



**CLEAN DEVELOPMENT MECHANISM  
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)  
Version 03 - in effect as of: 28 July 2006**

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**SECTION A. General description of project activity.****A.1. Title of the project activity:**

&gt;&gt;

Coega IDZ Windfarm

PDD version 3

19/01/2010

**A.2. Description of the project activity:**

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**Description of project proponent**

The project will see Electrawinds Africa and Indian Ocean Islands (Pty) Ltd install 25 wind turbines: one of 1.8 MW and 24 of 3 MW, making a total of 73.8 MW. Together the 25 wind turbines will generate 141 GWh annually. The electricity of the 1.8 MW is purchased by the Nelson Mandela Bay Metropolitan while the Renewable Energy Certificates are purchased by BHP Billiton. The electricity of the 24 other turbines will ultimately be purchased by the Single Buyers Office of ESKOM. The full project construction stretches over several months with a first turbine erected.

**Purpose**

The purpose of the project is to use the winds kinetic energy to generate electrical power in South Africa. The proposed 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 and a 3MW turbine technology.

**Emission Reductions from anthropogenic sources**

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 1,003,688 tonnes of CO<sub>2</sub>e over the chosen 7 year period as well as SO<sub>2</sub> and NO<sub>x</sub> emissions;. Additionally the project will improve air quality and local livelihoods, promote sustainable renewable energy industry development.



**A.3. Project participants:**

>>

| Name of Party involved<br>(host) indicates a host party) | Private and/or public entity (ies)<br>Project participants (as applicable) | Kindly indicate if the party involved wishes to be considered as project participant (Yes/No) |
|--|--|---|
| South-Africa   | Electrawinds Africa and Indian Ocean Islands (Pty) Ltd                     | No  |
| Belgium  | CO2logic NV/SA   | No  |

**A.4. Technical description of the project activity:**

**A.4.1. Location of the project activity:**

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The project will be located in Coega Industrial Development Zone (IDZ) which can be found along the coast just east of Port Elizabeth in the Eastern Cape Province in South Africa. For further detail see figure 1 & 2



Figure 1

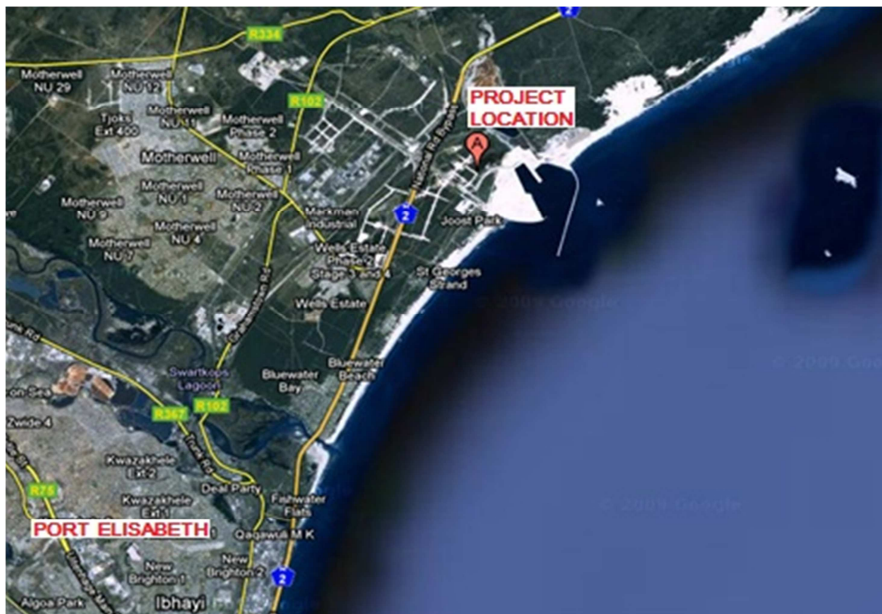


Figure 2 (Source: Google Earth)

**A.4.1.1. Host Party(ies):**

>>  
South Africa

**A.4.1.2. Region/State/Province etc.:**

>>  
Eastern Cape Province

**A.4.1.3. City/Town/Community etc.:**

>>  
Coega Industrial Development Zone

**A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):**

>>  
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 Colchester the project can be found approximately 800m to the East of junction 764.  
The exact Project location is Latitude 33° 45.157' Longitude 25° 40.597'

Figure 3 and 4 illustrate the location.

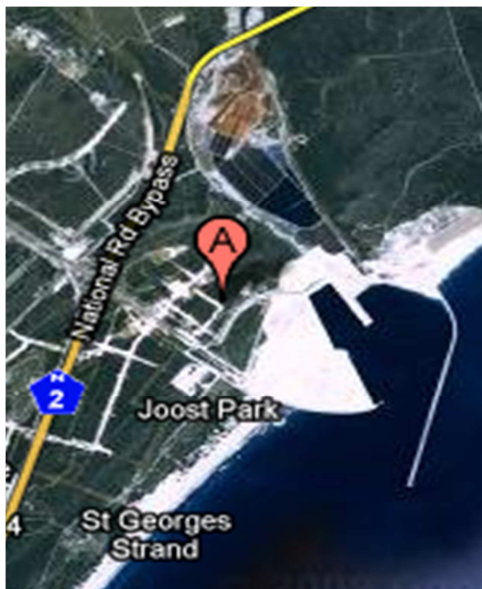


Figure 3 (Source: Google Earth)

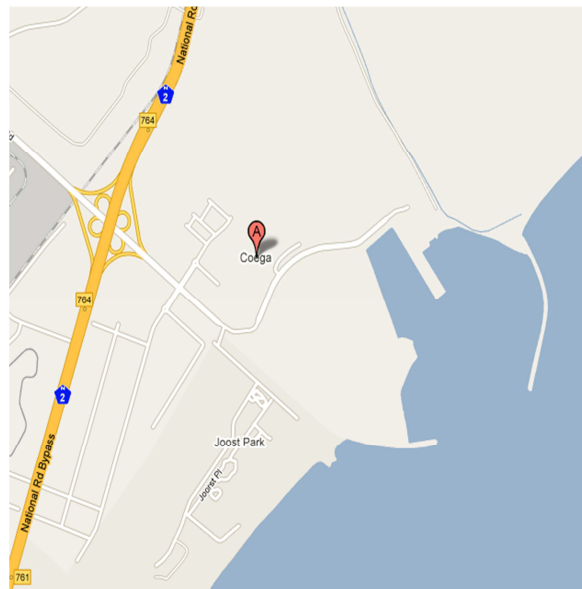


Figure 4 (Source: Google Earth)

#### **A.4.2. Category(ies) of project activity:**

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The project activity falls under the following category.

Sectoral Scope: 1. Energy Industries (renewable - / non-renewable sources)

Category: Grid-connected electricity generation from renewable energy sources

#### **A.4.3. Technology to be employed by the project activity:**

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Of the 25 turbines that will be erected twenty four will use an equivalent 3 MW SIEMENS technology and one will use the 1.9 MW Vestas V90-1.8 turbine.

The 3 megawatts (MW) technology offers innovation through a completely new Direct Drive concept introducing a permanent magnet generator. With half the parts of a conventional geared wind turbine, and much less than half the number of moving parts, the new wind turbine requires less maintenance. This turbine has > 50 m blades which deliver significant capacity and yield. The turbine has a permanent magnet generator to ensure wider operation range of the turbine and reduced loss of power as well as a full-scale converter which provides excellent grid support, reduced drive-train loads and optimum energy production over a greater range of wind speeds.

