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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

Project Title: Grid Connected Wind Power Plant in Witberg, South Africa
Version No: 01
Date of Document Completion: 22 January 2010

A.2. Description of the project activity:

The purpose of the project activity
The objective of the Witberg Wind Farm (henceforth referred to as 'the project') is to reduce greenhouse gas emissions through producing electricity from wind which is a renewable resource.

The project details are as follows:

- **The project scenario:** The project will involve the installation of up to 60.0 wind turbines on farms near Laingsburg in the Western Cape Province of South Africa. The electricity will be supplied onto the South African national electricity grid. The project will generate an estimated 507,204.0 Megawatt hours (henceforth represented as MWh) of electricity per year with an installed capacity of up to 150.0 Megawatts (henceforth represented as MW).
- **The scenario existing prior to the start of the implementation of the project activity:** The land on which the wind turbines will be erected is zoned for agricultural use.
- **The baseline scenario:** The baseline scenario is similar to the scenario existing prior to the start of the implementation of the project activity. The baseline for the project is the South African national electricity grid and, as such, the baseline is calculated using the emission factor for the national grid. The electricity generated from the project will be fed onto the South African national electricity grid. According to the South African Department of Energy, almost 90.0 percent (%) of South Africa's electricity is generated in coal-fired power stations[1]. Hence, grid electricity is predominantly coal-based and, as such, has an associated high greenhouse gas emission factor.
- **Current project development stage:** Currently, a permanent 80.0 metre wind measuring mast has been installed to gather data on wind velocities. This will enable the project developers to finalise the design of the plant including obtaining confirmation on both the configuration of the turbines and the size of the plant as well as to verify the estimated electricity generation of the project. The planned commissioning date for the power plant is 2014.
- **Reduction in greenhouse gas emissions:** The emission reductions result from the displacement of grid electricity through the supply of clean electricity generated using wind as a renewable resource.

Contribution to sustainable development
The South African Designated National Authority (DNA) has defined sustainable development in terms of three core categories: environmental, economic and social. The project contributes to each of the three categories in the following manner:

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[1] South African Department of Energy. 2010. Available online from: http://www.energy.gov.za/files/electricity_frame.html. Accessed 21 September 2010.

Economic

The project will contribute to national economic development in the following ways:

- The project will contribute to national economic development through the sales of the Certified Emission Reductions (CERs) which will result in an inflow of foreign exchange.
- EnBW Energie Baden-Württemberg AG, European energy provider, is a shareholder in G7 and is interested in acquiring the CERs from this wind power project. This, in itself, represents a foreign investment in South Africa.
- The success of this project in South Africa will encourage both local and international investment in the power generation sector and a diversification of energy supply.
- The project developers will be applying for the Renewable Energy Feed-In Tariffs (REFIT) as established in 2009 by the National Energy Regulator of South Africa (NERSA). The success of this project under the REFIT will promote investor confidence in the country and will encourage the growth of the renewable energy sector in South Africa.
- The project is a renewable energy power plant that will generate electricity and supply the electricity to the national electricity grid. Independent power generation represents a significant growth area for South Africa. The success of this project in the South African independent power generation regulatory framework will encourage other project developers to undertake clean power generation. In addition, the success of this project will encourage overseas investors to invest in the development of South Africa's clean energy sector. Encouraging international investment in local projects will contribute significantly towards national economic development.
- The wind power plant will assist in meeting the renewable energy targets on both a country and a provincial level. According to the White Paper on Renewable Energy, South Africa aims to diversify its power supply to include 10,000.0 GWh of electricity from renewable energy by 2013. The project will contribute to the Western Cape's target of 15.0% of its electricity mix from renewable energy by 2014.
- South Africa committed to a greenhouse gas emission reduction target of 34.0% by 2020 and 42.0% by 2025 at the climate change conference in Copenhagen held in December 2009. This commitment was re-iterated in the Integrated Resource Plan (IRP) for 2010. The project will assist in achieving this target by increasing the renewable energy component of the national electricity mix. National Treasury is investigating implementing a carbon tax. In the long term, the growth of clean energy will reduce the carbon tax that the private sector will be required to pay for using grid electricity. This, in turn, will reduce the negative impact that the carbon tax may have on the economy.

Social

The project will contribute to social development in South Africa in a number of ways:

- The project will result in the creation of temporary jobs in the construction phase of the project. A number of local people will be employed during construction for site security, manual labour, transportation of goods and other similar services.
- The project will result in technology transfer from developed countries to South Africa. In addition, a team of locals will be trained to maintain the wind turbines which will ensure the transfer of skills to South Africa.

- The success of the project will encourage the growth of the renewable energy sector in South Africa which may result in the creation of 'green' jobs. The success of the project will also encourage the diversification of South Africa's energy mix and the growth of Independent Power Producers (IPPs) in South Africa.
- The project encourages the use of renewable resources as opposed to fossil fuels and assists towards sustainable energy use.
- A portion of the proceeds from the sale of the electricity will be used to supplement the income of marginal farms as the landowners will receive payment for the use of their land during the operational phase.

Environmental

The project developers are in the process of conducting an Environmental Impact Assessment (EIA) for the project in accordance with the National Environmental Management Act (NEMA). The project conforms to the NEMA principles of sustainable development in the following ways:

- The project results in a reduction of greenhouse gas emissions by displacing coal-fired grid electricity with electricity generated from a renewable resource. This reduction in greenhouse gas emissions will play a role in assisting South Africa to achieve its emission reduction target of 34.0% below business-as-usual by 2020.
- The generation of electricity from wind power does not require the use of water. This is in direct contrast to the generation of electricity from coal.
- The footprint of the turbines is relatively small and this will allow for daily activities to continue undisturbed. The placement of wind turbines and associated infrastructure will take existing site activities into account to limit disruption.
- The project will make use of a renewable resource to generate electricity. The electricity will be fed onto the national electricity grid and displace coal-fired electricity. Apart from reducing greenhouse gas emissions, the project will displace the negative impacts of coal-mining and beneficiation as well as the adverse environmental impacts of combusting coal (particulate and sulphur emissions and water consumption and contamination). The success of the project will assist in encouraging the diversification of South Africa's energy mix and the use of renewable resources.

An environmental and social screening study was initiated which potential impacts. Amongst the impacts identified were the following: potential noise, visual and landscape impacts and flora, fauna and bird life impacts. These impacts will be assessed through a number of specialist studies during the EIA process and mitigating actions will be put in place to ensure that the impacts are managed and reduced where possible.

A.3. Project participants:

Name of Party involved ((host) indicates host Party)	Private and/or public entity project participants	Indication if party involved wishes to be considered as a project participant
Germany	Private entity Energie Baden Württemberg Kraftwerke AG	No
South Africa (host)	Private entity G7 Renewable Energies	No

	(Pty) Ltd.	

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

South Africa

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

Western Cape Province

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

The project is located west of Matjiesfontein and east of Touws River in the Laingsburg Municipality.

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

The project is located on the following farms:
Jantjesfontein (Farm RE/164)
Besten Weg (Farm 1/150 and Farm RE/150)
Tweeside (Farm RE/151)
Elandskrag (1/269)

The geographical co-ordinates of the project are as follows:
32°55’2.04’’S
20°30’32.72’’E

The location of the project is depicted below:

Figure 1: Provincial Map of South Africa from One World Nations Online[2]

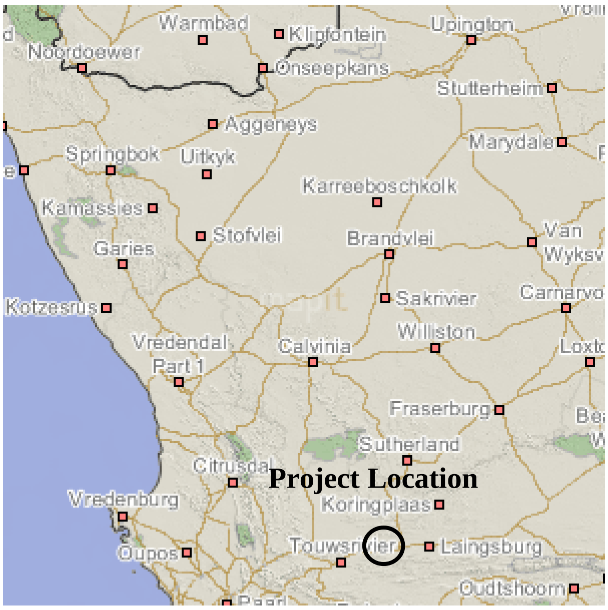


Figure 2: Map of the Western Cape from Street Maps[3]

[2] One World Nations Online. 2010. Map of South Africa Provinces. Available online from http://www.nationsonline.org/maps/south_africa_prov_map2.jpg&imgrefurl. Accessed 21 September 2010.

[3] Street Maps. 2010. Map of the Western Cape. Available online from http://www.streetmaps.co.za/. Accessed 21 September 2010.

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

The project falls within sectoral scope 01.0.

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

Description of the technology and measures implemented in the project activity
The project involves the installation of a wind farm near the town of Laingsburg in the Western Cape. The technical details of the plant are as follows:

Parameter	Value	Unit
Load Factor	38.6	Percentage (%)
Plant Electricity Generation	507,204.0	Megawatt hours (MWh)
Number of Turbines	60.0	
Rated capacity of each turbine	2.5	Megawatt (MW)
Installed capacity of plant	150.0	Megawatt (MW)
Rotor Diameter	90.0	Metres (m)
Height of Hub	60.0	Metres (m)

Each turbine will be accompanied by an electrical transformer. The turbines will be connected together via medium voltage electrical cables, which will be buried under the ground leading to a substation on site. A new substation will be constructed on site to connect the wind farm to the South African national electricity grid via existing transmission lines. Depending on the final location of the substation, the development may include a short 132 kV overhead transmission line (approximately 2 km) between the substation and the existing transmission lines.

The equipment that will be installed in the project is as follows:

- Turbines
- Electrical transformer for each turbine
- Electrical connections
- The new substation

Transfer of technology and know-how
South Africa has limited experience both in operating and manufacturing wind turbines. Currently, there are only two wind farms in operation in South Africa. These are the Darling and Klipheuwal wind farms.

Klipheuwal wind farm was erected by Eskom in 2002/3 as a research programme and has a total generating capacity of 3.2 MW[4]. The installed capacity of Darling wind farm is 5.2 MW. The wind farm was erected by private investors in 2007. The wind farm has been given the status of a national

[4] Eskom. Klipheuwal Fact Sheet. Available online from www.eskom.co.za/content/RW%200002Kliph**Wind**fRev3.doc. Accessed 23 September 2010.

demonstration project. The electricity produced by the wind farm is sold to the City of Cape Town at a negotiated tariff[5].

These wind farms are all relatively small, having less than four wind turbines installed. In addition, the wind farms are demonstration projects. The Witberg wind farm will consist of 60.0 turbines and will be a large scale commercial wind farm. The development of large-scale commercial wind farms such as this project will encourage the growth of the wind power industry in South Africa and result in technological transfer to South Africa.

The project will result in the creation of a number of jobs during the construction and operations phase. The aim is to appoint local people who will be trained by the turbine manufacturers. This training will result in skills and know-how transfer to South Africa.

The scenario existing prior to the start of the implementation of the project activity
The project is located on farms near the town of Laingsburg in the Western Cape Province of South Africa.

The project will feed electricity on to the South African national electricity grid. Currently, the grid is predominantly coal-based. According to the South African Department of Energy, almost 90.0 percent (%) of South Africa's electricity is generated in coal-fired power stations[6].

The baseline scenario
The baseline for this project is the continuation of the existing scenario (business-as-usual). This would be the current fuel mix of the electricity generated and fed to the South African national electricity grid. According to the South African Department of Energy, almost 90.0 percent (%) of South Africa's electricity is generated in coal-fired power stations[7].

