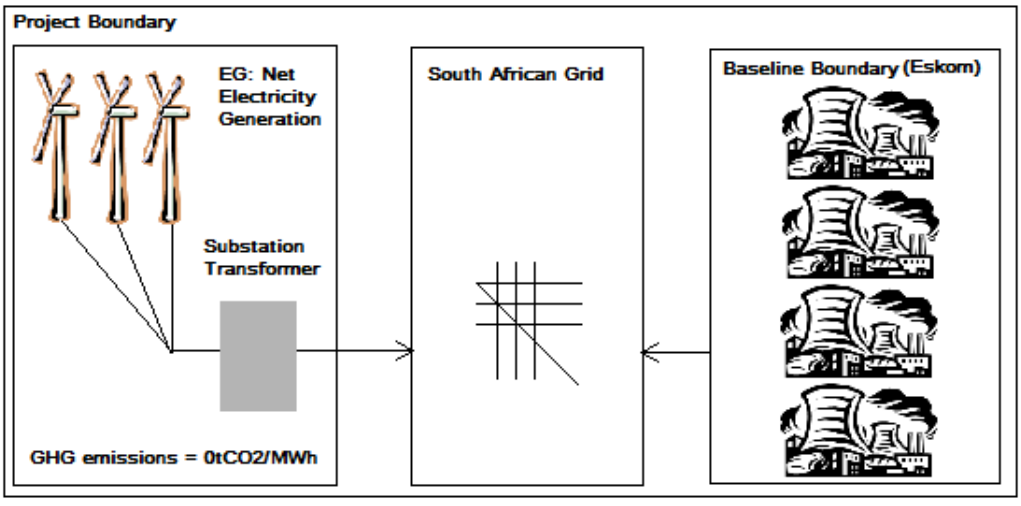


Figure 5

B.4. Establishment and description of baseline scenario

As the project is in its second crediting period, the following steps of the methodological TOOL11, "*Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period*" version 03.0.1, are applied to evaluate whether the baseline at project registration is still valid and to update the baseline in the case that the current baseline is not valid anymore.

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

The validity of the current baseline is assessed using the sub-steps 1.1 – 1.4 of TOOL11:

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

Paragraph 284 of the CDM Project Standard for project activities version 02.0 requires that:

“The project participants shall assess and incorporate the impact of national and/or sectoral policies and circumstances, existing at the time of requesting the renewal of the crediting period, on the current baseline GHG emissions, without reassessing the baseline scenario.”

However, the project activity uses the mandatory standardized baseline: ASB0040-2018 version 1. Therefore, an assessment as per paragraph 284 of the CDM Project Standard, version 2, is not required. This is aligned with paragraph 285 CDM Project Standard for project activities version 02.0 which states that:

“The requirements contained in paragraph 284 above are not applicable to a registered CDM project activity applying the valid version of an applicable approved standardized baseline that standardizes baseline scenario in accordance with paragraph 281 above.”

Therefore, the baseline scenario, as per the PDD at registration, is the generation of electricity in existing grid-connected power plants. There was no project power generation in the baseline which requires the continued use of existing and/or new grid-connected power plants for all municipal power supply. **This is effectively the continuation of the status quo**.

Therefore step 1.2 of TOOL11 is applied as follows.

- Step 1.2: Assess the impact of circumstances

The step entails an assessment of the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario. The baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. Therefore, an assessment of the changes in market characteristics is undertaken. This assessment evaluates whether the conditions used to determine the baseline emissions in the previous crediting period are still valid.

One condition has changed with respect to the baseline emissions relating to the displacement of grid electricity, which is the use of the mandatory grid emission factor (ASB0040-2018).

Step 1.3 of TOOL11 is not applicable, as the project is a greenfield project and did not entail the continued use of retrofitted equipment.

Therefore step 1.4 of TOOL11 is applied as follows.

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

As determined in Step 1.2 above, one condition used to calculate the baseline emissions has changed. The grid emission factor applied in the previous crediting period was the calculated figure of 0.9099 tCO_2/MWh. In the second crediting period, the mandatory grid emission factor of 0.9871 tCO_2/MWh prescribed by ASB0040-2018, version 1, has been applied.

The outcome of Step 1.4 indicates that the current baseline needs to be updated with the conditions that have changed since the registration of the project.

Step 2 of TOOL11, is therefore applied.

- Step 2.1: Update the current baseline

The current baseline emissions for the second crediting period have been updated, as reflected in the following section B.6.

- Step 2.2: Update the data and parameters

The parameter relating to the grid emission factor has been updated accordingly in the following section B.6.

B.5. Demonstration of additionality

CDM consideration

As defined by the EB41 annex 46 guidelines, the project participant informed the Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of the intention to seek CDM status for the project. As the starting date of the project activity is after 02 August 2008 this notification was made within six months of the project activity start date.

Please see the timeline here below:

Time	Milestones
06/11/2009	*Agreement signed with consultant to investigate potential for CDM revenues to support the project and to develop necessary calculations and documentation.*
07/12/2009	*Board Meeting confirming necessity to seek CER for the project to go forward*
22/12/2009	*Financial Parties contacted to get quotes for CER (ERPA proposals were made to Electrawinds/CO2logic) so as to gauge the CER revenue potential for the proposed project.*
09/02/2010	*The date when the project investment decision was finally taken.*
26/02/2010	*Prior Consideration sent to the South African DNA*
26/02/2010	*Prior Consideration to the UNFCCC secretariat*
04/03/2010	*Contact made with DOE for cost estimate for project validation*
11/03/2010	*Project Start Date*
01/06/2010	*First wind turbine connected to the grid Commercial production started*

As advised in Version 12.3.0 of ACM0002 we used the most recent version (5.2) of “Tool for demonstration and assessment of additionality” to show that the project is additional as seen below.

STEP 1. Identification of alternatives to the project activity consistent with mandatory laws and regulations

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

Paragraph 4 of version 6 of the additionality tool states: “Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity.”

We will consider two realistic and credible alternatives available to the project participant or to any similar project developer which would provide a comparable output to the proposed CDM project:

1. The proposed project activity undertaken without being registered as a CDM project activity.
2. Continuation of the current situation where Eskom provides the electricity.