The SIEMENS wind turbine has a rotor diameter of > 100 meter.

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.

**A.4.4. Estimated amount of emission reductions over the chosen crediting period:**

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A renewable crediting period of 3 times 7 years is adopted for the proposed project activity.

The total estimation of emission reductions in the first crediting period from 2012 to 2018 are 1,003,688 t CO<sub>2</sub>e, as shown in the table below.

Table 1

| Length of the crediting period (year)                                   | Estimate of annual emission reductions in tonnes of CO <sub>2</sub> equivalent. |
|---|---|
| 2012  | 4700  |
| 2013  | 166,498   |
| 2014  | 166,498   |
| 2015  | 166,498   |
| 2016  | 166,498   |
| 2017  | 166,498   |
| 2018  | 166,498   |
| Total estimated reduction over this period (tonnes of CO <sub>2</sub> ) | 1,003,688   |
| Total Number of initial crediting years                                 | 7   |
| Annual average of the estimated reductions over the crediting period    | 143,384   |

Note

Year 1: The first turbine was set up on the 06/2010 and the other turbines will be added over time and are all expected to be functional end of 2012

**A.4.5. Public funding of the project activity:**

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

**SECTION B. Application of a baseline and monitoring methodology****B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:**

&gt;&gt;

The project is a new grid connected renewable energy production. Approved consolidated baseline and monitoring methodology “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”- ACM0002 Version 12.1.0

Related tools:

Version 05.2 of the “Tool for the demonstration and assessment of additionality”

Version 2.2.0 of “Tool to calculate the emission factor for an electricity system”

**B.2. Justification of the choice of the methodology and why it is applicable to the project activity:**

&gt;&gt;

This proposed project is a grid-connected renewable power generation project and therefore applicable to Version 12.1.0 of ACM0002. More details of the comparison of the project’s characteristics and the applicability criteria as specified in, Version 12.1.0 of ACM0002 is given below.

This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

The methodology (a) is applicable to this Greenfield new grid-connected renewable power generation project activity.

| <b>Applicable conditions according to version 12.1.0 ACM0002</b>   | <b>Applicability of the project</b>   | <b>Applicability criteria obtained</b> |
|--|---|--|
| 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 proposed will install wind power plant  | YES                                    |
| In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a  | The project proposed is a new Greenfield renewable plant and is not a capacity addition, retrofit or replacement to an existing | YES                                    |



|   |   |             |
|---|---|-------------|
| <p>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;</p>   | <p>plant.</p>   |             |
| <p>In case of hydro power plants, one of the following conditions must apply:</p> <ul style="list-style-type: none"> <li>o The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or</li> <li>o 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/m<sup>2</sup>; or</li> <li>o 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/m<sup>2</sup>.</li> </ul> | <p>The proposed project is a wind plant therefore this is not applicable.</p> | <p>N.A.</p> |

The methodology is not applicable to the following:

| None Applicable conditions according to version 12.1.0 ACM0002  | Applicability of the project  | Applicability criteria obtained |
|---|---|---------------------------------|
| <p>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;</p> | <p>The proposed wind power plant does not involve switching from fossil fuels to renewable energy at the site of the project activity as there is no fossil fuel powered plant on the site.</p> | <p>YES</p>                      |



|  |  |      |
|--|--|------|
| Biomass fired power plants;  | Not applicable. The proposed project activity is a wind power plant. | N.A. |
| Hydro power plants <sup>1</sup> that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m <sup>2</sup> . | Not applicable. The proposed project activity is a wind power plant. | N.A. |

In addition, the applicability conditions included in the tools referred to above apply<sup>1</sup>.

The above shows that Version 12.1.0 of ACM0002 is clearly applicable to the proposed project activity.

Any conditions for the application of the tools are addressed in the sections below where the tools are used, sections B.5 and B.6, showing that the tools are applicable to the proposed project activity. In addition, it is noted that:

- the project is a Greenfield power project, therefore the methodological tool “*Combined tool to identify the baseline scenario and demonstrate additionality*” version 02.2 is not required to identify the baseline scenario of the proposed project; and
- the project is a wind power project, thus there are no fossil fuels used for electricity generation in the project, so there are no CO<sub>2</sub> emissions or leakage from the combustion of fossil fuels, and thus the methodological tool “*Tool to calculate project or leakage CO<sub>2</sub> emissions from fossil fuel combustion*” version 2 is not applicable to the proposed project.

### **B.3. Description of the sources and gases included in the project boundary:**

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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, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

#### *Spatial boundary*

As requested by the Version 12.1.0 of ACM0002 we used the “Tool to calculate the emission factor for an electricity system”, Version 2.1.0

<sup>1</sup> The condition in the “*Combined tool to identify the baseline scenario and demonstrate additionality*” that all potential alternative scenarios to the proposed project activity must be available options to project participants does not apply to this methodology, as this methodology only refers to some steps of this tool.



As reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system” the project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (i.e. the renewable power plant location) and that can be dispatched without significant transmission constraints.

As defined in the latest approved version of the “Tool to calculate the emission factor for an electricity system” the definition of an electricity system is taken as the largest grid definition which is the National South African grid.

#### *Emission sources and gases*

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

Table 2

|                         | Source  | Gas              | Included? | Justification/Explanation |
|-------------------------|---|------------------|-----------|---------------------------|
| <b>Baseline</b>         | CO <sub>2</sub> emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.         | CO <sub>2</sub>  | Yes       | Main Emission source      |
|                         |   | CH <sub>4</sub>  | No        | Minor Emission source     |
|                         |   | N <sub>2</sub> O | No        | Minor Emission source     |
| <b>Project Activity</b> | For geothermal power plants, fugitive emissions of CH <sub>4</sub> and CO <sub>2</sub> from noncondensable gases contained in geothermal steam. | CO <sub>2</sub>  | No        | Not applicable to wind    |
|                         |   | CH <sub>4</sub>  | No        | Not applicable to wind    |
|                         |   | N <sub>2</sub> O | No        | Not applicable to wind    |
|                         | CO <sub>2</sub> emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants  | CO <sub>2</sub>  | No        | Not applicable to wind    |
|                         |   | CH <sub>4</sub>  | No        | Not applicable to wind    |
|                         |   | N <sub>2</sub> O | No        | Not applicable to wind    |
|                         | For hydro power plants, emissions of CH <sub>4</sub> from the reservoir.  | CO <sub>2</sub>  | No        | Not applicable to wind    |
|                         |   | CH <sub>4</sub>  | No        | Not applicable to wind    |
|                         |   | N <sub>2</sub> O | No        | Not applicable to wind    |

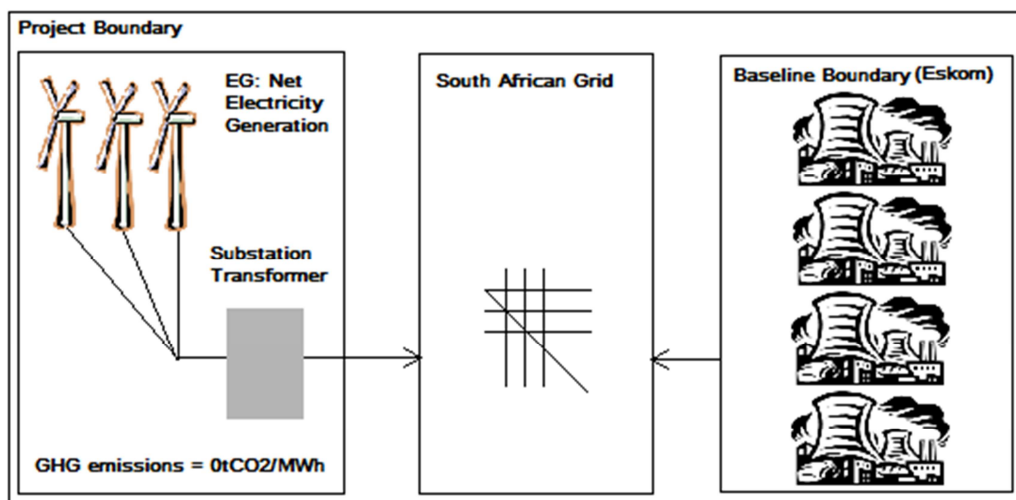


Figure 5

**B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:**

&gt;&gt;

This project involves the installation of a new grid-connected renewable power plant, and it is not a capacity addition, retrofit or replacement of an existing grid-connected renewable power plant/unit, therefore the baseline scenario, according to the methodology, is the following:

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

The baseline is determined in the combined margin calculation in Section B.6.