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

Years	Annual estimation of emission reductions in tonnes of CO_2 e
1 January 2014 – 31 December 2014	527,492.16
1 January 2015 – 31 December 2015	527,492.16
1 January 2016 – 31 December 2016	527,492.16
1 January 2017 – 31 December 2017	527,492.16
1 January 2018 – 31 December 2018	527,492.16
1 January 2019 – 31 December 2019	527,492.16
1 January 2020 – 31 December 2020	527,492.16
Total estimated reductions (tonnes of CO_2 e)	3,692,445.12

[5] Darling Wind Power (Pty) Ltd. Available online from http://www.darlingwindfarm.co.za/aboutus.htm. Accessed 23 September 2010.

[6] South African Department of Energy. 2010. Available online from: http://www.energy.gov.za/files/electricity_frame.html. Accessed 21 September 2010.

[7] South African Department of Energy. 2010. Available online from: http://www.energy.gov.za/files/electricity_frame.html. Accessed 21 September 2010.

Total number of crediting years	7 (renewable twice)
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	527,137.52

A.4.5. Public funding of the project activity:

The project will not receive any public funding from Annex 1 Parties.

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:

The approved baseline and monitoring methodology applied to the project activity is ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable resources." (Version 12.1)

The project will also make use of the following methodological tools:

- "Tool for the demonstration and assessment of additionality" (Version 05.2)
- "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2)
- "Tool to calculate the emission factor for an electricity system" (Version 02.1.0)

The project will not make use of the following methodological tool as set out in the selected methodology:

- "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02.0) – no fossil fuels are combusted as part of this project activity.

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

The proposed project activity meets each of the applicability criteria as set out under ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable resources" (Version 12.1). This is demonstrated below:

Applicability

Criteria	Project
This methodology is applicable to grid-connected renewable power generated project activities that a) Install a new power plant at the site where no renewable energy 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 d) Involve a replacement of an existing plant	The project involves the installation of a grid-connected, renewable power plant on a farm land. The Witberg wind farm will be installed on a site where there is currently no renewable energy power plant. The plant will be a Greenfield plant.
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 is the installation of a wind power plant.
In case of capacity additions, retrofits or	The project is not a capacity addition, retrofit or

replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference of five years, used for the calculation of baseline emissions and defined in the baseline emissions 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.	replacement. The project is a new (Greenfield) power plant.
In the case of hydro power plants, one of the following conditions must apply: • The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or • The project activity results in the new reservoirs and the power density of the power plant, as per definitions given the Project Emissions section, is greater than 4 W/m_2.	The project is not a hydro power plant.
The methodology is not applicable to the following: • Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; • Biomass fired power plants; • Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m^2.	• The project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity. The electricity generated from the new power plant will be fed into South Africa's national electricity grid. • The project does not involve the combustion of biomass for the purpose of generating electricity. • The project does not involve the installation of a hydro power plant.
In the case of retrofit, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual	The project is not a retrofit, replacement or capacity addition.

maintenance".	

Hence, the project complies will all the applicability criteria as specified in the selected methodology.

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

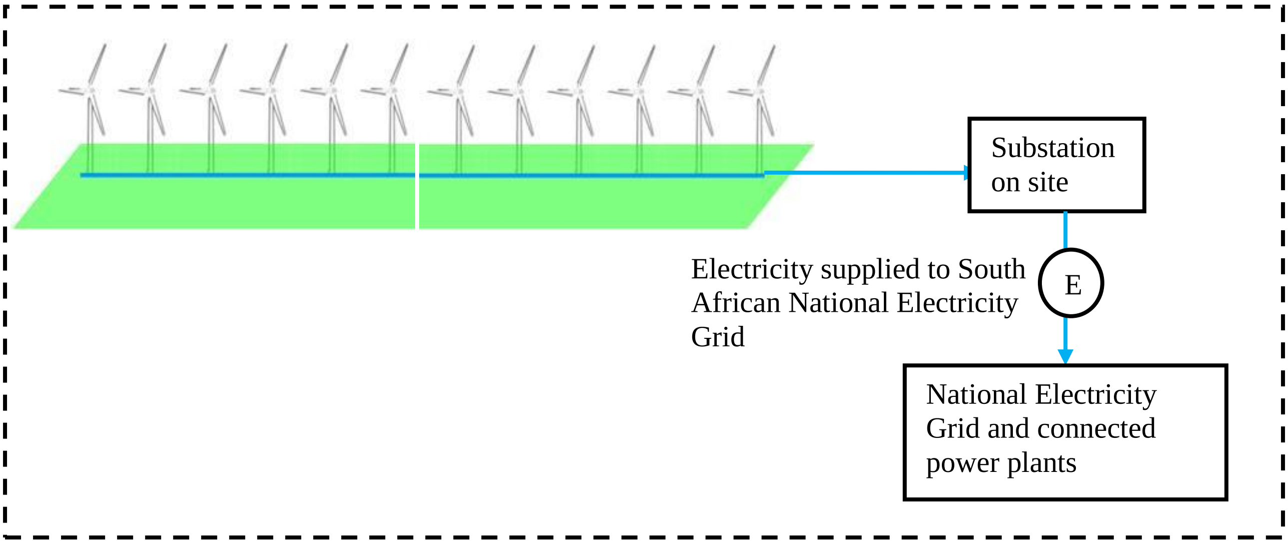
The project boundary encompasses the project power plant and all power plants connected physically to the electricity system which in this case is the South African National Electricity Grid.

Hence, the project power plant equipment included in the boundary is:

- Up to 60.0 wind turbines each with a rated capacity of up to 2.5 MW
- Electrical transformer for each turbine
- The new substation
- Electrical cables

The greenhouse gases and emissions sources included in the project boundary are shown below:

Source		Gas	Included ?	Justification / Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source. The baseline emissions from the electricity generated in fossil fuel fired power plants is calculated in accordance with the latest version of the "Tool to calculate the emission factor for an electricity system"
		CH_4	No	Minor emission source so is negligible and therefore not considered.
		N_2O	No	Minor emission source so is negligible and therefore not considered.
Project activity	The proposed wind power project	CO_2	No	No GHG emissions from wind power projects.
		CH_4	No	Excluded according to methodology.
		N_2O	No	Excluded according to methodology.



Where (E) represents an electricity metering point

The wind turbines in the diagram are representative of the number of turbines that will be installed in the project.

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

The baseline methodology procedure in ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable resources" (Version 12.1) was followed to identify the baseline scenario.

The project activity is the installation of a new grid-connected renewable power plant. In this case, the methodology states that the baseline scenario is the following: '*Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources...*' The baseline emissions are calculated using the grid emission factor for the South African national electricity grid as calculated using the "Tool to calculate the emission factor for an electricity system" (Version 02.1.0).

The calculations can be found in Annex 3. A summary of the results is presented in the table below:

Emission Factor	**tCO_2/MWh**
Simple Operating Margin (OM)	1.02
Build Margin (BM)	1.06
Combined Margin (CM)	1.04

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):

Prior Consideration of the CDM

CDM has been a major driver behind the project and has been considered from early on in the development of the project. The EB decided that for project activities with a starting date on or after 2 August 2008, the PP must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of its intention to seek CDM status.

The start date for the project has not occurred as of yet. The start date is defined as the earliest date at which either the implementation or construction or real action of a project begins. This is generally the data on which the project participant has committed to expenditures related to the implementation or construction of the project. The project is still in development and orders have not been placed for equipment.

However, CDM has been considered from the inception of the project. The project participants lodged prior consideration with the UNFCCC secretariat and the South African DNA before the start date of the project. The prior consideration form and emails are given below:

Document	Date	Description
Prior Consideration of the CDM Form	03/08/2010	Submission of notification of the commencement of the project activity to the UNFCCC with the intention to seek CDM status.
Email sent to DNA for prior consideration	06/08/2010	Submission of notification of the commencement of the project activity to the DNA with the intention to seek CDM status.
Email reply from DNA to acknowledge receipt of the prior consideration form	06/08/2010	Acknowledgement of the prior consideration from the DNA of South Africa.
Email reply from the UNFCCC secretariat to acknowledge receipt of the prior consideration form	19/08/2010	Acknowledgement of the prior consideration from the UNFCCC secretariat.
Letter of no objection from the DNA	04/11/2010	Letter of no objection received from the DNA of South Africa

Additionality

The additionality of the project is demonstrated by applying the latest version of the "Tool for the demonstration and assessment of additionality." The application of the tool to the project is described below:

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

<u>Sub-step 1a: Define alternatives to the project activity:</u>

Alternatives to the project activity are as follows:

a) The proposed project activity not undertaken as a CDM project activity;
b) Construction of a fossil fuel power plant with the equivalent amount of annual electricity output;
c) Construction of a power plant using other sources of renewable energy with the equivalent amount of annual electricity output;
d) The proposed project activity undertaken as a CDM project activity; and
e) The continuation of the current situation in supplying the equivalent annual power output by the National Grid (no investment is made and no grid-connected wind farm is developed to maintain the status quo).

According to the latest version of the Tool for the demonstration and assessment of additionality, *' ...a coal-fired power station or hydropower may not be an alternative for an independent power producer investing in wind energy or for a sugar factory owner investing in a co-generation, but may be an alternative for a public utility. Alternatives are, therefore, related to technology and circumstances as well as to the investor.* [8] As an organisation focused on wind power generation as the renewable energy of source, G7 Renewable Energies (Pty) Ltd., would not consider developing fossil fuel, solar, hydro, wave and tidal or nuclear power plants. Hence, options b and c are not realistic and credible alternatives for the project developer.

In addition, option b has been excluded as a realistic and credible alternative for the following reasons:

- Gas as potential fuel for the plant: Sasol is South Africa's largest supplier of natural gas. Sasol has gas pipelines in Gauteng, KwaZulu Natal and Mozambique[9]. There are no gas pipelines in the Western Cape to supply fuel to a power plant of the same size as Witberg. Natural gas is not a realistic alternative.
- Coal as potential fuel for the plant: South Africa has the seventh largest amount of recoverable coal reserves in the world. However, Mpumalanga province accounts for 83% of coal production while Free State, Limpopo and KwaZulu Natal account for 9%, 7% and 1% respectively[10]. There is no coal in the Western Cape. As such, it is not feasible to build a coal fired power station in the Western Cape due to the logistics surrounding the transportation of the coal.
- Diesel and HFO as potential fuel for the plant: The cost of diesel and HFO and the volumes required to generate the same amount of electricity as the Witberg wind farm make this alternative unrealistic.

Option c has been excluded as a realistic and credible alternative for the following reasons:

- Biomass as potential fuel for the plant: According to the "Draft Scoping Report" produced by ERM, the Witberg site is of a *semi-arid nature*[11]. Hence, biomass is not realistic and credible as a renewable energy source. Transportation costs of biomass and the amount of biomass needed to generate the same electricity output as the Witberg wind farm make this option unrealistic.

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[8] Tool for the demonstration and assessment of additionality. Version 05.2.

[9] Pipeline Maps. Available online from http://www.sasol.com/sasol_internet/frontend/navigation.jsp?navid=15700002&rootid=600000. [Accessed 10 January 2010].

[10] South Africa. Available online from http://southafricaenergy.com/. [Accessed 17 January 2011].

[11] Draft Scoping Report. September 2010. ERM

- Hydro as potential fuel for the plant: According to the “Draft Scoping Report” produced by ERM, there are no permanent watercourses in the project area.[12] Hence, hydropower is not realistic and credible as a renewable energy source. Wave power is also not a realistic option as the site is not located on the coast.
- Solar as potential fuel for the plant: According to the latest version of the Tool for the demonstration and assessment of additionality, *‘for the purpose of identifying relevant alternative scenarios, the project participant should include technologies or practices ...that have been implemented previously or are currently being introduced in the relevant country/region.[13]’* Solar has not been implemented previously on any significant scale in South Africa. This coupled with the high investment costs and technology development status, make solar as a potential fuel unrealistic in comparison to wind.