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

All the alternatives are compliant with applicable laws and regulations.

All the above alternatives are consistent with mandatory and regulatory requirements. Because the alternatives identified are in compliance with all applicable laws and regulations and are also realistic and credible alternatives available to the project participants, the project is additional under step 1

Step 2: Investment analysis

This step will determine whether the proposed project is economically or financially less attractive than other alternatives without the revenue from the sale of CERs. The investment analysis is conducted in the following steps:

Sub-step 2a: Determine appropriate analysis method

As decided at the Thirty-ninth meeting of the Meth Panel (Annex 12) the investment benchmark analysis was set up so that, for example, a wind power company that constructs wind power plant and not coal power generation facilities can prove the additionality of this project. Most of the power produced in South Africa by Eskom who produce nearly all of the electricity, is coal powered. In this projects case the coal power plant is not a realistic individual baseline scenario option to the project proponent. In this case, it is clear that the baseline cannot be determined with a high degree of certainty and a proxy (the combined margin) for the baseline will be used for the calculations. Thus the economic attractiveness of investing in the wind farm has to compared with the project participant’s acceptable financial benchmark for this investment.

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

In the calculations below we have determined the additionality of this project by comparing the Project to benchmark rates of return available to investors in the Host Country.

According to the “Tool for the demonstration and assessment of additionality”, a relevant benchmark for a project’s IRR can be derived from government bond rates increased by a suitable risk premium (to reflect private investment and / or project type).

$$R_e = R_f + \beta(R_m - R_f)$$

Where:

R_e Cost of equity for electricity generation project type
R_f Risk free rate
R_m Market return
β Beta electricity generation project type (CAPM)
$R_m - R_f$ Market risk premium

Three sources have been used to establish a suitable benchmark these sources were measured from early 2010 as this is when the project investment decision was taken and thus is considered as relevant for comparison.

According to a database from Bloomberg, an acknowledged specialist in providing financial data and investment information, the ten year risk free rate (YTM 10yr South Africa government bond) for South Africa is 6.57%.

For the expected market returns in South Africa we have used the average equity market return from the Johannesburg All-Share Index (JALSH) over the last ten most recent years 2000-2010. A compounded after tax return of 13.91% was obtained. The equity/country premium can be determined as the difference between the market return and the risk free rate i.e. 13.91%-6.57%= 7.34%. As an after tax compounded rate was used and due to the fact that the CAPM gives an after corporation tax but prior to personal tax return, this benchmark is solely comparable to an after corporate tax but prior to personal tax equity IRR[7].

To calculate the systematic risk and obtain the beta coefficient we used the Wilderhill Index was the first clean renewable energy index. A beta value of 1.642 was obtained. However so as to remain very conservative we have used a Beta of "1" in the calculation below.

The Equity Return Benchmark can therefore as explained above be established as:

$$R_e = 6.57\% + 1(13.91\% - 6.57\%)$$
$$R_e = 13.91\%$$

Thus it can be said that an Equity Return benchmark for renewable energy projects in South Africa can be considered as 13.91%. The general stock market rate was used for the equity risk premium it could even be said that this is a very conservative estimation as private investments in the renewable energy sector in South Africa are considerably more risky than the world average.

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

This step will determine whether the proposed project is the economically or financially less attractive than other alternatives without the revenue from the sale of CERs.

The assumptions and data used for the calculations in the IRR

Input/Assumption	Value	Comment
Electricity Price (ZAR/kWh)	0.9620 for the first test 1.8 MW turbine	National Energy Regulator of South Africa (NERSA) on the 26th of March 2009 concerning the Renewable Energy Feed-In Tariff (REFIT)

[7] http://www.nersa.org.za/Admin/Document/Editor/file/PetroleumPipelines/Consultations/Documents/Frontier%20report%20as%20per%20Transnet's%20%20201112%20petroleum%20pipeline%20tariff%20application.pdf

Annual Increase in Electricity Tariff (%/year)	6%	Inflation
Depreciation	15	Years
Exchange Rate	9.8562	18/05/2011 ZAR/EUR
Corporate Tax	28	%
Price per CER	13	EUR
Total Investment cost for Power	38,809,535	ZAR
Total M&O costs	809,677	ZAR

The following is a list of key input parameters considered in the revised investment analysis. They reflect on the changes, if any, from the PDD version 14, that was validated at registration.

Energy yield
PDD, version 14: The electricity yield from 25 turbines, total capacity of 73.8 MW, was expected to be 141.7 GWh/year. The electricity yield from the first 1.8 MW turbine was expected to be 4 GWh/year.

Revised PDD: Only considers the 1.8 MW turbine due to change in project design. Historical meter records indicate that the 1.8 MW turbine has been able to achieve between 5.1 – 5.9 GWh/year during actual operations. A value of 5.5 GWh/year has been utilised in the revised project design document and financial investment analysis. This is considered a conservative approach to proving the additionality of the revised project design because a higher annual yield will produce a higher IRR value.

Investment cost
PDD, version 14: the investment cost for 25 turbines, of a total capacity of 73.8 MW, was expected to be ZAR 1,369,065,883.

Revised PDD: Only considers the 1.8 MW turbine due to change in project design. The investment cost has been revised to reflect the actual costs of the 1.8 MW turbine plant and machinery, civils, IT equipment and motor vehicles, coming to a total of ZAR 38,809,535, as recorded in the independently audited Electrawinds' 2011 Annual Financial Statements, page 16 (Notes to the Annual Financial Statements). The estimated cost for T1, the 1.8 MW turbine, envisaged at registration was ZAR 33,653,963. This was the cost for the turbine only, excluding civils works, other plant, grid connection, other equipment, contingencies. The revised value is marginally higher than the value in the ex ante model. This is because the revised value includes the costs for civils, electrical work and other plant equipment.

Furthermore, the Electrawinds AFS 2011 also notes the provision for additional capex in the form on intangible assets to the value of ZAR 6,487,960 (page 13. As per note 1.3 to the AFS, page 13). The intangible assets comprise development and research costs, including various permits, that were capitalized. However, to be conservative, the cost of intangible assets was not included in the final net investment cost and therefore not included in the IRR assessment. A higher capex cost would lead to a lower IRR value.