**B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):**

&gt;&gt;

*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 time line here below:



| <b>Time</b> | <b>Milestones</b>   |
|-------------|---|
| 06/11/2009  | <i>Agreement signed with consultant to investigate potential for CDM revenues to support the project and to develop necessary calculations and documentation.</i>               |
| 07/12/2009  | <i>Board Meeting confirming necessity to seek CER for the project to go forward</i>   |
| 22/12/2009  | <i>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.</i> |
| 09/02/2010  | <i>The date when the project investment decision was finally taken.</i>   |
| 26/02/2010  | <i>Prior Consideration sent to the South African DNA</i>  |
| 26/02/2010  | <i>Prior Consideration to the UNFCCC secretariat</i>  |
| 04/03/2010  | <i>Contact made with DOE for cost estimate for project validation</i>   |
| 22/03/2010  | <i>Project Start Date</i>   |
| 01/06/2010  | <i>First wind turbine connected to the grid<br/>Commercial production started</i>   |

As advised in Version 12.1.0 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 05.2 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 proponant. 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 return

$R_m$  Market return

$\beta$  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% (see annex 3)

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 (see annex 3). A



compounded 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.  $13.91\% - 6.57\% = 7.34\%$

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 (as can be seen in annex 3). 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 project IRR

| Input/Assumption   | Value         | Comment  |
|--|---------------|--|
| Electricity Price (ZAR/MWh)                                | 1.15          | National Energy Regulator of South Africa (NERSA) on the 26th of March 2009 concerning the Renewable Energy Feed-In Tariff (REFIT) |
| 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 generation Equipment (ZAR) | 1,369,065,883 | ZAR  |
| Total M&O costs  | 34,546,962    | ZAR  |

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

#### **Project IRR without CDM**

IRR 8.82%

**Project IRR with CDM**

IRR 11.07%

**Sub-step 2d: Sensitivity analysis**

|              | Sensitivity Analysis     |                     |                  |          |           |           |                     |                  |          |       |
|--------------|--------------------------|---------------------|------------------|----------|-----------|-----------|---------------------|------------------|----------|-------|
|              | Resulting Equity IRR 20y |                     |                  |          |           |           |                     |                  |          |       |
|              | Benchmark                | Pesimistic scenario |                  |          |           | Base case | Optimistic scenario |                  |          |       |
| +10% Inv.    |                          | -10% Tariff         | -10% load factor | +10% O&M | -10% Inv. |           | +10% Tariff         | +10% load factor | -10% O&M |       |
| Without CERs | 13.91%                   | 6.32%               | 8.74%            | 5.32%    | 7.87%     | 8.82%     | 11.23%              | 8.90%            | 11.42%   | 9.69% |

Thus one can conclude that without CDM revenues this project would not have taken place. Higher market CER prices a expected in the future to help make this project reach a reasonable return.

**Step 3: Barrier analysis**

In South Africa the major electricity producer Eskom generates approximately 95% of the electricity (36,200 MW of net generating capacity in 2008<sup>2</sup>) and they totally control the energy sector. The remaining 5% of energy comes from municipality owned plants (2,400MW in 2008<sup>3</sup>) or self production units owned by large industrial organizations (800MW in 2008<sup>4</sup>) developed for internal energy consumption. In total only around 2% of South African electricity is produced by private companies (US EIA 2008). South African independence from external energy supplies was a political necessity in the past which helps explain this situation. The utility is the largest producer of electricity in Africa, is among the top seven utilities in the world in terms of generation capacity and among the top nine in terms of sales.

In South Africa the two main energy providers, Eskom (electricity) and Sasol (fuel), are responsible for the bulk of investment in energy research and development. At the same time, they are the main employers of university graduates in their relevant fields. South Africa has the world's sixth largest recoverable coal reserves in the world. The abundance of local coal with 86% of energy coming from this cheap source has not helped the development of renewable energies. Unsurprisingly South Africa has embryonic renewable energy market. Whilst the country topographic and geographical situation present significant wind power opportunities there exists only the 5MW Darling Wind Farm in the Western Cape.

Due to socio-economic pressures, state-owned electricity companies typically have been proven to set prices that are too low to finance new investment. South Africa is one of the countries with the cheapest electricity in the world. This creates problems when private investment is sought from Independent Power Producers (IPP's) for new power plants. The problem is that electricity prices are therefore below the cost that would be adequate to compensate new investment and the related risks. Lack of external investment in the local power sector has meant that currently there is an electricity crisis in South Africa where

<sup>2</sup> [http://www.eia.doe.gov/emeu/cabs/South\\_Africa/Electricity.html](http://www.eia.doe.gov/emeu/cabs/South_Africa/Electricity.html)

<sup>3</sup> [http://www.eia.doe.gov/emeu/cabs/South\\_Africa/Electricity.html](http://www.eia.doe.gov/emeu/cabs/South_Africa/Electricity.html)

<sup>4</sup> [http://www.eia.doe.gov/emeu/cabs/South\\_Africa/Electricity.html](http://www.eia.doe.gov/emeu/cabs/South_Africa/Electricity.html)



demand is over stretching supply and power cuts are frequent. Thus an increase in renewable energy production if it were possible would certainly help ease the current energy crisis in South Africa.

To remove this obstacle whereby project developers are solely reliant on one counter party, other entities must be allowed to act as purchasers. This monopolistic situation means the existing suppliers have absolute authority meaning that investors are not prepared to take the risk of financing and developing projects. Project developers do not have an exit option in case the initial terms of any legislation is breached or if significant pressure is placed on them by their sole income provider.

Numerous examples in South Africa and abroad have shown that these monopolistic scenarios contain significant risk. One example of this use of power can be found when examining the 2,000 megawatt Cahora Bassa, built by the Portuguese during the colonial era in Mozambique and still 82% owned by the Portuguese government, is some \$2.5 billion in debt, in part because of the absurdly low value of the Eskom contract. The Cahora Bassa HVDC transmission provides an important power import facility to the South African grid. A March 29, 2003 article in *The Economist* magazine states: "Hidroelectrica de Cahora Bassa (HCB), the company that operates the power station, is obliged to sell most of its output to South Africa, at a paltry price that, amazingly, is fixed until 2030. Mozambique then finds itself re-importing power at market rates." Eskom and the governments of Portugal and Mozambique continue to argue over the price Eskom pays for power from the dam, but as Eskom totally controls the electricity sector it refuses to let its much poorer neighbor renegotiate the terms of the contract. The chairman of HCB, Carlos Vega Angelos, told *The Economist*. "South Africa is selling back to Mozambique electricity we supplied to them in the first place, but at ten times the price."