Hence, options b and c are not realistic and credible alternatives.

As a wind energy developer, G7 Renewable Energies (Pty) Ltd. would not consider developing fossil fuel, solar or nuclear power plants. Hence, options b and c are not realistic and credible alternatives.

<u>Sub-step 1b: Consistency with mandatory laws and regulations:</u>

The construction of a power plant is required to be in compliance with all mandatory laws and regulations. The project must comply with the requirements of the REFIT guidelines which are governed by the National Energy Regulator Act, 2004 (No. 40 of 2004), Electricity Regulation Act, 2006 (No. 4 of 2006) and all subsequent relevant Acts of Amendment. In addition, the project must comply with the Generation Licence application procedures and all applicable environmental legislation[14].

Below are the laws and regulations that have been identified as relevant to the Witberg wind farm:

- Electricity Regulation Act (Act No. 4 of 2006);
- Generation License issued by NERSA under the Electricity Regulation Act 2006;
- The South African Grid Code and South African Distribution/Transmission Grid Code regarding planning information, operational information and post-dispatch information;
- National Environmental Management: Protected Areas Act 57 0f 2003;
- National Water Act (Act No. 36 of 1998);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- National Heritage Resources Act (Act No. 25 of 1999);
- Aviation Act (Act No. 74 of 1962);
- Occupational Health and Safety Act (Act No. 85 of 1993);
- Subdivision of Agricultural Land Act (Act No. 70 of 1970); and
- Noise Control Regulations, Environment Conservation Act (Act No. 73 of 1989).

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[12] Draft Scoping Report. September 2010. ERM

[13] Tool for the demonstration and assessment of additionality. Version 05.2.

[14] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

A detailed assessment of the above laws and regulations can be found in the "Draft scoping report" compiled by ERM[15] and in the REFIT guidelines[16]

In addition to the list above, a Power Purchase Agreement (PPA) must be obtained. At present, Eskom is the only organisation capable of entering into a PPA with an Independent Power Producer (IPP)[17]. The project developers are in the process of conducting an Environmental Impact Assessment (EIA) for the project in accordance with the National Environmental Management Act (NEMA).

The realistic and credible alternative scenarios to the project activity are as follows:

a) The proposed project activity is not undertaken as a CDM project activity;
b) The proposed project activity undertaken as a CDM project activity; and
c) The continuation of the current situation in supplying the equivalent annual power output by the National Grid (no investment is made and no grid-connected wind farm is developed to maintain the status quo).

Step 2: Investment analysis

The purpose of this step is to determine whether the project activity is not:

a) The most economically feasible of financially attractive; or
b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

Sub-step 2a: Determine appropriate analysis method:

According to the Tool for the Demonstration and Assessment of Additionality (Version 05.2, EB39, Annex 10), there are three potential methods that can be used to complete the investment analysis:

I. Simple cost analysis: A simple cost analysis can only be used if the project does not generate financial or economic benefits other than CDM related income. The project will generate revenue from the sale of electricity to the national grid. As such, a simple cost analysis cannot be used.
II. Investment comparison analysis: The guidelines on the assessment of the investment analysis state that an investment comparison analysis can only be used if the baseline scenario leaves the project participant no other choice than to make an investment to supply the same products or services. In this project, the choice of the developer is to invest or not to invest. The project developer can decided not to invest. As such, an investment comparison analysis is not an appropriate analysis method.

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[15] Draft Scoping Report. September 2010. ERM

[16] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[17] Eskom's plan to control market. Available online from http://www.mg.co.za/article/2010-08-07-eskoms-plan-to-control-market. [Accessed 17 January 2011].

III. Benchmark analysis: According to the guidelines, '*The benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest.'* In this project, the choice of the developer is to invest or not to invest in this project. Hence, a benchmark analysis is considered the acceptable approach.

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

Internal Rate of Return (IRR) will be used as the financial indicator for the project. In order to assess whether the project is economically feasible, the IRR of the project will be compared to a benchmark IRR.

The benchmark IRR selected is 20%. The benchmark has been extracted from the REFIT guidelines[18]. The electricity price for wind under the REFIT has been calculated so as to ensure a return on investment of 20%.

The IRR as per the REFIT guidelines is seen as the most appropriate benchmark for this project. The REFIT has been designed to ensure an adequate return on investment in order to increase the amount of renewable energy on the grid and to encourage private sector investment. The IRR as per the REFIT guidelines serves as a benchmark for the renewable energy IPP environment.

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

Treatment of Renewable Energy Feed In Tariffs (REFIT) in the Investment Analysis:

The project developers are planning on accessing the Renewable Energy Feed-In Tariffs (REFIT) for the Witberg Wind Farm. The REFIT was introduced by the National Energy Regulator of South Africa (NERSA) to encourage the uptake of grid-connected renewable energy projects[19]. The REFIT guidelines were first released in May 2008[20]. After an extensive stakeholder and public consultation period, NERSA released the final guidelines on the 26 March 2009[21]. The REFIT is a policy instrument that guarantees prices for the supply of renewable energy onto the South African national electricity grid over a specified time period[22].

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[18] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[19] Imbewu Sustainability Legal Specialists and The Renewable Energy and Energy Efficiency Partnership. 2009. *South African Policy and Regulation Review.* Available online from www.reeep-sa.org/projects/doc_download/56-south-africa-2009. [Accessed 16 November 2010].

[20] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[21] Department of Public Enterprises. April 2009. Nersa Decision on Renewable Energy Feed in Tariff (REFIT). Available online from http://www.dpe.gov.za/news-3. [Accessed 16 November 2010].

[22] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from

According to EB 22, policies '*which gives comparative advantages to less emission intensive technologies over more emissions intensive technologies*[23]' (Type E-) can be excluded from the baseline and additionality assessments if they were passed after 11 November 2001. This ruling allows for the avoidance of perverse incentives. The REFIT can be classified as Type E- policy as it was designed to promote less emissions intensive technologies. The rules for REFIT were developed and approved post November 2001[24]. As such, REFIT can be excluded from additionality and the baseline. The REFIT was not used in the investment analysis. The price of electricity from the national grid was used to calculate the project IRR.

The information used in the investment analysis is presented below:

Table B.2 Parameters used in the calculation of the project IRR

Parameter	**Value**	**Unit**	**Source**
Capital cost of plant	3,334,196,004.0	Rand	Based on quotations from suppliers
First year operating and maintenance costs	34,472,881.0	Rand per year	Based on operating and maintenance schedule
Electricity production per year	507,204.0	MWh per year	Calculated from wind data collected on site
2012 electricity price	52.30	Rand cents per MWh	Published increases from NERSA[25]

The operating and maintenance costs are escalated by Consumer Price Index (CPI). The escalation applied is as follows:

	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
CPI (%)	4.8	4.5	4.8	6.02	6.02	6.02	6.02	6.02

CPI values for 2013 to 2015 have been obtained from the Economist Intelligence Unit. CPI from 2016 onwards has been assumed to be the average of the CPI over the last ten years as calculated below:

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http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[23] Clarifications on the consideration of national and/or sectoral policies and circumstances in baseline scenarios. Available from: http://cdm.unfccc.int/EB/022/eb22_repan3.pdf. [Accessed: 5 January 2011].

[24] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[25] National Energy Regulator of South Africa. February 2010. Media Statement: Nersa's decision on Eskom's required revenue application. Available online from http://www.nersa.org.za/. [Accessed 2 February 2010]. On the left hand side of the webpage click on read more under Latest News: *Media statement on NERSA's decision on Eskom's required revenue application –Multi-Year Price Determination 2010/11 to 2012/13*

Year	**CPI (%)**[26]
2010	4.3
2009	7.1
2008	11.5
2007	7.2
2006	4.6
2005	3.4
2004	1.4
2003	5.8
2002	9.1
2001	5.8
Average	**6.02**

The electricity tariff increase for 2013 was obtained from the increases published by NERSA[27]. There is no indication of the escalation in electricity price post 2013. As such, the electricity prices have been increased by CPI. This is in accordance with the REFIT guidelines that state that '*Licensees awarded these tariffs will have them adjusted for inflation using the CPI or another suitable inflation index once per annum*.[28]' The idea is that the REFIT will be adjusted to take into account inflation each year. This has been extended to the price of electricity from the national grid.

In order to test the robustness of the financial model to variation in electricity prices, a sensitivity analysis has been done. The electricity tariff escalation has been varied in order to assess the impact on the IRR for the project. The prices have been varied to reflect two unique scenarios. This is presented in the sensitivity analysis.

The Euro – Rand exchange rate for the calculation of the operating costs was extracted from Nedbank Capital's facts and forecasts. The exchange rates to 2013 are given below:

[26] Statistics South Africa. Consumer Price Index. Available online from: http://www.statssa.gov.za/keyindicators/CPI/CPIHistory.pdf and http://www.statssa.gov.za/keyindicators/CPI/CPIHistory_rebased.pdf. [Accessed 26 January 2011].

[27] National Energy Regulator of South Africa. February 2010. Media Statement: Nersa's decision on Eskom's required revenue application. Available online from http://www.nersa.org.za/. [Accessed 2 February 2010]. On the left hand side of the webpage click on read more under Latest News: *Media statement on NERSA's decision on Eskom's required revenue application –Multi-Year Price Determination 2010/11 to 2012/13*

[28] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

Year	Euro Rand Exchange Rate (R per Euro)
2001	7.71
2002	9.93
2003	8.56
2004	8.03
2005	7.93
2006	8.51
2007	9.67
2008	12.1
2009	11.75
2010	9.77
2011	9.21
2012	9.96
2013	10.71
Average	**9.52**

The average exchange rate was used for 2014 onwards.

The capital cost will be incurred in 2012 and 2013 when equipment is ordered and construction begins and is completed. The plant will start generating electricity in the beginning of January 2014 as per the project plan.

The IRR was calculated over 20 years of operation (total of 22 years including construction period). According to the guidelines in the tool, the period of assessment should reflect the technical lifetime of the project. The wind turbines will operate for 20 years. After this period, the wind farm will either be decommissioned or the wind turbines will be replaced with new turbines. The use of 20 years is relevant to this project as it is in line with the term of the PPA under the REFIT[29].

Taxation has not been included in an expense in the financial model as the benchmark is intended for pre-tax comparison. Excluding taxation is conservative as it results in higher revenue for the project developers and a higher IRR. If taxation were to be included then the IRR of the project would be lower than the IRR presented in the financial model. In addition, the benchmark IRR does not include taxation.

The cost of financing expenditures (loan repayments and interest) has not been included in the calculation of the project IRR. This is in line with the guidelines.

The financial model is provided in a separate spreadsheet. The IRR is 10% for the project. The IRR for the project is lower than the 20% benchmark applied. This demonstrates that the proposed project activity is unlikely to be financially attractive.

<u>Sub-step 2d: Sensitivity analysis:</u>

[29] National Energy Regulator of South Africa. October 2009. South Africa Renewable Energy Feed-in Tariff Phase II. Available online from http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/REFIT%20Phase%20II%20150709.pdf. [Accessed 16 November 2010].

The sensitivity analysis was conducted by varying the capital cost, operating and maintenance costs and electricity generation and the electricity escalation.

The capital cost was varied by 37%. This percentage was calculated from the difference between the project capital cost (R22.2 million per MW) and the capital cost for wind farms as sourced in the public domain. According to a publication on wind energy facts, the capital cost for a wind farm is 1,227,000.0 Euros per MW in 2006 prices[30]. This corresponds to R14,018,206.0 per MW using the average exchange rate for 2006 and escalating by CPI.

The results are presented below:

Parameter	**IRR**
Increase capital cost by 37%	6%
Decrease capital cost by 37%	17%

The benchmark obtained from the REFIT accounts for fixed operating and maintenance costs. The project financial model includes both fixed and variable costs. Hence, the IRR for the project was calculated excluding the variable operating and maintenance costs. The following costs were identified as variable costs and therefore excluded:

- Operations and maintenance service contract
- Land lease
- Community development fund

The IRR for the project excluding these variable costs was calculated to be 11%. Using the operating and maintenance costs from the REFIT, the IRR for the project was calculated to be 11%.