Operational cost
PDD, version 14: The operational costs were collectively assessed to amount to ZAR 38,993,257 /year in the first year of operation, in preparation for the expected commissioning of 25 turbines, of a total capacity of 73.8 MW. The annual cost maintenance cost of the turbines was assumed to escalate at 7% higher than the indexation of revenues, to model margin erosion over time.

Revised PDD: Only considers the 1.8 MW turbine due to change in project design. The operational cost was proportionately reduced to reflect the envisaged operational costs in the first year of

operation for the 1.8 MW turbine: ZAR 809,677. The escalation rate of 7% maintenance cost of the turbines was left unchanged.

The revised total operating cost of ZAR 809,677, which is used in the IRR assessment, is conservative when compared to the actual ZAR operating expenses contained in the Electrawinds AFS 2011, page 22 (Detailed Income Statement) of ZAR 3,094,223.

Financing

PDD, version 14: Depreciation was calculated over 15 years and the project was considered to have 0 value at the end of its operational life. The fixed interest on senior debt was conservatively calculated based on the term sheet submitted and set at 13.5%, which was also the source for the 6 months debt service. A corporate tax of 28% has was included.

Revised PDD: Only considers the 1.8 MW turbine due to change in project design. Hence the capital and operating costs were proportionately reduced. Furthermore, the actual implementation of the 1.8 MW turbine did not include the provision of any long-term debt (Source: Electrawinds AFS 2011, page 8 – Statement of Financial Position). Therefore, the gearing and related interest rates and debt service terms were removed. The other original inputs, for example related to depreciation and corporate tax, have all been retained.

Tariff

PDD, version 14: The tariff used at the registration of the project with respect to the sale of electricity from the 1.8 MW turbine was ZAR 0.9620/kWh and ZAR 1.150/kWh with respect to the sale of electricity from the other 24 turbines with a total of 72 MW.

Revised PDD: Only considers the 1.8 MW turbine due to change in project design. The tariff used at the registration of the project with respect to the sale of electricity from the 1.8 MW turbine was ZAR 0.9620/kWh. This tariff has been retained in the IRR assessment. This is despite the change in electricity purchaser from the purchaser recorded in the original PDD. The use of the original tariff in the IRR assessment is conservative, as the new tariff, agreed in the new Power Purchase Agreement, is a lower tariff. A lower tariff would result in a lower IRR. In the actual project implementation, the tariff used is the Eskom Megaflex tariff. The Megaflex tariff is based on different rates, Peak, Standard and Off-peak, depending on the season. The average Megaflex tariff, assuming a constant level of electricity production, is calculated to be ZAR 0.60/kWh.

The results below illustrate the result of the revised financial analysis for the project activity. As shown, the equity IRR (without CDM revenues) is lower than the chosen benchmark.

Investment Cost Sensitivity:

Change in investment costs	Investment cost sensitivity parameter	Equity IRR	Equity return benchmark
-10%	90%	13.1%	13.9%
-8%	92%	12.8%	13.9%
-6%	94%	12.6%	13.9%
-4%	96%	12.3%	13.9%
-2%	98%	12.1%	13.9%
0%	100%	11.8%	13.9%
2%	102%	11.6%	13.9%
4%	104%	11.4%	13.9%
6%	106%	11.2%	13.9%

8%	108%	10.9%	13.9%
10%	110%	10.7%	13.9%

Tariff Sensitivity:

Change in revenue	Tariff sensitivity parameter	Equity IRR	Equity return benchmark
-10%	90%	10.4%	13.9%
-8%	92%	10.7%	13.9%
-6%	94%	11.0%	13.9%
-4%	96%	11.3%	13.9%
-2%	98%	11.5%	13.9%
0%	100%	11.8%	13.9%
2%	102%	12.1%	13.9%
4%	104%	12.4%	13.9%
6%	106%	12.7%	13.9%
8%	108%	12.9%	13.9%
10%	110%	13.2%	13.9%

Operating Cost Sensitivity

Change in opex	Opex sensitivity parameter	Equity IRR	Equity return benchmark
-10%	90%	12.1%	13.9%
-8%	92%	12.1%	13.9%
-6%	94%	12.0%	13.9%
-4%	96%	12.0%	13.9%
-2%	98%	11.9%	13.9%
0%	100%	11.8%	13.9%
2%	102%	11.8%	13.9%
4%	104%	11.7%	13.9%
6%	106%	11.6%	13.9%
8%	108%	11.6%	13.9%
10%	110%	11.5%	13.9%

The sensitivity analysis above indicates that material changes would need to be made to the project structure and scenario in order to increase the equity IRR of 11.8% above the equity IRR benchmark of 13.9%:

- Investment cost: the sensitivity analysis indicates that a 10% investment cost decrease would not exceed the benchmark IRR. The decrease in investment cost would need to be 15.5% higher to meet or breach the benchmark IRR. Such a decrease would be impossible considering that the investment costs have already been expended, as recorded in the 2011 Electrawinds audited financial statements which outline the cost of the 1.8 MW turbine and plant (ZAR 38,809,353) as well as the additional cost allocated as an intangible asset related to the development of the Coega Wind project (ZAR 6,487,960). As per note 1.3 to the Electrawinds' 2011 Annual Financial Statements, page 14, the intangible assets comprise research costs, including various permits, that are capitalized on a project-by-project basis. To be conservative, the cost of the intangible assets was not included in the IRR assessment, further strengthening the case for additionality.

- Tariff: the tariff used at the registration of the project with respect to the sale of electricity from the 1.8 MW turbine was ZAR 0.9620/kWh. The sensitivity analysis indicates that an increase in 10% in the tariff would not result in the benchmark equity IRR being exceeded. Such an increase is highly unlikely considering the regulated constraints in the national inflation rates. Additionally, the tariff of ZAR 0.9620/kWh was the proposed Renewable Energy Feed-In Tariff (REFIT) tariff, prescribed by the National Energy Regulator of South Africa (NERSA) at the time of registration. The REFIT was however never implemented in South Africa[8]. In the actual project implementation, the tariff used was the Eskom Megaflex tariff, as per the agree Power Purchase Agreement. The Megaflex tariff is based on different rates, Peak, Standard and Off-peak, depending on the season. The average Megaflex tariff, assuming a constant level of electricity production, is calculated to be ZAR 0.60/kWh. A lower tariff would result in a lower IRR. Hence the use of the original tariff, of ZAR 0.9620 / kWh, in the IRR calculation is considered to be a conservative approach.