An enterprise making the first move, only to see its project fail, will face economic but also reputational risks. The financial institutions will factor all these risks into their credit conditions, which will raise the cost of lending. In addition, a lack of competition among South African financial institutions may have led to reluctance to explore new fields of lending activity in the past. As there is consequently a lack of experience with renewable energy projects, it is difficult for project developers to obtain funding on the private capital market at reasonable rates.

The obstacles encountered by private renewable energy developers in South Africa are numerous and will be difficult to overcome. The benefits of the carbon revenues related to the CDM are a clear necessity for this project to overcome these related barriers.

The start of the South African REFIT process has been delayed a couple of times. The final conditions of REFIT tender are not known but a maximum upper value of 1.15 R/kWh is stipulated.

The market for renewable energy technologies in South Africa is young and not very present. This lack of maturity leads to higher volatility and to greater risk. Initiatives such as the REFIT in reality will do little to alter the economics of a given project due to the high risks related to any activity in this sector in South Africa. Such feed-in instruments actually add to the market risk especially in a situation where there is a monopoly with total control, where the link between the monopoly and local politics is so narrow and where political rivalry is dominant. One needs to remember that feed-in tariffs are an instrument of market creation. For example, the unexpected alteration of the Spanish feed-in tariff in 2008 led to a significant fall in solar technology market. Secondly the South African REFIT has a crucial flaw as Eskom is the monopolistic buyer of electricity produced from renewable energy and is responsible for distributing it to consumers. REFIT-tender is still open however it is clear the price will be a maximum of 1.15 R/kWh but most likely less. In the business plan this maximum rate was applied even if the final figure could be lower thus providing a worse IRR.



Another major issue is the lack of reliable long term wind data. As there are no other wind turbines in this area and no real commercial wind park projects in the whole of South Africa the data concerning the wind resources are subject to significant uncertainty. Ten years or more of reference data is typically available for wind farm developments in Annex 1 countries. The lack of long-term reference data introduces an important degree of risk that the data obtained from site monitoring will prove to be incorrect and misrepresentative of the long term wind resources in this coastal area. This project is clearly far more risky than any other wind project in other similar countries and this risk-adjusted profile needs to be taken into account in any investment decision. CER revenues would provide additional return to the project and thereby compensate the project proponent for some of the additional risk it faces due to technological barriers.

Barriers due to prevailing practice, inter alia:

The project activity is a “first of its kind” in South Africa and in the region.

There are currently no existing running projects of a similar kind in South Africa. This will be the first commercial wind farm project in South Africa. This is not common practice in South Africa.

The ‘First of its kind’ barrier and the infrastructure barrier do not prevent the implementation of alternative 4 “Electricity generated by the operation of grid-connected power plants and by the addition of new generating sources”. Electricity is already generated by the grid and only some of the possible new additions will face the same ‘First of its kind’ barrier (e.g. Concentrated Solar Power or Photovoltaic). The project activity is, therefore, additional under Step 3, even though additionality has already been shown under Step 2, investment analysis.

Step 4 (Common practice analysis)

In line with the “Tool for the demonstration of and assessment of additionality” (version 05.2), this step is omitted because in step 3 it has been demonstrated that the project is a “first-of-a-kind”.

**B.6. 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:

$$PE_y = 0 \tag{1}$$

***Baseline emissions***

According to the methodology, the baseline emissions include only CO<sub>2</sub> 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:

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

Where:

$BE_y$  = Baseline emissions in year  $y$  (tCO<sub>2</sub>/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<sub>2</sub> emission factor for grid connected power generation in year  $y$  calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO<sub>2</sub>/MWh)

#### Calculation of $EG_{PJ,y}$

The proposed 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**

In line with the baseline methodology procedure in the “Tool to calculate the emission factor for an electricity system” version 2, the baseline emission factor is calculated as a combined margin ( $EF_{grid,CM,y}$ ), consisting of the combination of operating margin ( $EF_{grid,OM,y}$ ) and build margin ( $EF_{grid,BM,y}$ ). The following six steps defined this calculation:

##### **Step 1: Identify the relevant electricity systems**

The wind farm project will be connected to the National Grid of South Africa. The National Grid of South Africa clearly represents the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. We therefore regarded the National Grid of South Africa as the relevant electricity system for the Project activity.

##### **Step 2: Select a method to determine the operating margin (OM)**

In South Africa, Eskom dominates the electricity supply market, and only a few municipal and private generators exist. There is public information available for Eskom power plants through 2008, while for private generators the information available is only partial and ends in 2005. It is considered to be



acceptable that the Eskom represent the electricity production industry in South Africa, as it produces over 95% of electricity in South Africa. Only less than 5% comes from private and municipal generators<sup>5</sup>.

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

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

The grid calculation data on the Eskom website<sup>6</sup> indicates that in South Africa low cost must run resources constitute less than 50% of total grid generation. Thus the option **(a) Simple OM** method will be used and the **ex ante** method to calculate the ( $EF_{grid,OM,y}$ ) will be used with the 3- year generation-weighted average for 2007, 2008 and 2009 which are the last three years for which the total information is 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.

### ***Step 3: Calculate the operating margin emission factor according to the selected method***

The simple OM emission factor is calculated as the generation-weighted average CO<sub>2</sub> emissions per unit net electricity generation (t CO<sub>2</sub>/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated:

- Option A: Based on the net electricity generation and a CO<sub>2</sub> emission factor of each power unit; or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option A will be used as the data is available. *Calculation based on average efficiency and electricity generation of each plant*

Under this option, the simple OM emission factor is calculated based on the net electricity generation of each power unit and an emission factor for each power unit. The most recent data available for the 3-year generation-weighted average is 2007, 2008, 2009. The following calculation was used:

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

Where :

<sup>5</sup> [http://www.eia.doe.gov/emeu/cabs/South\\_Africa/Electricity.html](http://www.eia.doe.gov/emeu/cabs/South_Africa/Electricity.html)

<sup>6</sup> [http://www.eskom.co.za/live/content.php?Item\\_ID=4226](http://www.eskom.co.za/live/content.php?Item_ID=4226)



$EF_{grid,OMsimple,y}$  = Simple operating margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)  
 $EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit  $m$  in year  $y$  (MWh)  
 $EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)  
 $m$  = All power units serving the grid in year  $y$  except low-cost / must-run power units  
 $y$  = The relevant year as per the data vintage chosen in Step 3

**Option A1.** If for a power unit  $m$  data on fuel consumption and electricity generation is available, the emission factor ( $EF_{EL,m,y}$ ) should be determined as follows:

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_{m,y}}$$

Where :

$EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)  
 $FC_{i,m,y}$  = Amount of fossil fuel type  $i$  consumed by power unit  $m$  in year  $y$  (Mass or volume unit)  
 $NCV_{i,y}$  = Net calorific value (energy content) of fossil fuel type  $i$  in year  $y$  (GJ/mass or volume unit)  
 $EF_{CO_2,i,y}$  = CO<sub>2</sub> emission factor of fossil fuel type  $i$  in year  $y$  (tCO<sub>2</sub>/GJ)  
 $EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit  $m$  in year  $y$  (MWh)  
 $m$  = All power units serving the grid in year  $y$  except low-cost/must-run power units  
 $i$  = All fossil fuel types combusted in power unit  $m$  in year  $y$   
 $y$  = The relevant year as per the data vintage chosen in Step 3

See separate calculation sheet for full calculations of  $EF_{EL,m,y}$

**Step 4: Identify the group of power units to be included in the build margin**

The sample group of power units  $m$  used to calculate the build margin consists of the set of five power units that have been built most recently. The **ex ante** method will be used. The set of five power units that have been built most recently are.