The electricity generation was varied by changing the load factor for the plant. The load factor used in the calculation of the electricity generation is currently 38.6%. The load factor could reach 40% for the project although this is unlikely. This is an increase of 4%. Hence, the electricity generation was varied by 4%.

The results are presented below:

Parameter	**IRR**
Increase electricity generation by 4%	11%
Decrease electricity generation by 4%	10%

An increase of 4% is not a significant increase. In order to test the robustness of the model, we increased the electricity generation by 10%. This gave us an IRR of 12%.

Two scenarios were modelled for the electricity price escalation:

[30] Wind Energy. 2011. Wind Energy – The Facts. Available online from http://www.wind-energy-the-facts.org/en/part-3-economics-of-wind-power/chapter-1-cost-of-on-land-wind-power/cost-and-investment-structures/. [Accessed 2 February 2011]

1. Scenario 1

The draft Integrated Resource Plan (IRP) 2010[31] is the only document available that provides information on long-term planning with regards to the energy sector. The IRP models electricity demand, production and prices until 2030. A number of scenarios are modelled and the conclusion is that the revised balanced scenario is the most appropriate scenario as should be used as the basis for long-term planning.

The electricity price for the revised balanced scenario is as follows:

- 2020/2021 – electricity prices is 111 Rand cents per kWh
- 2030 – electricity price is 115 Rand cents per kWh

The prices in the IRP2010 include inflation.

In the financial model, the electricity price is escalated by CPI. The results are:

- 2020/2021 – electricity prices is 102.4 Rand cents per kWh
- 2030 – electricity price is 173.3 Rand cents per kWh

The electricity price escalation in the financial model was modified to follow the revised balanced scenario in the draft IRP2010. The electricity price for 2020/2021 was adjusted to 112.1 Rand cents per kWh by increasing inflation to 7% for each year up to an including 2020. The IRR for this scenario was 11%.

2. Scenario 2

In this scenario, the electricity price is inflated by 11.5% as opposed to forecast CPI. This percentage was selected as the maximum historical CPI over the last ten years:

Year	**CPI (%)**[32]
2010	4.3
2009	7.1
2008	11.5
2007	7.2
2006	4.6
2005	3.4
2004	1.4
2003	5.8
2002	9.1
2001	5.8
Maximum	**11.5**

[31] South African Department of Energy. 2010. *Integrated Resource Plan for Electricity*. Available online from http://www.doe-irp.co.za/content/INTEGRATED_RESOURCE_PLAN_ELECTRICITY_2010_v8.pdf. [Accessed 16 November 2010].

[32] Statistics South Africa. Consumer Price Index. Available online from: http://www.statssa.gov.za/keyindicators/CPI/CPIHistory.pdf and http://www.statssa.gov.za/keyindicators/CPI/CPIHistory_rebased.pdf. [Accessed 26 January 2011].

The IRR of this project increases to 17% which is still below the benchmark of 20%.

In order to ensure that the model is robust, we used excluded the variable operating costs and modelled the two scenarios for electricity price escalation. The results were as follows:

Parameter	IRR
Scenario 1	11%
Scenario 2	17%

The project IRR does not meet the benchmark IRR. As such, the project is unlikely to be financially attractive.

Step 3: Barrier analysis

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

G7 Renewable Energies is a South African developer of wind power plants. The key shareholder, The key shareholder, Energie Baden Württemberg Kraftwerke AG (henceforth referred to as EnBW), has already funded a large portion of the upfront costs to develop the Witberg wind farm. EnBW are involved in funding three wind projects of which Witberg is the largest wind farm. The timing on all three wind projects is similar. Hence, the risks involved in developing and realising the three wind farms is similar. The barriers to the Witberg wind farm are as follows:

1. **Investment Barriers:**

1.1 Market structure

Entry into the electricity generation market is challenging given the structure of the electricity sector in South Africa. The South African electricity sector is a monopoly with Eskom (the national utility) dominating both the generation and distribution of electricity in the country[33]. Eskom is responsible for the production of over 95%[34] of South Africa's electricity and is also responsible for the transmission of electricity. This structure has left very little room for the development of IPPs. With this structure, Eskom has a conflict of interest and is not motivated to purchase power from IPPs or to work towards a bankable PPA under the REFIT.

The carbon credits represent an income stream that is independent to selling power on to the national grid. If the project developers cannot negotiate a PPA with the monopoly Eskom then it may be possible to sell electricity to a municipality or business via a wheeling agreement. The revenue from the carbon credits would be required to fund the project and to offset the cost

[33] Edkins, M., Marquard, A. And Winkler, H. Energy Research Centre. University of Cape Town. June 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Available online from http://www.erc.uct.ac.za/Research/publications/10Edkinesetal-Solar_and_wind_policies.pdf. [Accessed 16 November 2010].

[34] Creamer Media. March 2010. *South Africa's Electricity Industry 2010*. Page 7. Available online from http://www.esco.org.za/pdf/new/Electricity_Overview%202010.pdf. [Accessed 16 November 2010].

difference between current electricity costs and the electricity generated from the wind farm. In any event, the carbon credits increase the return of the project and change the appetite of the investors for risk.

1.2 Lack of maturity in Independent Power Producer (IPP) framework

The IPP framework in South Africa and the lack of experience with IPPs presents challenges to the success of this project. Prior to August 2009, there were no electricity regulations dealing with IPPs. This was changed only recently with the introduction of New Generation Capacity Regulations which were promulgated on the 5th of August 2009[35]. The regulatory framework for IPPs in South Africa is very new and there are a number of challenges in the application of the regulations going forward.

The immaturity in regulatory framework also calls into question the stability of the regulations over a long-term. Financiers are looking for stable investments and the risk that the regulations may change as the market matures increases the risk profile of the project. The carbon credits increase the attractiveness of the project as an investment. This compensates for the higher risk profile of the project owing to regulatory concerns.

Renewable energy projects in countries where there is a well-developed IPP framework would not have the same investment challenges as projects in South Africa. South Africa has its own, unique challenges as a result of the lack of a mature regulatory framework which increases the risk of investing in renewable energy projects.

The regulatory challenges are demonstrated by the lack of IPPs and renewable energy projects in South Africa. As the market matures, this barrier may fall away. At this stage in the country, carbon credits are essential to stimulate growth in the renewable energy market by increasing the attractiveness of investments and increasing the appetite of investors for risk.

1.3 Unbalanced Power Purchase Agreement (PPA)

A significant barrier to this project is the ability to negotiate a bankable PPA with Eskom where the project risk is shared between developer and Eskom[36]. In fact, the barriers to negotiating PPAs with Eskom led to the failure of a number of Eskom programmes aimed at encouraging private sector investment in the energy sector. Information on the programmes in presented in Annex 5.

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[35] Brodsky, S. Dewey & LeBoeuf. 17 August 2010. South Africa's REFIT programme – latest developments and the way forward. Page 8. Available online from http://www.sanea.org.za/CalendarOfEvents/2010/SANEALecturesJHB/Aug17/SANEA%20Lecture%20JHB%20-%2017%20August%202010%20(SA's%20REFIT%20Programme%20-%20Scott%20Brodsky).pdf. [Accessed 16 November 2010].

[36] South African Department of Energy. May 2009. *Creating an enabling environment for distributed power generation in the South African electricity supply industry*. Page 5. Available online from www.ameu.co.za/.../Cogen%20WG%20-%2020090419_ Special%20Dispensation%20Cogen.pdf. [Accessed 16 November 2010].

Failure to negotiate access to the grid was one of the barriers to the development of the Bethlehem Hydro Power Plant. The Bethlehem Hydro Power Plant involves the generation of 7.0 MW using hydro near the town of Bethlehem in South Africa[37]. The developers entered into a PPA with the municipality for the sale of electricity[38]. The project is registered under the CDM[39] as project number 2692.

The failure to negotiate favourable PPAs with Eskom is a risk to the success of the Renewable Energy Feed-In Tariffs (REFIT). A condition for approval under the REFIT is acceptance of the standardised PPA[40]. According to The International Institute for Sustainable Development, '*...the primary difficulty that lies with Eskom from the point of view of an IPP is the lack of negotiability of PPAs. This was pointed out by Christopher Clarke, Director of the Evolution One Fund, the foremost player in private equity investments in clean energy in South Africa. Clarke (2008) did not criticize Eskom or its workings, but did point out that a PPA set in stone might be a problem. Other private players pointed out that the Eskom PPA is very tightly drafted by renowned international lawyers and is substantially one-sided.*[41]'

The project will not supply electricity to the grid unless it can negotiate a bankable PPA with Eskom. Engaging in negotiations with Eskom may jeopardise the project's chance at accessing the REFIT. The carbon credit revenue is an income stream into the project that is independent of the REFIT. Should the project fail to access the REFIT then the revenue from the carbon credits will assist in reducing the cost of power produced by the project. In any event, the carbon credits enable investment in the project developers and the project itself through EnBW despite the challenges surrounding acceptance of the standardised PPA.

1.4 Lack of certainty regarding success under REFIT programme

The project developers are planning on accessing the Renewable Energy Feed-In Tariffs (REFIT) for the Witberg Wind Farm. The REFIT timeline is described in more detail in Annex 5. There are a number of challenges introduced by the REFIT programme:

- Timing of REFIT

[37] Bethlehem Hydro. Available online from http://www.bethlehemhydro.co.za/. [Accessed 16 November 2010].

[38] Bethlehem Hydro. June 2008. *Clean Development Mechanism Project Design Document*. Available online from http://www.bethlehemhydro.co.za/docs/carboncredits.pdf. [Accessed 16 November 2010].

[39] Registered Bethlehem Hydro Project (Ref. Number: 2692). Available online from http://cdm.unfccc.int/Projects/projsearch.html. [Accessed: 17 January 2011].

[40] Brodsky, S. Dewey & LeBoeuf. 17 August 2010. South Africa's REFIT programme – latest developments and the way forward. Page 18. Available online from http://www.sanea.org.za/CalendarOfEvents/2010/SANEALecturesJHB/Aug17/SANEA%20Lecture%20JHB%20-%2017%20August%202010%20(SA's%20REFIT%20Programme%20-%20Scott%20Brodsky).pdf. [Accessed 16 November 2010].

[41] Roy, S., Disenyana, T. And Kiratu, S. International Institute for Sustainable Development. June 2010. *Clean Energy Investments in Developing Countries*. Page 10. Available online from http://www.iisd.org/pdf/2009/bali_2_copenhagen_rsacase.pdf. [Accessed 16 November 2010].

Currently, there is no certainty regarding when the first PPA will be signed under the REFIT. It is now more than 18 months after the final REFIT guidelines were approved and no IPPs have been able to access the feed-in-tariffs. The delay in the REFIT is concerning for IPPs as they have been exposed to a number of false starts and investors can only be asked to continue to spend time and money for so long[42].

- Tender Criteria

Access to the REFIT will be governed by a tender process. There is no guarantee that the Witberg wind farm will be able to access the REFIT. Project developers must meet set criteria in order to qualify under the REFIT. According to Sustainable Energy Africa, one of the risks is that '*A tender process needs to be followed by developers to qualify for their renewable energy generated to be purchased. This creates risks in the market again*[43].' The criteria for selection of projects pose barriers to the project qualifying under the REFIT:

- The tender process will give preference to IPPs that accept the standardized PPA[44]. This presents a significant challenge as the risk allocation in the draft PPA favours the buyer which impacts on the bankability of the PPA.[45] [46]'

  The bankability of the PPA represents a significant barrier to the project. The carbon credit revenue is an income stream into the project that is independent of the REFIT. Should the project fail to access the REFIT then the revenue from the carbon credits will assist in reducing the cost of power produced by the project.