- Operating cost: the operating costs are based on a proportionate reduction of the operational costs. The sensitivity analysis indicates that a decrease in 10% in the operating costs would not result in the benchmark equity IRR being exceeded. Such a decrease is highly unlikely considering that the actual operational costs documented in the Electrawinds' 2011 Annual Financial Statements, page 22, related to the installed 1.8 MW turbine, was ZAR 3,094,223. Hence the use of the lower, revised opex figure is conservative.

Step 3: Barrier analysis

The 'Tool for the demonstration and assessment of additionality' states that project participants may choose to apply Step 2 (Investment Analysis) or Step 3 (Barrier Analysis).

Step 4 Common Practice Analysis)

Sub-step 4a - Other activities similar to the Coega IDZ Windfarm project in South Africa;

In May 2011 when the prior consideration for this project was sent there were there were 34 wind projects in South Africa which had submitted Prior Consideration of the CDM forms to the UNFCCC, but none of these projects are registered. Currently there are only two demonstration wind energy facilities in operation in South Africa. Sub-step 4b – Discussion of similar options that occur.

No similar activities have proceeded without CDM financing.
As a result of the above analysis it can be concluded that the project activity is additional.

Prior Consideration of CDM

The decision to develop this wind energy facility as a CDM project was taken by Electrawinds in 2010. The Prior Consideration of the CDM Form was submitted to the UNFCCC and the DNA on the 26 of February 2010.

[8] Instead, the country moved to a competitive bidding programme: https://cleanenergysolutions.org/news/blog/refit-rebid-south-africas-renewable-energy-auctions.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

Project emissions

According to the methodology, for most renewable energy project activities, $PE_y = 0$. However, the methodology prescribes project emission calculations for geothermal, solar thermal and hydro power plant. As a wind power plant, therefore, there are no project emissions according to the methodology:

$$PE_y = 0$$

(ACM0002, simplified equation 1)

Baseline emissions

According to the methodology, the baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

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

(ACM0002, equation 11)

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

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using ASB0040:2018, version 01.0 (t CO_2/MWh).

Calculation of $EG_{PJ,y}$

The project activity is a Greenfield renewable energy power plant. It is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity,

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

Where:
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)

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

Baseline emission factor

This project applies the latest version of the mandatory Standardized Baseline for grid emission factor for the Southern African Power Pool (ASB0040-2018 version 01.0). The Standardized Baseline is applied in accordance with paragraph 50 of the CDM project standard for project activities (Version 02.0) and paragraph 4 of ASB0040-2018.

As per the Standardized Baseline, the combined margin CO_2 emission factor ($EF_{grid,CM,y}$) for interconnected electricity system of the Southern African Power Pool is used. The applicable value applied is 0.9871 tCO_2/MWh which is the value that may be applied in the second crediting period of this project, and applies to all wind and solar power generation project activities. ASB0040-2018 is a mandatory Standardized Baseline and as such has been used in the calculations.

The baseline emission factor EF shall be fixed for the crediting period.

Leakage
According to ACM0002, Version 20.0, no leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport).

These emissions sources are neglected. therefore $LE_y = 0$

Emission reductions
Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:
ER_y = Emission reductions in year y (t CO_2e/yr).
BE_y = Baseline emissions in year y (t CO_2e/yr).
PE_y = Project emissions in year y (t CO_2/yr).
LE_y = Leakage emissions in year y (t CO_2/yr).

B.6.2. Data and parameters fixed ex ante

Data/Parameter	**$EF_{grid, CM, y}$**
Data unit	tCO_2/MWh
Description	Combined margin emission factor for the grid in year *y*
Source of data	ASB0040-2018 Standardized baseline: Grid emission factor for Southern African Power Pool, Version 01.0
Value(s) applied	0.9871
Choice of data or measurement methods and procedures	The value of 0.9871 tCO_2/MWh is the combined margin CO_2 emission factor for interconnected electricity system of the SAPP, specific for wind and solar power generation project activities. The value is applicable for the second crediting period of the project activity.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

According to the baseline methodology ACM0002, the GHG emission of the proposed project within the project boundary is zero, i.e. $PE_y = 0$.

According to the baseline methodology ACM0002, the leakage of the proposed project is not considered,

i.e. $LE_y = 0$.
According to the descriptions and formulas in section B.6.1, the combined baseline emission factor of the South African Grid is:

$EF_{grid,CM,y} = 0.9871\ tCO_2e/MWh$

Calculation of $EG_{PJ,y}$

$EG_{PJ,y} = EG_{facilty,y}$
$EG_{PJ,y} = 5,500\ MWh/yr$

Where:
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)

Baseline Emissions BE_y

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$
$BE_y = 5,500\ MWh/yr \times 0.9871\ tCO_2e/MWh$
$BE_y = 5,429\ tCO_2e/yr$

Where:
BE_y = Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using ASB0040-2018 Standardized baseline: Grid emission factor for Southern African Power Pool, Version 01.0 (tCO_2/MWh)

Ex-ante Emission reductions are calculated as follows:

Emission reductions are calculated as follows:

$ER_y = BE_y – PE_y - LE_y$
$ER_y = 5,429\ tCO_2e/yr – 0 – 0$
$ER_y = 5,429\ tCO_2e/yr$

Where:
ER_y = Emission reductions in year y ($t\ CO_2e/yr$).
BE_y = Baseline emissions in year y ($t\ CO_2e/yr$).
PE_y = Project emissions in year y ($t\ CO_2/yr$).
LE_y = Leakage emissions in year y ($t\ CO_2/yr$).