- Kendal
- Lethabo
- Matimba
- Majuba
- Tutuka

**Step 5: Calculate the build margin emission factor**

The build margin emissions factor is the generation-weighted average emission factor (tCO<sub>2</sub>/MWh) of all power units  $m$  during the most recent year  $y$  for which power generation data is available, calculated as follows:

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



Where :

$EF_{grid,BM,y}$  = Build margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)

$EG_{m,y}$  = Net quantity of electricity generated and delivered to the grid by power unit  $m$  in year  $y$  (MWh)

$EF_{EL,m,y}$  = CO<sub>2</sub> emission factor of power unit  $m$  in year  $y$  (tCO<sub>2</sub>/MWh)

$m$  = All power units serving the grid in year  $y$  except low-cost / must-run power units

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

Table 3 years 2007, 2008, 2009

| Plant        | Average CO2 Emissions | Average MWh Emissions | %             | tCO2/MWh | Weighted CO2  |
|--------------|-----------------------|-----------------------|---------------|----------|---------------|
| Kendal       | 26,387,820            | 24,555,284            | 20.3%         | 1.07     | 0.22          |
| Lethabo      | 31,051,954            | 24,934,884            | 20.6%         | 1.25     | 0.26          |
| Matimba      | 25,385,064            | 27,747,317            | 22.9%         | 0.91     | 0.21          |
| Majuba       | 21,987,056            | 22,899,325            | 18.9%         | 0.96     | 0.18          |
| Tutuka       | 22,718,705            | 20,777,419            | 17.2%         | 1.09     | 0.19          |
| <b>Total</b> | <b>127,530,599</b>    | <b>120,914,230</b>    | <b>100,0%</b> |          | <b>1.0547</b> |

$EF_{grid,BM,y}$

**Step 6: Calculate the combined margin emissions factor**

The combined margin emissions factor is calculated as follows:

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

$EF_{grid,BM,y}$  = Build margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)

$EF_{grid,OM,y}$  = Operating margin CO<sub>2</sub> emission factor in year  $y$  (tCO<sub>2</sub>/MWh)

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

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

For the proposed project the  $W_{OM} = 0.5$  and  $W_{BM} = 0.5$  will be used.

As seen in Separate calculation sheet

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

$$EF_{grid,CM,y} = 1.2954 \times 0.5 + 1.0547 \times 0.5$$

$$EF_{grid,CM,y} = \mathbf{1.1750 \text{ tCO}_2/\text{MWh}}$$



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

### Leakage

According to ACM0002, Version 12.1.0, 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<sub>2</sub>e/yr).

$BE_y$  = Baseline emissions in year y (t CO<sub>2</sub>e/yr).

$PE_y$  = Project emissions in year y (t CO<sub>2</sub>/yr).

$LE_y$  = Leakage emissions in year y (t CO<sub>2</sub>/yr).

#### B.6.2. Data and parameters that are available at validation:

|   |  |
|---|--|
| <b>Data / Parameter:</b>  | EG <sub>m,y</sub>  |
| Data unit:  | MWh  |
| Description:  | Net quantity of electricity generated and delivered to the grid by power unit <i>m</i> in year <i>y</i>  |
| Source of data used:  | Eskom make this data available on their website specifically for CDM calculations it includes electricity produced and fuel consumption<br><a href="http://www.eskom.co.za/live/content.php?Item_ID=4226">http://www.eskom.co.za/live/content.php?Item_ID=4226</a> |
| Value applied:  | See separate calculation sheet   |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The selection of data satisfies the guidance in the “Tool to calculate the emission factor for an electricity system” (version 2). The figures used are the data for the three most recent years available.  |
| Any comment:  | For calculation EF <sub>grid,OMsimple,y</sub> as well as EF <sub>EL,m,y</sub> and EF <sub>grid,BM,y</sub>  |

|                          |   |
|--------------------------|---|
| <b>Data / Parameter:</b> | EF <sub>EL,m,y</sub>  |
| Data unit:               | tCO <sub>2</sub> /MWh   |
| Description:             | CO <sub>2</sub> emission factor of power unit <i>m</i> in year <i>y</i> |



|   |   |
|---|---|
| Source of data used:  | Using the figures provide on the Eskom website specifically for CDM calculations it includes electricity produced and fuel consumption one can calculate this value <a href="http://www.eskom.co.za/live/content.php?Item_ID=4226">http://www.eskom.co.za/live/content.php?Item_ID=4226</a> |
| Value applied:  | See separate calculation sheet  |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The selection of data satisfies the guidance in the “Tool to calculate the emission factor for an electricity system” (version 2). The figures used are the data for the three most recent years available.   |
| Any comment:  |   |

|   |  |
|---|--|
| <b>Data / Parameter:</b>  | $FC_{i,m,y}$   |
| Data unit:  | Mass or volume unit  |
| Description:  | Net quantity of fossil fuel type $i$ consumed by power unit $m$ in year $y$  |
| Source of data used:  | Using the figures provide on the Eskom website specifically for CDM calculations it includes electricity produced and fuel consumption one can obtain this value <a href="http://www.eskom.co.za/live/content.php?Item_ID=4226">http://www.eskom.co.za/live/content.php?Item_ID=4226</a> |
| Value applied:  | See separate calculation sheet   |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The selection of data satisfies the guidance in the “Tool to calculate the emission factor for an electricity system” (version 2). The figures used are the data for the three most recent years available.  |
| Any comment:  |  |

|   |   |
|---|---|
| <b>Data / Parameter:</b>  | $NCV_{i,y}$   |
| Data unit:  | GJ/mass or volume unit  |
| Description:  | Net calorific value (energy content) of fossil fuel type $i$ in year $y$  |
| Source of data used:  | NCV of Coal: Eskom annual report 2008, p.216,<br><a href="http://www.eskom.co.za/annreport08/">http://www.eskom.co.za/annreport08/</a><br>NCV of Kerosene: IPCC default values (2006, Guidelines for National Greenhouse Gas Inventory, Volume 2, p.1.18, p.1.23) |
| Value applied:  | See separate calculation sheet  |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | The factor is calculated according the guidance given in the “Tool to calculate the emission factor for an electricity system” (version 2).   |
| Any comment:  |   |

|                          |                      |
|--------------------------|----------------------|
| <b>Data / Parameter:</b> | $EF_{CO_2,i,y}$      |
| Data unit:               | tCO <sub>2</sub> /GJ |



|   |  |
|---|--|
| Description:  | CO <sub>2</sub> emission factor of fossil fuel type <i>i</i> in year <i>y</i>  |
| Source of data used:  | Coal emission factor (IPCC default value 2006)   |
| Value applied:  | See separate calculation sheet   |
| Justification of the choice of data or description of measurement methods and procedures actually applied : | Using IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of <i>2006 IPCC Guidelines on National GHG Inventories</i> |
| Any 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:

$$EF_{grid,CM,y} = 1,1750 \text{ tCO}_2/\text{MWh}$$

#### Calculation of $EG_{PJ,y}$

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

$$EG_{PJ,y} = 141,700 \text{ MWh/yr}$$

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<sub>2</sub> 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:

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

$$BE_y = 141,700 \text{ MWh/yr} \times 1.1750 \text{ tCO}_2/\text{MWh}$$

$$BE_y = 166,498 \text{ tCO}_2/\text{yr}$$

$BE_y$  = Baseline emissions in year *y* (tCO<sub>2</sub>/yr)



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

$EF_{grid,CM,y}$  = Combined margin  $CO_2$  emission factor for grid connected power generation in year  $y$  calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO<sub>2</sub>/MWh)

**Ex-ante** Emission reductions are calculated as follows:

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

$$ER_y = 166,498 \text{ tCO}_2/\text{yr} - 0 - 0$$

$$ER_y = 166,498 \text{ tCO}_2/\text{yr}$$

Where:

$ER_y$  = Emission reductions in year  $y$  (t CO<sub>2</sub>e/yr).