- The REFIT will give preference to generators that can be commissioned in the shortest time. The Witberg wind farm will come on line only in 2014[47].

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[42] Brodsky, S. Dewey & LeBoeuf. 17 August 2010. South Africa's REFIT programme – latest developments and the way forward. Page 19. Available online from http://www.sanea.org.za/CalendarOfEvents/2010/SANEALecturesJHB/Aug17/SANEA%20Lecture%20JHB%20-%2017%20August%202010%20(SA's%20REFIT%20Programme%20-%20Scott%20Brodsky).pdf. [Accessed 16 November 2010].

[43] Sustainable Energy Africa. 2007. *How to implement renewable energy and energy efficiency options*. Available online from http://www.cityenergy.org.za/files/resources/implementation/10Renewable%20power%20purchase.pdf. [Accessed 16 November 2010].

[44] National Energy Regulator of South Africa (NERSA). February 2010. *Rules on selection criteria for renewable energy projects under the REFIT programme.* Available online from http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Regulatory%20Rules/RULES%20FOR%20SELECTION%20CRITERIA%2019%20Feb10.pdf. [Accessed 16 November 2010].

[45] Brodsky, S. Dewey & LeBoeuf. 17 August 2010. South Africa's REFIT programme – latest developments and the way forward. Page 18. Available online from http://www.sanea.org.za/CalendarOfEvents/2010/SANEALecturesJHB/Aug17/SANEA%20Lecture%20JHB%20-%2017%20August%202010%20(SA's%20REFIT%20Programme%20-%20Scott%20Brodsky).pdf. [Accessed 16 November 2010].

[46] Roy, S., Disenyana, T. And Kiratu, S. International Institute for Sustainable Development. June 2010. *Clean Energy Investments in Developing Countries*. Page 10. Available online from http://www.iisd.org/pdf/2009/bali_2_copenhagen_rsacase.pdf. [Accessed 16 November 2010].

- Cap on REFIT

  Further risks are introduced by the lack of clarity regarding how long and how much the REFIT will fund. According to the University of Cape Town, '*Until 2013 IPPs face the uncertainty of whether they will be chosen for the programme according to the guidelines set out...*[48]' Not all renewable energy developments will be accepted once a cap is reached. According to the REFIT guidelines*, 'to prevent over subscription of REFIT, the Regulator shall be permitted to bring in capacity limits on specific technologies in the future*.[49]'

  The draft Integrated Resource Plan (IRP) 2010 released by the South African Department of Energy allows for only 700 MW of wind power under the first Phase of the REFIT. Subsequently, the IRP2010 assumes a new wind programme starting in 2014 after the first phase of the REFIT. This wind programme allows for 3.8 GW of new build wind power onto the national electricity grid[50]. The limit of 500 MW from wind for the first phase of the REFIT is of concern for the project developers as this is low and there is no guarantee that the project will make it in to the first phase of the REFIT. The carbon credits represent an income stream which is independent of the REFIT. The revenue from carbon credits will assist in offsetting the costs for the project if it fails to access the REFIT. Even so the carbon credits are essential to the success of the project.

2. Administrative barriers

In South Africa, obtaining approvals and licenses is cited by developers as being a significant hurdle to project development[51]. To date, South Africa's renewable energy policies have not only been ineffective but are also fraught with administrative barriers.[52]

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[47] National Energy Regulator of South Africa (NERSA). February 2010. *Rules on selection criteria for renewable energy projects under the REFIT programme.* Available online from http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Regulatory%20Rules/RULES%20FOR%20SELECTION%20CRITERIA%2019%20Feb10.pdf. [Accessed 16 November 2010].

[48] Edkins, M., Marquard, A. And Winkler, H. Energy Research Centre. University of Cape Town. June 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Available online from http://www.erc.uct.ac.za/Research/publications/10Edkinesetal-Solar_and_wind_policies.pdf. [Accessed 16 November 2010].

[49] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[50] South African Department of Energy. 2010. *Integrated Resource Plan for Electricity*. Available online from http://www.doe-irp.co.za/content/INTEGRATED_RESOURCE_PLAN_ELECTRICITY_2010_v8.pdf. [Accessed 16 November 2010].

[51] Edkins, M., Marquard, A. And Winkler, H. Energy Research Centre. University of Cape Town. June 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Available online from http://www.erc.uct.ac.za/Research/publications/10Edkinesetal-Solar_and_wind_policies.pdf. [Accessed 16 November 2010].

The REFIT does not alleviate this barrier. All developers are required to obtain a Generation License issued by NERSA under the Electricity Regulation Act 2006[53]. In addition, the developers must comply with national environmental legislation which means a full Environmental Impact Assessment (EIA) if the installed capacity is greater than 20.0 MW[54]. According to research done by the University of Cape Town, '*Nonetheless* [despite the introduction of the REFIT], *renewable energy projects still face major administrative barriers. Too many agencies are involved, the time taken to process licences has been very long, financers are still hard to come by, and EIAs can be cumbersome processes. Although the publication of the REFIT has promised to largely reduce these barriers, little progress has been seen. More specifically NERSA recently published guidelines for selecting IPPs for the REFIT, which in itself seems to contain a number of administrative barriers.*[55]'

The administrative barriers are enhanced as a result of:

- The large number of authorities involved leading to a lack of co-ordination resulting in project delays;
- A highly complex and non-transparent procedure;
- Long waiting periods to obtain permits which can result in project rejection;
- Renewable energy sources are not sufficiently taken into account in spatial planning; and
- A low awareness of the benefits of renewable energy sources within local and regional authorities[56].

The carbon credits represent an additional revenue stream into the project which increases the attractiveness of the investment and assists in recovering upfront costs to obtain licenses.

3. Technological Barriers:

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[52] Perrot, R. 3 November 2010. South Africa must strengthen green tech transfer. Available online from http://www.scidev.net/en/opinions/south-africa-must-strengthen-green-tech-transfer.html. [Accessed 10 November 2010].

[53] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[54] National Energy Regulator of South Africa (NERSA). February 2010. *Rules on selection criteria for renewable energy projects under the REFIT programme.* Available online from http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Regulatory%20Rules/RULES%20FOR%20SELECTION%20CRITERIA%2019%20Feb10.pdf. [Accessed 16 November 2010].

[55] Edkins, M., Marquard, A. And Winkler, H. Energy Research Centre. University of Cape Town. June 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Available online from http://www.erc.uct.ac.za/Research/publications/10Edkinesetal-Solar_and_wind_policies.pdf. [Accessed 16 November 2010].

[56] The European Wind Energy Association. *Wind Energy: The Facts*. Available online from http://wind-energy-the-facts.org/en/part-4-industry--markets/chapter-5-administrative-and-grid-access-barriers---an-analysis-of-existing-eu-studies-in-the-field/administrative-barriers/. [Accessed 12 November 2010].

3.1 Lack of skills in wind energy

One of the biggest challenges to wind energy projects in South Africa is the lack of skilled technicians and trained personnel to operate and maintain the wind turbines.[57] According to the United Nations, '*by contrast, Africa has seen little development of modern wind turbines. This is partly due to low wind speeds compared with many parts of Europe, Asia and the Americas. This is compounded by the low level of technical skills and awareness of the potential of the technology. Consequently, few projects have been undertaken in Africa, and there is only limited experience of wind energy for grid connected... electricity generation.*[58]' The lack of expertise can result in a high risk of equipment disrepair, malfunctioning or underperformance.

The revenue from carbon credits acts as an incentive to invest in skills transfer and training. The carbon credits are dependent on the successful operation of the turbines.

3.2 Technological Constraints

One of the main objectives of the CDM is technology transfer. The technology used in this project is not available locally and there is a lack of experience and skills in South Africa in wind technology. The carbon credits will assist in funding the transfer of the wind turbine technology from developed to developing countries.

The technological risks associated with wind energy are significantly higher in South Africa than for conventional fossil fuel-fired power plants. South Africa has experience in the operation and maintenance of coal-fired power plants as approximately 90% of the national electricity grid is coal-based[59]. There is a lack of understanding and experience with wind turbine technology in South Africa.

Technological barriers increase the risk profile of the investment. Investors perform a risk/return analysis on renewable energy projects as is the case with conventional projects. The technological barriers will be factored into the risk profile of the investment. Investors are often reluctant to fund first-of-its-kind, new technology projects. They want projects that work and with which the country and the financiers have experience. The carbon credits increase the return for the project and as a result increase the risk appetite of the investors.

4. Lack of prevailing practice

The renewable energy sector in South Africa is still in the early stages of development. Even though small, government demonstration wind farms are operational in South Africa (Klipheuwal and Darling wind farms), large commercial wind farms have not yet been developed.

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[57] Daniels, R. C.. University of Cape Town. 2007. *Skills Shortages in South Africa: A Lierature Review*. Available online from http://www.sba.muohio.edu/abas/2000/kirovda.pdf. [Accessed 8 December 2010].

[58] Karekezi, S., Kithyoma, W. United Nations. June 2003. *Renewable Energy in Africa: Prospects and Limits*. Page 16. Available online from http://www.un.org/esa/sustdev/sdissues/energy/op/nepadkarekezi. [Accessed 16 November 2010].

[59] Creamer Media. March 2010. *South Africa's Electricity Industry 2010*. Page 7. Available online from http://www.esco.org.za/pdf/new/Electricity_Overview%202010.pdf. [Accessed 16 November 2010].

Based on the assessment of the existing wind power plants, the Witberg Wind Farm will be the first large commercial wind farm to be owned and operated by an IPP. The Witberg Wind Farm is first-of-its-kind in the region. In accordance with the guidelines proposed by the Meth Panel (Annex 11 of the 33rd meeting), the project is first-of-its-kind in the region or Country.

The revenue from carbon credits increases the attractiveness of the investment.

The barriers all increase the risk and lower the chance of investment in the project. Renewable energy projects are subject to risk/return analysis by potential investors as with conventional projects. This wind farm is the first-of-its-kind in the country and is faced with numerous regulatory and technological barriers. Investors will look at both the upside (profit) and the downside (loss or liabilities) of investments. The revenue from carbon credits increases the upside of the investment and shifts the risk/return analysis; increasing appetite for risk. As such the project requires the carbon credits in order to be realised. Therefore the project is additional.

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

The identified barriers would not affect alternative (e), which is the continuation of the current scenario.

Step 4: Common practice analysis

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

As described in Step 3, there are only two operational wind power plants in South Africa. These wind power plants differ substantially from the project activity:

- Kilpheuwel Wind Farm is a demonstration project which is partially government owned through the parastatal Eskom. Annually, since all turbines have been operating, total production has been just more than 4GWh.[60] The Klipheuwal wind farm is government owned and not an IPP. The Klipheuwal wind farm is intended as a demonstration wind farm and not a commercial wind farm.

- The Darling Wind Farm is the first commercial wind energy facility in South Africa[61]. Annually, average total production is 13.2 GWh since operation[62]. Financial assistance from the Danish government through Danida, a loan from the Development Bank of Southern Africa and

[60] South African Department of Energy. *Wind Power*. Available online from: http://www.energy.gov.za/files/renewables_frame.html. Please select wind power tab on the left hand side of the webpage in order to access data [Accessed 16 November 2010].

[61] Benton, S. South Africa.info. 6 November 2006. *Green light for SA's wind farm*. Available online from http://www.southafrica.info/about/sustainable/windfarm-darling.htm. [Accessed 16 November 2010].

[62] Wind Farms. Available online from http://www.energy.gov.za/files/esources/renewables/r_wind.html. [Accessed 18 January 2011].

investment by the Central Energy Fund assisted in the development of the project.[63] The Darling wind Farm Company (DWP) signed a 20 year PPA with the City of Cape Town as well as a power wheeling agreement with Eskom[64].