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1	5,429	0	0	5,429
Year 2	5,429	0	0	5,429
Year 3	5,429	0	0	5,429
Year 4	5,429	0	0	5,429
Year 5	5,429	0	0	5,429
Year 6	5,429	0	0	5,429
Year 7	5,429	0	0	5,429
Total	**38,003**	**0**	**0**	**38,003**
Total number of crediting years	7			
Annual average over the crediting period	5,429	0	0	5,429

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$EG_{facility,y}$
Data unit	MWh/year
Description	Quantity of electricity generated and supplied by the project power plant to the grid in year y.
Source of data	Metering equipment installed at project activity site
Value(s) applied	5,500 MWh/yr
Measurement methods and procedures	The primary electricity meter measures incoming and outgoing electricity. This primary meter is owned by the Nelson Mandela Bay Municipality and recorded on the Municipality's SILK system which is used for billing purposes across the metro. The metered data sets are aggregated on a monthly basis by the project proponent's billing company, by downloading data from the SILK system, for the purpose of compiling monthly invoices. The calibration frequency will be as per the manufacturer specifications. In the event that there are no manufacturer specifications, the calibration frequency stipulated in the national standard, SANS 474, will be applied. The accuracy of the electricity meters must be aligned with the national standard, SANS 474, for example, Class B.
Monitoring frequency	Continuous monitoring and aggregated on a monthly basis
QA/QC procedures	The data from the meters installed at the substation will be crosschecked with invoices of sold power. In the case of inconsistencies, the more conservative of the two values will be used. The calibration requirements will be in accordance with the manufacturer specifications or the national standard, SANS 474, if manufacturer specifications are not available.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.7.2. Sampling plan

Not applicable.

B.7.3. Other elements of monitoring plan

The total responsibility for the monitoring as defined in this monitoring plan will be held by the project owner. The project owner may delegate the responsibility for monitoring to a third party.

A CDM Manager has been appointed by the project owner and is fully responsible for the monitoring and reporting related to the entirety of this wind farm.

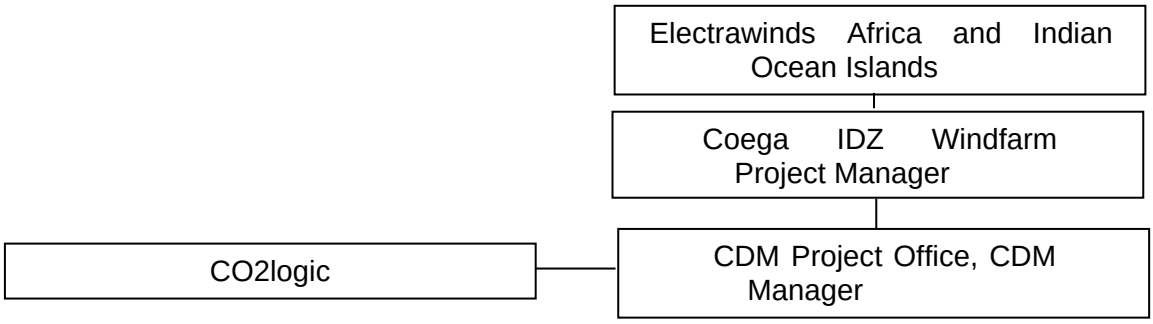
According to ACM0002, there is no need to monitor project emissions and leakage under this project activity.

The output from this project is monitored and recorded using a primary meter installed at the onsite substation.

The meter readings are used for both CDM purposes and sales of the electricity generated. The generation figures are cross checked against the records for sold electricity. The electricity generated from the project activity before entering into the grid at the grid interconnection point will be measured by digital kilowatt hour (kWh) meters. The metering system includes the main system and a back-up system. The back-up system will be used in case of a failure of the main meter.

These recordings are also the basis of payment to Electrawinds Africa and Indian Ocean Islands (Pty) Ltd which further guarantees the integrity of these figures.

The CDM operating and management structure is illustrated as follows:



Data management procedures:
The Coega Wind Farm utilises the SILK System which is owned and operated by the Nelson Mandela Bay Municipality to store monitored electricity generation and consumption data. The primary Coega Wind electricity meter for the 1.8 MW turbine - situated within the substation of the turbine on the Coega Wind Farm - is the meter used to monitor the electricity generation at the Coega Wind Farm Turbine 1. The meter is also owned and operated by the Nelson Mandela Bay Municipality.

SECTION C. Start date, crediting period type and duration

C.1. Start date of project activity

The start date of the project was 11/03/2010.
“the earliest date at which either the implementation or construction or real action of a project activity begins”.

C.2. Expected operational lifetime of project activity

20 years (240 months).

C.3. Crediting period of project activity

C.3.1. Type of crediting period

Renewable crediting period.
This is the second crediting period.

C.3.2. Start date of crediting period

01/08/2020.

C.3.3. Duration of crediting period

7yrs (84 months).

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

In line with the Environmental Management and Coordination Act of 1999 and the Environmental (Impact Assessment and Audit) Regulations 2003, the project activity has carried out an Environmental and Social Impact Assessment (ESIA). In terms of the regulations promulgated under Chapter 5 of the National Environmental Management Act (Act 107 of 1998) in South Africa ("NEMA") published in GN R 385, 386 and 387 on 21 April 2006, Scoping and Environmental Impact Assessment (EIA) is required for this project. The Environmental Impact Assessment (EIA) for the proposed project activity, which includes consideration of transboundary impacts, was completed by the Council for Scientific and Industrial Research (CSIR) in South Africa. CSIR is one of the leading scientific and technology research, development and implementation organizations in Africa. The Environmental Impact Assessment (EIA) report for the proposed Electrawinds Coega Windfarm project was published by CSIR in February 2011. Previously, in August 2010 the Coega IDZ Windfarm Final Basic Assessment Report was published after having been made available for 40 days between May and June 2010 for public comments. All issues raised were covered in the Final Scoping Report.

The conclusions of the main impacts drawn from the final EIA are summarized below:

The Impact on flora:
The overall impact is predicted to be negative and low of significance with mitigation. No critically endangered or endangered vegetation type is directly impacted. The turbine layout will utilize already impacted sites, in areas of reduced ecological sensitivity.