$BE_y$  = Baseline emissions in year  $y$  (t CO<sub>2</sub>e/yr).

$PE_y$  = Project emissions in year  $y$  (t CO<sub>2</sub>/yr).

$LE_y$  = Leakage emissions in year  $y$  (t CO<sub>2</sub>/yr).

#### B.6.4 Summary of the ex-ante estimation of emission reductions:

>>

Table 4

| Period                          | Estimation of Project activity emissions (tCO <sub>2</sub> e) | Estimation of the Baseline emissions (tCO <sub>2</sub> e) | Estimation of leakage (tCO <sub>2</sub> e) | Estimation of overall emission reductions (tCO <sub>2</sub> e) |
|---------------------------------|---|---|--|--|
| 2012                            | 0   | 4700  |  | 4700   |
| 2013                            | 0   | 166,498   | 0  | 166,498  |
| 2014                            | 0   | 166,498   | 0  | 166,498  |
| 2015                            | 0   | 166,498   | 0  | 166,498  |
| 2016                            | 0   | 166,498   | 0  | 166,498  |
| 2017                            | 0   | 166,498   | 0  | 166,498  |
| 2018                            | 0   | 166,498   | 0  | 166,498  |
| <b>Total (tCO<sub>2</sub>e)</b> | 0   | <b>1,003,688</b>  | 0  | <b>1,003,688</b>   |

#### B.7. Application of the monitoring methodology and description of the monitoring plan:



All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data will be monitored if not indicated otherwise in the tables below. All measurements will be conducted with calibrated measurement equipment according to relevant industry standards.

|   |
|---|
| <b>B.7.1 Data and parameters monitored:</b> |
|---|

|  |   |
|--|---|
| <b>Data / Parameter:</b>   | EG <sub>facility,y</sub>  |
| Data unit:   | MWh/year  |
| Description:   | 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). |
| Source of data to be used:   | Metering equipment installed at project activity site   |
| Value of data applied for the purpose of calculating expected emission reductions in section B.5 | 141,700 MWh/yr once fully operational   |
| Description of measurement methods and procedures to be applied:                                 | See Annex 4   |
| QA/QC procedures to be applied:  | See Annex 4   |
| Any comment:   | See Annex 4   |

|   |
|---|
| <b>B.7.2. Description of the monitoring plan:</b> |
|---|

>>

The total responsibility for the monitoring as defined in this monitoring plan will be held by the project owner.

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 version 12.1.0 of ACM0002, there is no need to project emissions and monitor leakage under this project activity.

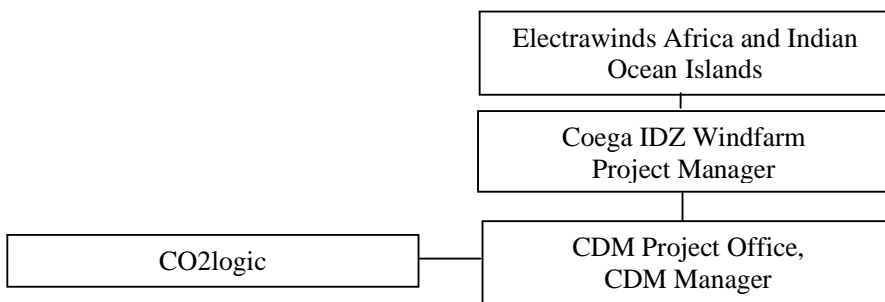
The output from this project is monitored and recorded using a meters installed at the onsite substation. The meter readings are used for both CDM purposes and sales of the electricity generated to the grid company. The meter used will be installed and sealed by Vincotte – Infrac and is a Landis & Gyr ZMD405CT41.0607S2 current ratiom 125 / 5 class 0.5s.



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:



Further details on the monitoring plan is presented in Annex 4.

**B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies):**

>>

Date of completion of the baseline study and monitoring methodology: 20/02/2010

CO2logic prepared the PDD. CO2logic is a project participant. Contact information is given in Annex 1.

The responsible person and entity is:

Mr Tanguy du Monceau tanguy@co2logic.com +32477801141

**SECTION C. Duration of the project activity / crediting period**

**C.1. Duration of the project activity:**

**C.1.1. Starting date of the project activity:**

>>

The start date of the project was 22/03/2010



“the earliest date at which either the implementation or construction or real action of a project activity begins”.

**C.1.2. Expected operational lifetime of the project activity:**

>>

20 years (240 months)

**C.2. Choice of the crediting period and related information:**

**C.2.1. Renewable crediting period:**

**C.2.1.1. Starting date of the first crediting period:**

>>

01/01/2012 (or the date of registration, whichever is later)

**C.2.1.2. Length of the first crediting period:**

>>

7yrs (84 months)

**C.2.2. Fixed crediting period:**

**C.2.2.1. Starting date:**

>>

Not chosen

**C.2.2.2. Length:**

>>

Not chosen

**SECTION D. Environmental impacts**

>>

**D.1. Documentation on the analysis of the environmental impacts, including transboundary 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 Electrawinds 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 planned 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. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:**

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.

**D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:**

>>

Environmental impacts are not considered significant.

#### **SECTION E. Stakeholders’ comments**

>>

**E.1. Brief description how comments by local stakeholders have been invited and compiled:**

&gt;&gt;

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 (22<sup>nd</sup> 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](http://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](http://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 the comments received:**

&gt;&gt;

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:

Civil Aviation Impacts

*Radar and aviation impacts*

Noise related Impacts

*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. Report on how due account was taken of any 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.*

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

|                  |  |
|------------------|--|
| Organization:    | Electrawinds Africa and Indian Ocean Islands (Pty) Ltd         |
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| Country:         | South Africa   |
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| FAX:             | +2786 6008622  |
| E-Mail:          | <a href="mailto:emil@megatrade.co.za">emil@megatrade.co.za</a> |
| URL:             | <a href="http://www.electrawinds.be">www.electrawinds.be</a>   |
| Represented by:  | Country Manager  |
| Title:           | Country Director   |
| Salutation:      |  |
| Last name:       | Unger  |
| Middle name:     |  |
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| Direct tel:      |  |
| Personal e-mail: |  |



|                  |  |
|------------------|--|
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| State/Region:    | Brussels   |
| Postcode/ZIP:    | 1000   |
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| E-Mail:          | <a href="mailto:tanguy@co2logic.com">tanguy@co2logic.com</a> |
| URL:             | <a href="http://www.co2logic.com">www.co2logic.com</a>       |
| Represented by:  | Mr Tanguy du Monceau   |
| Title:           | Managing Partner   |
| Salutation:      |  |
| Last name:       | du Monceau   |
| Middle name:     | Diego  |
| First name:      | Tanguy   |
| Department:      |  |
| Mobile:          |  |
| Direct FAX:      |  |
| Direct tel:      |  |
| Personal e-mail: |  |