Below is a table of comparison between the Klipheuwal Wind Farm, the Darling Wind Farm and the Witberg Wind Farm:

	Klipeuwal Wnd Farm[65]	Darling Wind Farm[66]	Witberg Wind Farm
Financing	Public funding: Eskom	Public funding: • Central Energy Fund • Danish Government • Development Bank of South Africa and	Privately funded
Number of turbines	3.0	4.0	60.0
Total Capacity	3.2 MW	5.2 MW	Up to 150.0 MW
Total Annual Production	4.0 GWh	13.2 GWh	507 GWh
Load Factor	20.0%-30.0%	28.0%	38.6%
Year of Operation	The first unit started generating on 16 August 2002 and the last on 20 February 2003.	May 2008	2014
Electricity off taker	Eskom	City of Cape Town	Eskom

The Witberg Wind Farm is not similar to the Kilpheuwal and Darling Wind Farms. Witberg is a large, commercial wind farm which is privately owned. No public funding will be used for Witberg.

According to the 'Tool for the demonstration and assessment of additionality,' projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar

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[63] South African Department of Energy. *Wind Power*. Available from http://www.energy.gov.za/files/renewables_frame.html. Please select wind power tab on the left hand side of the webpage in order to access data [Accessed 16 November 2010].

[64] Otto, A. South African Wind Energy Programme (SAWEP). 13 May 2008. Renewable Energy City Summit. Available online from http://www.eskom.co.za/content/Potential%20contribution%20by%20wind%20energy%20in%20SA.pdf . [Accessed 16 November 2010].

[65] South African Department of Energy. *Wind Power*. Available online from: http://www.energy.gov.za/files/renewables_frame.html. Please select wind power tab on the left hand side of the webpage in order to access data [Accessed 16 November 2010].

[66] Darling Wind Power (Pty) Ltd. Available online from http://www.darlingwindfarm.co.za/aboutus.htm. Accessed 23 September 2010.

scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Under this definition, the Klipheuwal and Darling Wind Farms are not similar to the Witberg Wind Farm as the scale, access to financing and regulatory framework is substantially different.

As mentioned earlier, the renewable energy sector is in its infancy in South Africa. The lack of commercial wind farms and IPPs are testament to the fact that the sector has not seen significant development to date. It can be concluded that renewable energy and specifically wind technology has not penetrated into South Africa to any significant extent.

This is supported by the fact that total electricity generated from wind power is 17.2 GWh (calculated using the electricity generation in the table above). This represents 0.00794% of the total grid electricity (216,507.158 GWh as per calculation of grid emission factor in Annex 3). Carbon credits are required to stimulate investment in the renewable energy sector in South Africa.

The carbon credits are required in order to increase the project return and increase the appetite of investors for risk.

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

The only two wind farms in South Africa cannot be considered similar to the Witberg Wind Farm as demonstrated above. There is one other wind farm that is further advanced than the Witberg Wind Farm. The Sere Wind Farm is a large wind farm at 100 MW. Construction on this wind farm was expected to commence in early 2011, but has not happened to date. This farm is Eskom-owned and received funding from the World Bank and other multilateral development banks[67].

The farm will not be owned and operated by an IPP. This eliminates a number of barriers associated with being an IPP in South Africa. Hence, the Sere Wind Farm cannot be compared to the Witberg Wind Farm which is owned and operated by an IPP. The ownership of the Sere Wind Farm eliminates the regulatory barriers associated with IPPs and dealing with Eskom. In addition, the wind farm has government support and weight behind it.

The Sere Wind Farm is not subject to the barriers faced by the Witberg Wind Farm. The carbon credits are required for the Witberg Wind Farm in order to attract project investment despite the high risk profile of the project.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The calculation of the emission reductions is done in accordance with ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable resources” (version 12.1). The calculation methodology is set out below:

Project emissions

[67] Eskom Annual Report. 2010. Capacity Expansion Programme. Available from http://www.eskom.co.za/annreport10/gb_capacity.htm. [Accessed 10 November 2010].

According to the methodology, for most renewable energy power generation activities, $PE_y = 0$. This is the case for this project activity as it is neither a hydro nor a geothermal power plant. In addition, it does not involve the combustion of fossil fuels as with geothermal and some solar plants.

Baseline emissions

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

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{(Equation 6)}$$

Where:

BE_y	Baseline emissions in year y (tCO_2/yr)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system." (tCO_2/MWh)

The methodology for the calculation of the grid emission factor is presented in Annex 3. The net quantity of electricity generation that is fed onto the grid as a result of the implementation of the project activity ($EG_{PJ,y}$) is calculated as follows:

$EG_{PJ,y}$ is equivalent to $EG_{facility,y}$ as the project activity is the installation of a new grid-connected renewable energy power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfields project). In other words,

$$EG_{PJ,y} = EG_{facility,y} \quad \text{(Equation 7)}$$

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 to the grid in year y (MWh/yr)

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{(Equation 11)}$$

Where:

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

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

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh

Description:	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system."
Source of data used:	Calculation using version 2.0 of the "Tool to calculate the emission factor for an electricity system" as set out in Annex 3
Value applied:	1.04
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Ex-ante option selected so grid emission factor will only be updated at the end of the crediting period.

B.6.3. Ex-ante calculation of emission reductions:

The data used to calculate the emission reductions and the source of the data is as follows:

Parameter	**Value**	**Unit**	**Source**
$EG_{facility,y}$	507,204.0	MWh/yr	Wind Data

The grid emission factor is presented in Annex 3.

The ex-ante calculation of the emission reductions is presented below:

Project emissions

There are no project emissions as a result of the installation of the Witberg wind farm.

Baseline emissions

The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{(Equation 6)}$$

Year	$\mathbf{BE_y}$	$\mathbf{EG_{PJ,y}}$	$\mathbf{EF_{grid,CM,y}}$
1 January 2014 – 31 December 2014	527,492.16	507,204.0	1.04
1 January 2015 – 31 December 2015	527,492.16	507,204.0	1.04
1 January 2016 – 31 December 2016	527,492.16	507,204.0	1.04
1 January 2017 – 31 December 2017	527,492.16	507,204.0	1.04
1 January 2018 – 31 December 2018	527,492.16	507,204.0	1.04
1 January 2019 – 31 December 2019	527,492.16	507,204.0	1.04
1 January 2020 – 31 December 2020	527,492.16	507,204.0	1.04

The net quantity of electricity generation that is fed onto the grid as a result of the implementation of the project activity ($EG_{PJ,y}$) is calculated as follows:

$$EG_{PJ,y} = EG_{facility,y} \quad \text{(Equation 7)}$$

Year	$EG_{PJ,y}$	$EG_{facility,y}$
1 January 2014 – 31 December 2014	507,204.0	507,204.0
1 January 2015 – 31 December 2015	507,204.0	507,204.0
1 January 2016 – 31 December 2016	507,204.0	507,204.0
1 January 2017 – 31 December 2017	507,204.0	507,204.0
1 January 2018 – 31 December 2018	507,204.0	507,204.0
1 January 2019 – 31 December 2019	507,204.0	507,204.0
1 January 2020 – 31 December 2020	507,204.0	507,204.0

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{(Equation 11)}$$

Year	ER_y	BE_y	PE_y
1 January 2014 – 31 December 2014	527,492.16	527,492.16	0.0
1 January 2015 – 31 December 2015	527,492.16	527,492.16	0.0
1 January 2016 – 31 December 2016	527,492.16	527,492.16	0.0
1 January 2017 – 31 December 2017	527,492.16	527,492.16	0.0
1 January 2018 – 31 December 2018	527,492.16	527,492.16	0.0
1 January 2019 – 31 December 2019	527,492.16	527,492.16	0.0
1 January 2020 – 31 December 2020	527,492.16	527,492.16	0.0

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

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
1 January 2014 – 31 December 2014	0.0	527,492.16	0.0	527,492.16
1 January 2015 – 31 December 2015	0.0	527,492.16	0.0	527,492.16
1 January 2016 – 31 December 2016	0.0	527,492.16	0.0	527,492.16
1 January 2017 – 31 December 2017	0.0	527,492.16	0.0	527,492.16
1 January 2018 – 31 December 2018	0.0	527,492.16	0.0	527,492.16
1 January 2019 – 31 December 2019	0.0	527,492.16	0.0	527,492.16
1 January 2020 – 31 December 2020	0.0	527,492.16	0.0	527,492.16
Total (tonnes of CO_2 e)	**0.0**	**3,692,445.12**	**0.0**	**3,692,445.12**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{facility,y}$**
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data to be used:	Continuous online electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	507,204.0
Description of measurement methods and procedures to be applied:	Continuous monitoring using an online electricity meter which is placed after the step-up transformer. This will allow it to measure the net electricity generation. The meter will take a reading at least every hour and record this on site. The data collected by the online meter will be aggregated monthly and stored both on and off site for the entire crediting period. The responsible person for the measurement and calibration of the meter will be the operations and maintenance personnel appointed for the project.
QA/QC procedures to be applied:	Cross check measurement results with records for sold electricity. The data collected using the online meter will be aggregated monthly. The monthly values will be checked against purchase records from the authority responsible for transmission and distribution of electricity from the South African national electricity grid. If there is a significant difference (greater than 2.0%) then the difference must be clarified/justified in the annual monitoring and verification report. The most conservative value will be used if there is any doubt as to which is more accurate. The online electricity meter will be calibrated in accordance with manufacturer's standards. The accuracy of the meter is set in accordance with the regulations of the National Energy Regulator of South Africa (NERSA). NERSA has published an industry standard with which all electricity generation projects that supply onto the national electricity grid must comply. The accuracy of the meter shall be in accordance with the minimum requirements of NRS 057.
Any comment:	

B.7.2. Description of the monitoring plan:

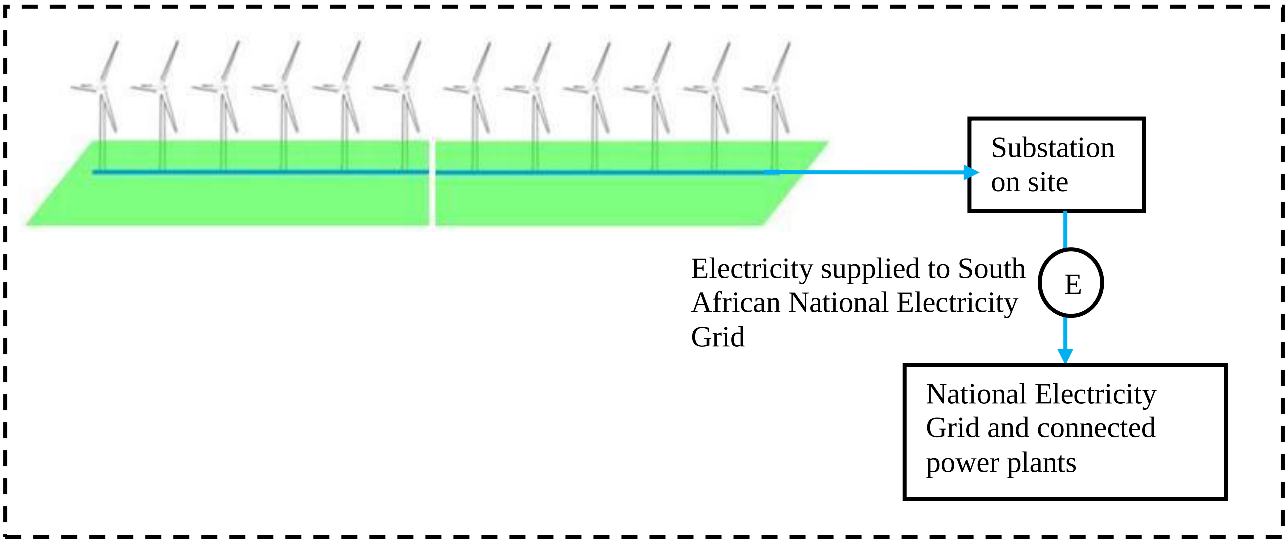
The monitoring and verification plan for Witberg wind farm

Parameters to be monitored

The only parameter that requires monitoring is the quantity of net electricity generation supplied by the project plant to the grid in year y. The monitoring plan describes the procedure to monitor and record the electricity supplied to the national electricity grid.