The impact during the construction period:
Mitigation measures are planned to reduce direct loss of vegetation cover as well as habitat from the turbine's footprint: protected plant species must be removed prior to construction and used for rehabilitation afterwards, the construction sites have to be demarcated, with no-go areas known by the constructors. Also, road layouts shall be strictly in accordance with the CDC IDZ Master Plan. About alien vegetation species, a comprehensive alien plant management plan is included by Electrawings into the project EMP.

Impact during the operational period:
No additional impact on the flora is expected during the operational period.

The impact on terrestrial fauna
The impact is rated as being negative and of low significance.

Impact during the construction period:
Positive impact from the creation of additional habitats for reptiles and small mammals. To mitigate the impact on species that cannot vacate the area during the construction phase; measures are planned to displace the animals to the Open Space Area prior the start of the construction. Application of speed limits on the site and on the road is another prevention.

Impact during the operational period:
No additional impact on the terrestrial fauna is expected during the operational period.

The impact on birds
The project is predicted to result in a negative impact on birds of low significance (with mitigation applied where possible).

Impact during the construction period: No impact is to be expected.

Impact during the operational period:
The main threat is the collision of birds with the project infrastructure and birds displacement due to the project. In general, the planed layout of the wind turbines places them out of the potential flight paths with exception for turbine 22 and 23. Mitigation measures include both the pre-construction of a monitoring program to help assess the impact on birds and the minimization of the amount of overhead power lines running through sensitive bird areas.

The impact on bats

Impact during the construction period: No particular impact during that phase.

Impact during the operational period:
Barotrauma and direct collision with turbine blades are two recognized risks. Two bat species are more likely to be affected by the project since they are open-air insectivorous. Especially round sites 13 to 24, the impact is expected to be high. Mitigation measures could reduce the level to medium. The results of seasonal monitoring would tell if various operational management projects should be implemented.
Operational management of turbines is a technical solution for mitigation.

The visual impact
Impact during the construction period Not to be considered as relevant.

Impact during the operational period:
With public opinion often considering that wind farms should be located in industrial areas, the Coega IDZ is the appropriate planning context. The impact is believed to be negative and of medium significance. No mitigation measures could decrease the visibility impact.

The noise impact
According to the EIA, the impact is considered to be negative, of low significance and confined within the IDZ area.

Impact during the construction period:
Construction operation will be restricted to daylight hours, using modern wind turbine technology.

Impact during the operational period:
Noise modeling was made using WindPro Software. Noise sensitive area (Residential house at Coega Brick Works) would be above the SANS10103 noise guideline limit of 45 dBA for rural areas, but below the limit of 70 dBA for industrial areas. The latest applies for the IDZ. Mitigation through regular maintenance.

The impact on heritage
The impact is rated as negative and of low significance (with mitigation).

Impact during the construction period:
Due to the eventuality to make some fossil findings during the construction period, certain measures have been put in place to avoid any loss. In case of findings, measures would be taken together with SAHRA. Especially Zone 10 is an archaeologically sensitive area. An archaeological specialist will be asked to make an inspection prior to the construction taking place with small machinery. By monitoring possible findings, the project might have a positive impact.

Impact during the operational period:
None.

Educational and Benefits
Electrawinds Africa and Indian Ocean Islands (Pty) Ltd will also invest through the provision of scholarships in the future development of the Eastern Cape through a training programme. Electrawinds Africa and Indian Ocean Islands (Pty) Ltd will be managing an educational programme the selection of the first three candidates has already been carried out and they have started an engineering programme in January 2010 at the Nelson Mandela Metropolitan University. For further specialisation, there is a postgraduate programme offered in Europe.

Conclusion
The report concludes that no negative impacts have been identified that, in the opinion of the environmental Assessment Practitioner, should be considered as "fatal flaws" from an environmental perspective, and thereby necessitate substantial re-design or determination of the project.

The report does not mention any transnational impact. The expected negative effects will be diminished as far as possible thanks to the planned mitigation measures. Jobs will be created, both for the construction and for the operating of the wind farm. Measures will also be positive for the environment, such as dealing with alien vegetation species. Ongoing maintenance will help mitigate the impact of the wind turbines in the environment.

D.2. Environmental impact assessment

The Department of Environmental Affairs (DEA) and the Province Environmental Protection Bureau has approved the EIA. The Council for Scientific and Industrial Research (CSIR) in South Africa identified no negative environmental impacts that should be considered as serious enough to stop the project. In case serious impacts should be found out by further monitoring, specified operating measures would be considered.

The EIA also includes an investigation of a "no go" option. The following opportunities would be lost: an investment of approx R 1400 million in the Coega Industrial Development Zone for renewable energy facilities producing approximately 70 – 80 MW. Jobs for the construction and the later operation of the project's facilities. An increase in the amount of energy produced in a region currently relying on import.

Environmental impacts are not considered significant.

SECTION E. Local stakeholder consultation

E.1. Modalities for local stakeholder consultation

As required by the law in South Africa the Draft EIA Report was released to stakeholders for comment from 19 November 2010 to 31 January 2011.

Advertisements were placed in one local and one regional newspaper, EP Herald (22nd November 2010, Regional, Language: English) and Die Burger Oos-Kaap (Local, Language: Afrikaans) advertising the availability of the Draft EIA report for review as well as providing details of the public meeting to be held. A copy of the Newspaper advertisements can be found in the EIA. The Report was placed on the project website: www.publicprocess.co.za.

The selection of Interested and Affected Parties (I&APs) was carried out to satisfy the requirements of local South African regulations 57, 58 and 59 of the NEMA 2006 EIA Regulations

relating to the public participation process and, specifically, the registration of I&APs and recording of submissions from interested and. All I&APs on the database for this EIA (Appendix C) were informed of the release of the draft EIA Report for comment. All comments received have been recorded and are addressed in the Final EIA Report. The Draft EIA Report was released for a 40 day. All I&APs on the project database were notified in writing of the release of the Draft EIA for review and were invited to attend a public meeting. The public meeting was conducted on 2 December 2010 at the King Edward Hotel in Port Elizabeth. The Draft EIA Report was also presented to the Coega Environmental Liaison Committee meeting of 25 Nov 2010 where any queries were discussed.