Annex 2

**INFORMATION REGARDING PUBLIC FUNDING**

NOT APPLICABLE



Annex 3  
ADDITIONALITY CALCULATION INFORMATION

Bloomberg African Government Securities

**<HELP>** for explanation. Govt **GOVT**  
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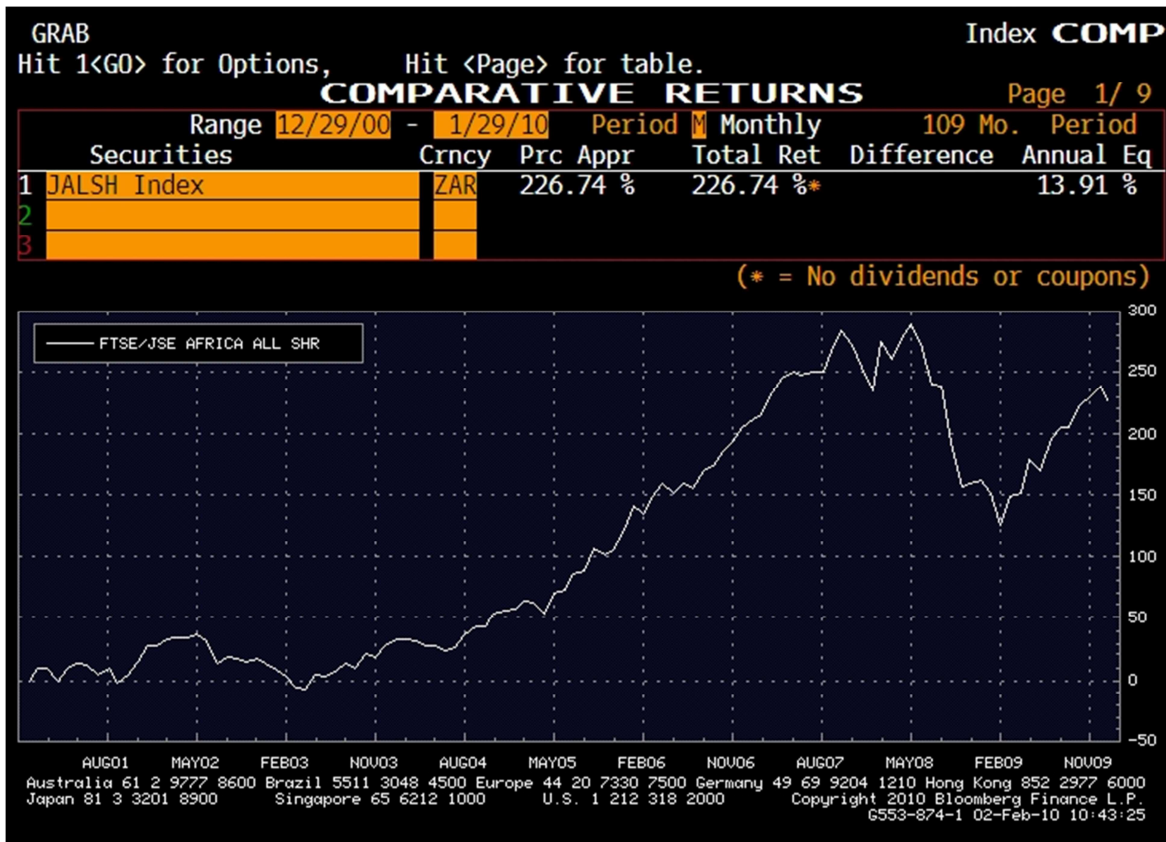
**Government Securities** Page 1/2

| Issuer              | Coupon | Maturity | Series | Rtg | Mty Type | Announce | Curr | Ask Px   | PCS  |
|---------------------|--------|----------|--------|-----|----------|----------|------|----------|------|
| 1)SOUTH AFRICA I/L  | 2.750  | 01/31/22 | R212   |     | BULLET   | 06/07/10 | ZAR  | N.A.     | N.A. |
| 2)SOUTH AFRICA I/L  | 2.500  | 01/31/17 | R211   | NR  | BULLET   | 06/04/10 | ZAR  | N.A.     | N.A. |
| 3)REP SOUTH AFRICA  | 7.000  | 02/28/31 | R213   | A-  | BULLET   | 05/19/10 | ZAR  | 83.2086  | BGN  |
| 4)REP SOUTH AFRICA  | 6.500  | 02/28/41 | R214   | A-  | BULLET   | 05/19/10 | ZAR  | 75.6572  | BGN  |
| 5)SOUTH AFRICA I/L  | 2.600  | 03/31/28 | R210   | NR  | BULLET   | 09/17/07 | ZAR  | N.A.     | N.A. |
| 6)REP SOUTH AFRICA  | 6.750  | 03/31/21 | R208   | A-  | BULLET   | 08/23/06 | ZAR  | 88.7720  | BGN  |
| 7)REP SOUTH AFRICA  | 6.250  | 03/31/36 | R209   | A-  | BULLET   | 07/12/06 | ZAR  | 74.6950  | BGN  |
| 8)REP SOUTH AFRICA  | 7.500  | 01/15/14 | R206   | A-  | BULLET   | 07/08/05 | ZAR  | 101.4731 | BGN  |
| 9)REP SOUTH AFRICA  | FLOAT  | 03/31/12 | R205   | NR  | BULLET   | 07/01/05 | ZAR  | N.A.     | N.A. |
| 10)REP SOUTH AFRICA | 7.250  | 01/15/20 | R207   | A-  | BULLET   | 06/08/05 | ZAR  | 93.1332  | BGN  |
| 11)REP SOUTH AFRICA | 8.000  | 12/21/18 | R204   | A-  | BULLET   | 04/16/04 | ZAR  | 98.2917  | BGN  |
| 12)REP SOUTH AFRICA | 8.250  | 09/15/17 | R203   | A-  | BULLET   | 04/16/04 | ZAR  | 100.4359 | BGN  |
| 13)SOUTH AFRICA I/L | 3.450  | 12/07/33 | R202   | A-  | BULLET   | 08/11/03 | ZAR  | 113.8440 | BGN  |
| 14)REP SOUTH AFRICA | 8.750  | 12/21/14 | R201   | A-  | BULLET   | 05/19/03 | ZAR  | 104.8372 | BGN  |
| 15)SOUTH AFRICA I/L | 5.500  | 12/07/23 | R197   | A-  | BULLET   | 05/09/01 | ZAR  | 131.6120 | BGN  |
| 16)SOUTH AFRICA I/L | 6.250  | 03/31/13 | R189   | A-  | BULLET   | 03/09/00 | ZAR  | 109.4250 | BGN  |
| 17)REP SOUTH AFRICA | 10.500 | 12/21/26 | R186   | A-  | BULLET   | 03/19/98 | ZAR  | 115.9464 | BGN  |
| 18)REP SOUTH AFRICA | 0.000  | 09/15/16 | Z109   | A-  | BULLET   | 11/24/97 | ZAR  | 64.7210  | BVAL |
| 19)REP SOUTH AFRICA | 0.000  | 09/30/19 | Z083   | A   | BULLET   | 04/01/96 | ZAR  | 48.2210  | BVAL |
| 20)REP SOUTH AFRICA | 0.000  | 11/30/14 | Z025   | A-  | BULLET   | 05/18/94 | ZAR  | 76.3450  | BVAL |