Electricity metering point

The electricity will be metered after the step-up transformer at the substation on site. This will provide a measurement of the net electricity supplied to the national electricity grid. The metering point is depicted below:



Where (E) represents an electricity metering point

The wind turbines in the diagram are representative of the number of turbines that will be installed in the project.

Electricity metering device

A power meter will be installed to measure the voltage and current delivered by the wind farm.

Calibration

The power meter will be calibrated in accordance with manufacturer’s specification and the standards as set out by the National Energy Regulator of South Africa (NERSA).

Data storage

The data will be stored both on and off-site. The meter will monitor continuously and the data will be integrated hourly and aggregated monthly. Any maintenance or downtimes will be recorded in an exception report.

Quality control
Cross check measurement results with records for sold electricity. The data collected using the online meter will be aggregated monthly. The monthly values will be checked against purchase records from the authority responsible for transmission and distribution of electricity from the South African national electricity grid. If there is a significant difference (greater than 2.0%) then the difference must be clarified/justified in the annual monitoring and verification report. The most conservative value will be used if there is any doubt as to which is more accurate.

Accuracy
The accuracy of the meter will be dictated within the terms and conditions of a power purchase agreement with the national utility responsible for transmission and distribution. NERSA requires that electricity generation, transmission, distribution or supply projects comply with NRS 57. NRS 057: 2009/SANS 474: 2009 "South African National Standards Code of practice for electricity metering" is used to determine the minimum accuracy requirements for the metering equipment. In accordance with this standard, the electricity/power meter will be at least a "Class 0.2" which means it will be accurate to at least 0.2%.

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: 22/09/2010
Responsible person/s:
Peter Oldacre
Deloitte
South Africa
+27 (082) 920 4984
poldacre@deloitte.co.za

The persons and entities responsible for the completion of the application of the baseline study and monitoring methodology are not project participants.

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 anticipated starting date for the project is the date of placement of the order for the wind turbines in February 2012.

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

The minimum operational lifetime of the wind turbines is 25.0 year and 0.0 months. This exceeds the crediting period selected for the projects.

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:

01/01/2014 but not prior to project registration

C.2.1.2. Length of the first crediting period:

7.0 years and 0.0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The project will have a number of positive impacts on the environment. These include:

- The project results in a reduction of greenhouse gas emissions by displacing coal-fired grid electricity with electricity generated from a renewable resource. This reduction in greenhouse gas emissions will play a role in assisting South Africa to achieve its emission reduction target of 34.0% below business-as-usual by 2020.
- The generation of electricity from wind power does not require the use of water. This is in direct contrast to the generation of electricity from coal.
- The footprint of the turbines is relatively small and this will allow for the day-to-day farming activities to continue undisturbed. The placement of wind turbines and associated infrastructure will take existing site activities into account to limit disruption to agricultural activities.
- The project will make use of a renewable resource to generate electricity. The electricity will be fed onto the national electricity grid and displace coal-fired electricity. Apart from reducing greenhouse gas emissions, the project will displace the negative impacts of coal-mining and beneficiation as well as the adverse environmental impacts of combusting coal (particulate and sulphur emissions and water consumption and contamination). The success of the project will assist in encouraging the diversification of South Africa’s energy mix and the use of renewable resources.

The initial scoping report for the Witberg wind farm indentified a number of potential negative environmental impacts for the project. These impacts are as follows:

- **Noise Impacts:** There could be an increase in noise during the construction phase of the project where large construction vehicles will be using both the public and farm roads in the area. During the operational phase of the project, there could be aerodynamic noise generated by the blades of the turbines. In addition, noise could be caused by the turbine generators during operation. A specialist study will be conducted on noise generation in order to quantify the impact and look at methods of mitigating the noise.
- **Loss of Agricultural Land:** The proposed site is zoned for agriculture. The project could reduce land available for agriculture.
- **Visual and Aesthetic Landscape Impacts:** The wind turbines stand approximately 60.0 metres high. A specialist study will be conducted on the visual impacts on the landscape during the EIA process.
- **Impact on Flora and Fauna:** The project could impact on the vegetation in the area and result in loss of vegetation. A specialist study will be conducted on the potential impacts on the vegetation. The land will be fully rehabilitated upon the decommissioning of the power plant. The project may also impact on birdlife and bats through collisions with the turbine blades or internal injuries sustained through decompression near the moving blades. Other fauna may be impacted through habitat loss or disturbance. Studies on the impacts of birds and bats are included in the EIA process.

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 project requires an Environmental Impact Assessment (EIA) in accordance with the South African National Environmental Management Act No. 107 of 1998 (NEMA). ERM is the environmental practitioner that has been appointed to complete the scoping report and the EIA Report (EIR). The project triggers the following listed activities in Government Notice R387:

- Activity 1(a) – "the generation of electricity where (i) the electricity output is 20.0 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1.0 hectare."
- Activity 1(l) – "the transmission and distribution of above ground electricity with a capacity of 120.0 kilovolts or more."
- Activity 2 – "any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20.0 hectares or more."

In addition, the project may trigger the following listed activities in Government Notice R386:

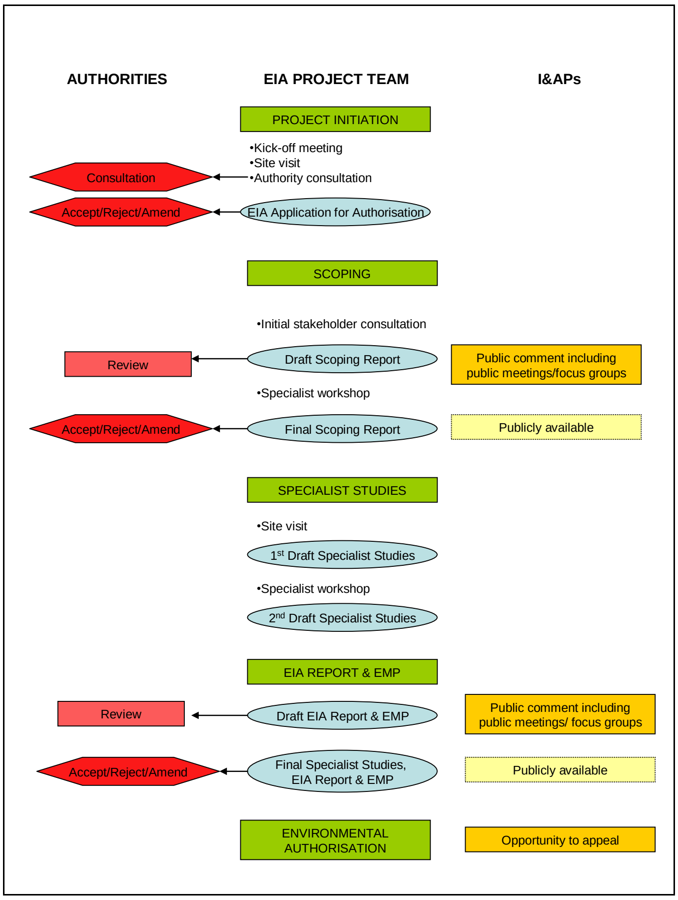
- Activity 1(l) – "Transmission and distribution of electricity above ground with a capacity of more than 22.0 kilovolts and less than 120.0 kilovolts."
- Activity 1(m) – "The construction of facilities or infrastructure, including associated structures or infrastructure, for – (m) any purpose in the one in ten year flood line or a river or stream, or within 32.0 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including – (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs.

- Activity 14 – “Construction of masts above 15.0 metres high.”
- Activity 15 – “Road construction if wider than 4.0 metres or with reserve wider than 6.0 metres unless within the ambit of another listed activity or which are access roads of less than 30.0 metres long.”

The purpose of the EIA process is to assist in identifying environmental and social impacts of the project. As part of the EIA process, an Environmental Management Plan (EMP) will be drafted which will put in place mitigating and monitoring plans to reduce and manage the potential impacts.

The EIA process is depicted in Figure 4:

Figure 4: EIA Process (supplied by ERM)



To date, the scoping report for the project has been drafted and released for public comment. The public participation meeting as per the requirements of the EIA process was held on the 27th of October 2010. The specialist studies required for the EIA will commence after the scoping report has been approved by the South African Department of Environmental Affairs (DEA).

SECTION E. Stakeholders' comments

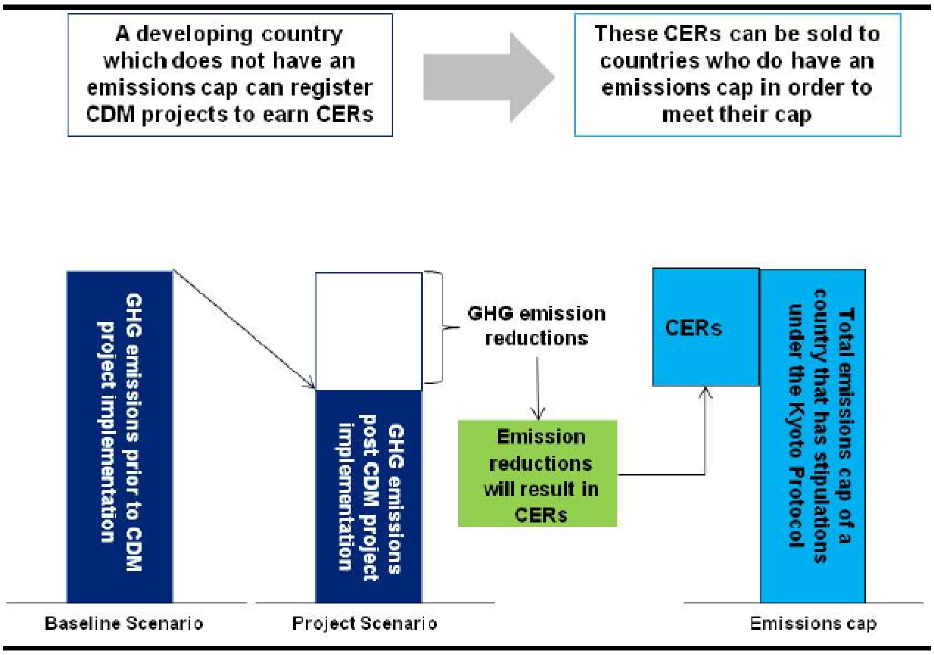
E.1. Brief description how comments by local stakeholders have been invited and compiled:

The scoping report contains the following information on the project being developed under the Clean Development Mechanism:

3.6 CLEAN DEVELOPMENT MECHANISM REGISTRATION

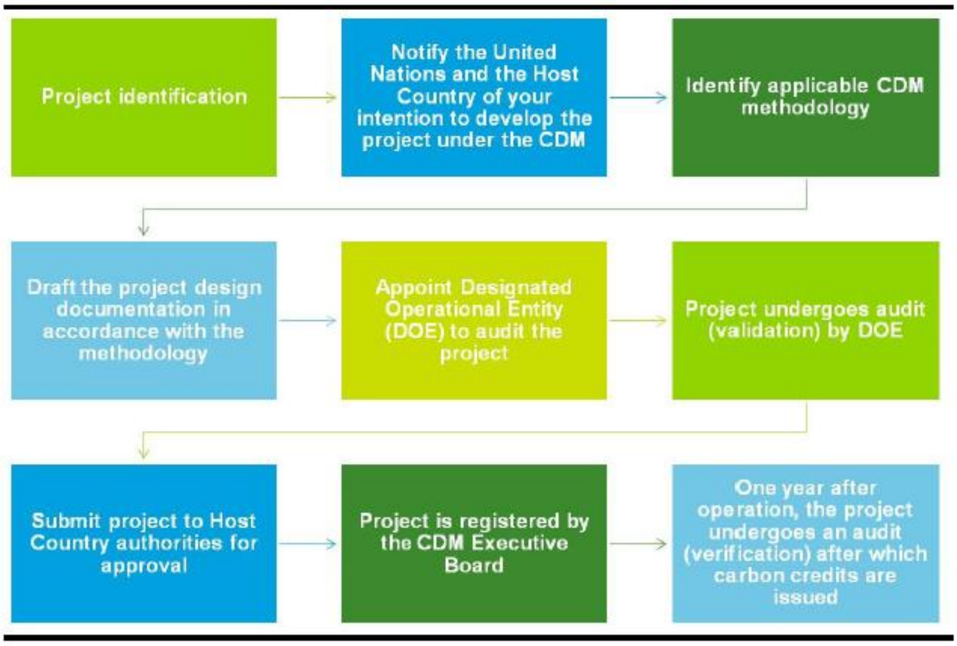
The proposed Witberg Wind Farm will generate electricity which will be supplied onto the national grid. The electricity generated by this facility will displace grid electricity which is primarily coal-based and, as such, has a high Greenhouse Gas (GHG) emission factor. Part of the project planning includes an application for the project to be registered under the Clean Development Mechanism (CDM) of the Kyoto Protocol. The CDM allows developing countries such as South Africa to implement GHG emission reduction projects and generate carbon credits. These carbon credits are also known as Certified Emission Reductions (CERs). One MWh of electricity generated by the proposed Witberg Wind Farm would be equivalent to one carbon credit (one CER). The carbon credits are sold to developed countries to assist in achieving the GHG emission reduction targets committed to under the Kyoto Protocol. This process is illustrated in *Figure 3.4* below.