At the time of producing this report, the database stands at 122 I&APs. Issues were further identified by a meeting between the EIA consultant, specialists and land owners. A synthesis of these issues is provided in the Issues & Response Trail in the EIA which includes an explanation of how the issues will be addressed through the EIA. In addition to the public meeting, focus group meetings were held with key community organisations. The purpose of these meetings was to provide an overview of the outcome and recommendations from the specialist studies, as well as provide opportunity for comment. Comments raised through written correspondence (emails, comments, forms) and at meetings (public meeting and focus group meetings) have been captured in the Comments and Responses Trail in this Final EIA Report which includes responses by the CSIR EIA team and/or the applicant. These responses indicate how the comment has been dealt with in the EIA process.

This Final EIA Report is available in the main library in Port Elizabeth (Govan Mbeki Ave), in the Motherwell library, and on the project website at www.publicprocess.co.za. Hard copies and/or CDs containing the document were sent to key stakeholders, including authorities.

In addition to the Public Meeting the table below provides an overview of Focus Group Meetings held with community organisations in order to provide them with information on the outcome of the specialist studies undertaken for the EIA and provide them with an opportunity to submit any comments.

Organisation	Date	Participation
SA NGO Coalition	1 February 2011	1
SA National Civics Organisation	2 February 2011	3
Ward 58 Councillor	2 February 2011	1

E.2. Summary of comments received

A key component of the EIA process is documenting and responding to the comments received from Interested and Affected Parties (I&APs) and the authorities. The comments were received in various forms:

- Written and email comments (e.g. letters and completed comment forms)
- Comments made at public meetings
- Comments made at focus group meetings
- Telephonic communication and/or consultation
- One on one meetings with key authorities and/or I&APs.

Below one can find a summary of the comments and issues raised:

<u>Civil Aviation Impacts</u>
Radar and aviation impacts

<u>Noise related Impacts</u>

Will modern wind turbine design in terms of noise mitigation be taken into account when drafting the tender specifications as the manufacturer will be chosen by tender? The cheapest tender might not necessarily be the best design in terms of noise mitigation.

Question regarding Adherence to Noise Control By-Law of 24 March 2010

What is the impact of low frequency/infra sound in terms of nuisance value (vibration noise)?

Has the cumulative impact of 25 turbines with regards to noise generation been taken into consideration?

Various Noise reports and their differing results.

Will the wind turbine still function well during very windy days, will it not cause a large increase in noise?

Potential impacts on birds and bats

How can you manage, reduce or prevent the impacts on bats? Was this considered in the EIA?

Biophysical (vegetation and wetlands) and Open Space Management System

How will you take care of plant and animal species of concern which are found during construction, does the report make a recommendation in this regard?

The protection of nature and natural vegetation on site is important?

Important to protect of the vegetated dune systems in the Coega Open Space Management Plan (OSMP)?

To prevent ad hoc fragmentation of the OSMP system, degraded areas suitable for servitudes and

"turbines or similar" need to be identified as part of the OSMP revision as the OSMP area is regarded as a no go area for development. The OSMP serves as an ecological corridor – not just a vegetation reserve, so even degraded areas within the system may have a function.

Power cables need to follow servitudes and avoid the OSMP areas.

OSMP areas in the vicinity of planned access roads and construction sites need to be surveyed and demarcated prior to construction (this is a requirement of the CDC RoD but has not been implemented – leading to several incidences of encroachment into OSMP areas).

Traffic Related Issues

The South African National Roads Agency Limited would like to have more information with regard to turbine position No 4 and 23 as they seem to be very close to the national road. Please confirm what distance will they be erected from the national road reserve fence.

Heritage Related Impacts

Comments were received from SAHRA which agree with the recommendations included in Chapter 10 of the Draft EIA Report. We would like to stress the importance of a constant interaction with the archaeologist to find a balance between preservation of heritage resources and development of the wind energy facility.

This zone is sensitive from a heritage perspective, as archaeological and palaeontological deposits as well as graves were identified in this zone. Due to low visibility on most of zone 5, SAHRA requires that an archaeologist is present on site during both vegetation clearing and all earth moving activities.

Two important palaeontological sites have also been identified in the area certain questions were made in regards to their conservation.

Questions concerning that the graves and commentaries found in the area should not be displaced and that the legal distances of activity from these sites should be respected.

In a long trench cut into the surface limestone, north of the Hougham Park farmstead, an excellent exposure of large fossilized root systems in ancient dune sands formation are recorded, including some Plio-Pleistocene land snails. This exposure needs to be protected from development.

It is requested that monitoring by a palaeontologist is carried out during some of the constructions.

A request for the recording and preservation of the archaeological features found on the wind turbine sites and destruction permits need to be obtained in the case of the identification of any archaeological objects.

Appropriate vegetation clearing in certain zones so as to minimize the risk of impact on uncovered archaeological sites.

Socio-Economic

Impact on local price of electricity.

Local employment

Identification scheme for the three bursary students?

Linking program to a community based organisation?

Local participation in the project decisions?

E.3. Consideration of comments received

The comments received have been compiled into a Comments and Responses Trail for inclusion in the Final EIA Report. The Comments and Responses trail indicates the nature of the comment, when and who raised the comment. The comments received have been considered by the EIA team and appropriate responses provided by the relevant member of the team and/or specialist. The response provided indicates how the comment received has been considered in the Final EIA Report, in the project design.

Civil Aviation Impacts
South African Civil Aviation Authority (SACAA) was contacted and project verified

Noise related Impacts
A noise study model was made (WindPro Version 2.7) and was part of the EIA which shows the project is within the required limits and the developer gurantees this will be respected.

Potential impacts on birds and bats
The project developer confirms that the potential impact on bats was investigated and the findings presented in Chapter 7 of the EIA Report concluded that potential management actions shall be put in place.

A comprehensive flora and flora specialist study was conducted. Several recommendations for avoiding or mitigating impacts on flora and fauna during the construction phase.

Biophysical (vegetation and wetlands) and Open Space Management System
The OSMP has been considered and the necessary actions have been considered and the relevant rehabilitation of the habitat will be put in place. The power cables will follow the roads and not cross the OSMP area. The construction sites will be clearly demarcated with hazard tape prior to the commencement of the construction.

Traffic Related Issues
Turbine is 165m and 171m from the road creating no issue.