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000  
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2011 Bloomberg Finance L.P.  
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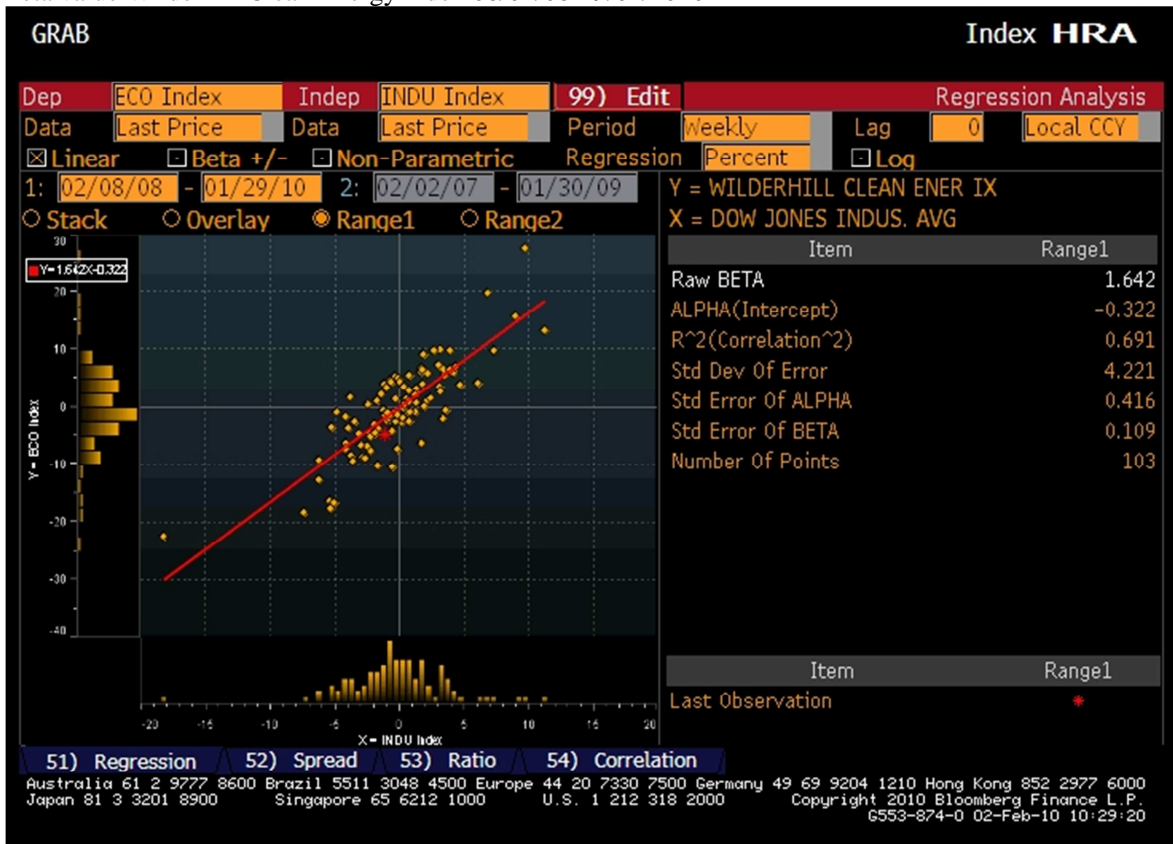
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|---------|-------------------------------|
| 2000    | 6.25                          |
| 2001    | 5.5                           |
| 2002    | 5.8 (Average 2001 and 2003)   |
| 2003    | 6.1                           |
| 2004    | 8.125                         |
| 2005    | 7.375                         |
| 2006    | 6.5                           |
| 2007    | 6.625 (Average 2006 and 2010) |
| 2008    | 6.625 (Average 2006 and 2010) |
| 2009    | 6.625 (Average 2006 and 2010) |
| 2010    | 6.75                          |
| Average | 6.57 %                        |

29/01/2010 JALSH Index South African Stock Exchange 10 year





Beta value Wilderhill Clean Energy index 08/02/08-29/01/2010





#### Annex 4

### MONITORING INFORMATION

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#### MONITORING INFORMATION

In order to enable verification of emission reductions the project activity must maintain credible, transparent and adequate data measurement, collection, estimation, and tracking systems. The monitoring plan is to serve for Electrawinds Africa and Indian Ocean Islands (Pty) Ltd (the project owner) to monitor the emission reduction of the proposed project.

##### **Monitoring subject**

The main data to be monitored is  $EG_{PI,y}$  (Net electricity generated and delivered in the project electricity system in year y). To calculate the annual emission reduction in the PDD, The calibration procedure, QA/QC and data management of the proposed project will also be monitored.

##### **Training program**

The project owner will train all related staff before the start of the crediting period. The training will contain CDM knowledge, operational regulations, quality control (QC), data monitoring requirements and data management regulations, etc.

##### **Other provisions**

If problems occur that may affect the quality of data, Electrawinds Africa and Indian Ocean Islands (Pty) Ltd will inform the project proponent and offtaker of the need for corrective actions. For instance, metering equipment installed shall be inspected by an accredited inspection agency after the repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications. In the case that data quality problems result in uncertainty issues Electrawinds Africa and Indian Ocean Islands (Pty) Ltd will always use the more conservative value from an energy generation or emission factor standpoint in preparing calculations and monitoring data for verification.

##### **Description of the measurement methods and procedures to be applied?**

The net quantity of electricity generated is metered on site using the main metering system (SCADA controls and communication) and quantified in generation data. The quantity of electricity supplied to the grid will be measured continuously and recorded monthly. Electrawinds Africa and Indian Ocean Islands (Pty) Ltd shall install a data recorder and shall make a continuous recording of the Net Electrical Output. Such Net Electrical Output shall be recorded on appropriate magnetic media or equivalent. The data shall be stored in long-term data storage. The basic measurement period shall be 10 minutes. The metering shall register per measurement period the following data: per kWh and kVARh meter the delivered energy and reactive power and the metering period. The measurement period shall be synchronized on the national standard time. The deviation of the start and stop time shall not be greater than 5 sec. When the synchronization system is out of service, the deviation of start and stop time shall be less as 10 sec in max one week. All data shall be transferred to the meter data buffer, and to the SCADA systems of Electrawinds Africa and Indian Ocean Islands (Pty) Ltd. In case the data measured and stored differ, the meter data buffer prevails. The Metering System shall be



read monthly on distance on the last day of each month (or such other day as may be agreed upon by the Parties) for the purpose of determining the Net Electrical Output of the Plant since the preceding reading. Electrawinds Africa and Indian Ocean Islands (Pty) Ltd shall read the Metering System by reading the log in the SCADA system and taking the kWh meter position on the first day of the calendar month at 0:00 midnight. All data collected as such will be archived electronically and be kept at least for two years after the end of the last crediting period as required by ACM0002/Version 12.1.0

**QA/QC procedures to be applied?**

Actual electricity supplied by the project activity to the grid as per main metering equipment measurements. Reconciliation of data with backup metering system as needed. Meters will have a fixed seal not to be broken by the project proponent. Monthly on-site physical verification checks, including use of photographic facilities. The Main Metering Equipment and the Back-Up Metering Equipment shall be installed according to the requirement of the SA.

Electricity Grid Code and shall adhere to international standards and measured accuracy of class 0.5%.

Any programmable settings available within a metering installation, data logger or any peripheral device, which may affect the resolution of displayed or stored data, shall meet the relevant requirements of IEC 1036 and shall comply with any applicable specifications or guidelines. The method of calibration and frequency of tests shall be done every five years; based on knowledge of the performance and the design of the installed meters and the manufacturers' recommendations.

**Any comment?**

The Power Purchase Agreement Schedules contain detailed procedures on how electricity metering will take place.