Heritage Related Impacts
Chapter 10 of the EIA shows that the project meets all the potential heritage impacts (including cultural/historical, archeological and palaeological impacts)

Recommendations are provided (in EIA section 10.10) for a site inspection by an archaeologist prior to construction.

If any concentrations of archaeological material are exposed during construction, all work in that area will be stop and it will be reported immediately to the nearest museum/archaeologist

The EIA clearly mentions the requirement for monitoring by a palaeontologist in specified areas of the project development site.

Socio-Economic
Electricity is sold to the national grid no link to local electricity price.

Electrawinds Africa and Indian Ocean Islands (Pty) Ltd is committed to use local workers as much as possible.

The bursary students were identified in close cooperation with the Coega Development Cooperation.

Electrawinds Africa and Indian Ocean Islands (Pty) Ltd will have a community BBBEE (Broad-Based Black Economic Empowerment) program in place shortly.

The local Motherwell community has been consulted on the project through the Motherwell Councillors forum.

SECTION F. Approval and authorization

The letters of approval from Parties to the project were provided to the DOE for validation and registration.

Appendix 1. Contact information of project participants

Organization name	Electrawinds Africa and Indian Ocean Islands (Pty) Ltd
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Appendix 2. Affirmation regarding public funding

Not Applicable.

Appendix 3. Applicability of methodologies and standardized baselines

Not Applicable.

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

Not applicable.

Appendix 5. Further background information on monitoring plan

Not applicable.

Appendix 6. Summary report of comments received from local stakeholders

Not applicable.

Appendix 7. Summary of post-registration changes

History of all post-registration changes to the project activity that have been approved by the Board after the project's registration.

Corrections:

1. Changes were made to reflect the new content or structure required by the new PDD template.
2. The electricity purchaser was expected to be, Nelson Mandela Bay Metropolitan, as per the original PDD. The PDD has been revised to reflect the actual scenario, where the power purchaser is PowerX (formerly known as Amatola Green Power). PowerX is an electricity trader, which on-sells the electricity to third parties through the grid. Hence, this correction is aligned with the methodology, ACM0002, version 12.3.0, which requires that the generated power be grid-connected.
3. The broken weblink references included in the PDD at registration (referenced in the fixed and monitored parameter tables) were corrected or revised.
4. A typographical error relating to the calculated grid emission factor was amended. The $EF_{grid,CM,y}$ (for wind and solar power generation project activities for the first crediting period and for subsequent crediting periods) was calculated at the time the project was registered and recorded in the ex ante emission reduction calculation sheet. The $EF_{grid,CM,y}$ was erroneously recorded in the PDD as 0.8834 tCO_2e/MWh in section B.6.1 and as 0.8975 tCO_2e/MWh in section B.6.3 of the PDD. The correct value for EFgrid,CM,y is 0.9099 tCO_2e/MWh, as per the ex ante emission reduction calculation sheet that was validated at registration. The EFgrid,CM,y value has been corrected which required amendments to the related emission reduction calculations. Note that the ex ante emissions have increased due to both the correction of the EFgrid,CM,y value, as well as the increased expected electricity generation value described further below.

Permanent changes to the registered monitoring plan:

1. The monitoring plan in section B.7.1, was revised to allow for the application of electricity meters that have an accuracy classes that are aligned with the national standard SANS 474 (also known as NRS 057). The monitoring plan has also been revised to allow for calibration frequencies to be stipulated by the manufacturers of the installed electricity meters. In the absence of manufacturer specifications, the frequency stipulated in the national standard, SANS 474, may be applied. The use of the national standard related to the accuracy and calibration frequency of the electricity meters is compliant with the local laws.
2. The QA/QC procedure in the parameter table in section B.7.1 has been revised to be aligned with the methodology, which requires QA/QC against the invoices of sold electricity.
3. The original PDD, section B.7.3, contained the name of the installation company and the brand and type of electricity meter that was expected to be commissioned. This did not occur as originally planned, hence the references to company name and meter brand have been removed.

Changes to the project design:

4. Decrease in capacity (type b change as per § 241 of CDM PS for Project Activities v 02.0): the original PDD envisaged that the total project capacity would be 73.8 MW, generated by 25 wind turbines. The design has been revised to reflect the actual 1.8 MW during the first crediting period. The design has also been revised to reflect that electricity generation will occur in phases, with Phase 1 entailing the installed 1.8 MW turbine. The installed 1.8 MW turbine is the only turbine commissioned during the first crediting period. Phase 2 entails construction of further turbine/s, which may become operational in the second crediting period. The second crediting period starts on 1 August 2020. The addition of the further turbine/s may be included in the PDD during the second crediting period, using the process for applying for post registration changes.
   The revised capacity impacted on the additionality assessment. However, the revised IRR was below the benchmark value, even when stressed and hence additionality was not adversely affected by the change in project design.
   Changes to the technology descriptions have also been made in section A.3. The original PDD specified the type and size of the expected additional 24 wind turbines. These details which have been deleted. Only the details of the installed 1.8 MW turbined have been retained.
5. Increase in expected electricity production of the 1.8 MW turbine from 4 GWh/year to 5.5 GWh/year, based on a conservative average of the renewable electricity generation of the installed 1.8 MW turbine between the full years of 2015 – 2019. The increase in expected annual electricity generation has not increased the equity IRR above the benchmark of 13.9%. The ex ante emission reductions have been revised accordingly. The ex ante emissions have therefore increased due to both the correction of the EFgrid,CM,y value described above, as well as the increased expected electricity generation value.

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Document information

Version	*Date*	*Description*
11.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
10.1	28 June 2017	Revision to make editorial improvement.
10.0	7 June 2017	Revision to: • Improve consistency with the "CDM project standard for project activities" and with the PoA-DD and CPA-DD forms; • Make editorial improvement.
09.0	24 May 2017	Revision to: • Ensure consistency with the "CDM project standard for project activities" (CDM-EB93-A04-STAN) (version 01.0); • Incorporate the "Project design document form for small-scale CDM project activities" (CDM-SSC-PDD-FORM); • Make editorial improvement.
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.

Version	*Date*	*Description*
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.
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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