Figure 3.4 *CDM Process Illustration*



The revenue from the sale of the CERs will contribute to offsetting a portion of the costs associated with the project as well as overcoming some of the barriers associated with the development of wind energy facilities. The CDM is administered and governed by the United Nations Framework Convention on Climate Change (UNFCCC). The process to develop the project and apply for registration under the CDM is shown in *Figure 3.5* below.

Figure 3.5 *CDM Project Development*



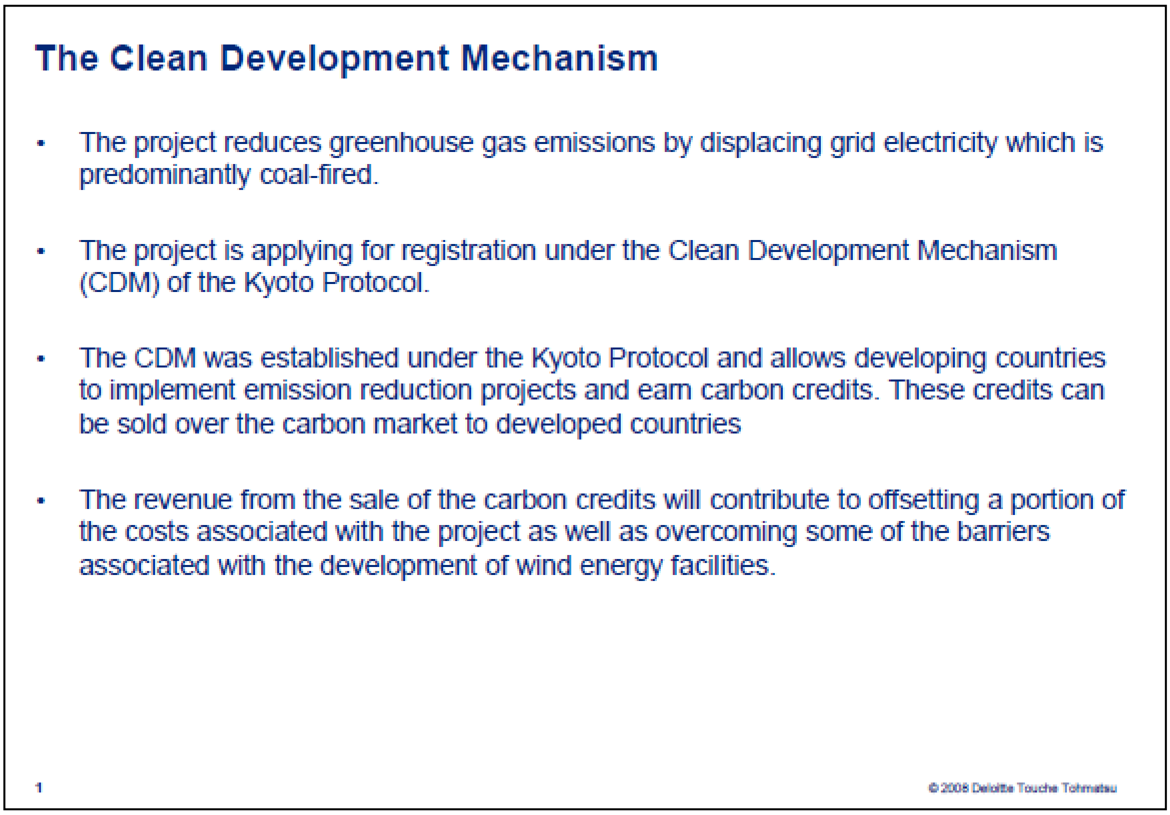
The project is in the process of preparing an application for registration under the CDM. This CDM registration process is not part of the EIA process and is not being undertaken by ERM. G7 has commissioned Deloitte & Touche as independent CDM consultants. General information on the CDM can be found at www.unfccc.int and for further information on the CDM registration for the Witberg Wind Farm please contact Joslin Andrews at Deloitte & Touche (josandrews@deloitte.co.za or +27 (0) 11 806 5952).

The report was made available on the internet (http://www.erm.com/G7_Renewable_Energies) and in the Laingsburg town. In addition, the environmental consultants notified all interested and affected parties about the release of the scoping report. Once the scoping report was released for public comment, a public participation meeting was arranged for the Witberg wind farm. All interested and affected parties were notified of the meeting and notices were placed in the Laingsburg town. The participants who attended the public meeting were:

Name	Organisation
Mr Dean Chapman	DBSA
Mr Westhuizen	Ou Mare Farm
Mr DJ Calldo	Calldo Boerdery
Mr Conradie	Private
Dr Marianne Thomson	Ambiance Trust
Maj Mariam January	ERM
MNR Wilbur Smith	Kannidood Project
Patricia Boer	Kannidood Project

Mr Alan Veasey	Rietfontein Nature Reserve
Mr Muller Coetzee	ERM
Ade V le Rone	Fortuin Farm
J Du Plessis	Elandsfontein Boerdery
Mrs J Hart	Tweedside Farm
Dr Herwig Hitlenberger	Private
Katherine Degenaar	ERM
G.RD. Westhuiszen	Arts
A Ketteringham	HWB Communications
Mr Shumani Mugeri	Department of Transport
Jetter Vye	Private
Lawrence Hoevt	Tweedside
Mrs F van Wyk	Tourism
C G du Plessis	Department of Agriculture Western Cape
Amaria Marais	Hartjieskraal Laingsburg

At the public meeting, a presentation was delivered which included information on the project and the development of the project under the CDM. Below is the slide presented at this meeting:



E.2. Summary of the comments received:

The comments and response report is made available in the scoping report. A second round of comments will be invited on completion of the full Environmental Impact Assessment (EIA). Below are a number of comments and questions relating to the wind farm in Witberg:

1. The site is covered by Matjiesfontein Quartzite Karoo, Matjiesfontein Shale Renosterveld, Matjiesfontein Shale Fynbos and Koedoesberge-Moordenaars Karoo. All of these vegetation types are considered to be Least Threatened on a national basis. However, parts of the site in the north east and south west have been determined as Critical Biodiversity Areas (CBAs) due to the presence of rare and/or endangered species, edaphic interfaces and ecological connectivity. There are also many rivers, streams and drainage channels on the site.

2. Cape Nature does not support the loss of endangered or critically endangered vegetation and the wind farm and its associated infrastructure should be located in areas which have already been transformed.

3. Detailed botanical and avifaunal studies must be provided during the EIA process.

4. Will ERM consider or fully investigate the impact on flora and fauna as various proteas and succulents grow in the area?

5. The project will have major impact on biodiversity of the Witteberg endemic fynbos species, leucadendron cadens and leucospermum wittebergense which are all localised plants, and can be eradicated by the smallest of development footprints.

6. The project is in conflict with Cape Nature’s Langeberg-Witteberg conservation corridor.

7. Wind farms are known for having negative impact on the rainfall and temperature patterns, will this be investigated?

8. The wind farm has the potential to change rainfall pattern for the areas as a result of disturbances in the micro climate of Witteberg. Witteberg currently receives more rain than the adjacent areas such as Laingsburg and Touwsrivier, and any changes in the rainfall patterns will have severe impacts on the natural environment of the area.

9. The wind turbines will completely spoil the Witteberg Mountain Range if they are placed on top of the mountain.

10. Private nature reserves in the area are concerned about the visual impact of the masts as they are 25 km away from the proposed project site.

11. The wind farm will have visual impacts on heritage sites in the area: The historic village of Matjiesfontein which was declared a national heritage site it 1979 and the historic rural settlement on farm Elandskloof.

12. Its expected that many of the wind turbines will be placed on top of the mountains, as there will be no economical sense to place them in the leeway/shadow zone or turbulent areas, and there is

not often much wind in the valley anyway. The large size of the turbines will affect the available clear horizon. The resolution of the map I have concerning the placement is too poor to see exact placement and it obscures the topographical map.

13. Potential visual impact on the Witteberg skyline as the turbines will be seen in Witteberg Private Nature Reserve.

14. Does G7 have wind speed statistics available for the district?

15. If not, were wind speeds already measured or do you intend to measure wind speeds over a period in the district, to determine suitability of properties?

16. "The final location, size and type of turbines used will be determined using information gathered from wind measuring masts…" (Quoted from BID). Is the idea to first install these wind measuring masts and thereafter find the suitable location?

17. To the knowledge of the stakeholder the closest transmission line is in Matjiesfontein. Is it correct to assume that the wind farm's cables will then be connected to those *"existing transmission lines"* (4km away), and would necessarily have to be erected on the closest suitable farm?

18. Is there a site map available that indicates the current or *"existing transmission lines"* that can be forwarded to stakeholders?

19. Possible geological vibrations caused by the turbines could affect the accuracy of the measurements taken at the *planned* International Space Geodesy Observatory, south of Matjiesfontein, regardless the strength vibrations.

20. Space Geodesy HardRao has invested several years and has held several workshops at Matjiesfontein with respect to the proposed development of a Space Geodesy Observatory on the farm of Mr David Rawdon.

21. This area was selected because of the clean, clear skies and relatively low horizon for satellite laser ranging purposes as well as being relatively free of radio frequency interference. The establishment of such a station would have synergistical benefits to the local community, and would have attracted additional visitors to Matjiesfontein, would also have utilised part of the train museum as a science visitor's centre which would have promoted science and technology awareness. However, if the wind farm is built in the area, the space geodesy project will have to be abandoned, which will mean that the time, effort and money we have invested will also be wasted.

22. A neighbouring landowner plans to start a private nature reserve in the area and is concerned about how the project is going to impact on these plans.

23. Plans are underway to restore and renovate some of the historic buildings in the rural settlement of Elandskloof.

24. The Matjiesfontein area depends on tourism for its livelihood, if the natural environment is destroyed by the erecting of large rotating structures, tourism will be adversely affected and thus the livelihoods of many people.

25. Turbines have a potential to interfere with radio frequency, especially of the planned international Space Geodesy Observatory.

26. Turbines are likely to interfere with mobile telephones and data signals (Vodacom and MTN towers in the area) and most people in the area do not have access alternative signals.

27. Interference with radio and TV signals transmitted from the Sentech tower on Witteberg mountain could be felt by residents.

28. Possible interference with radio transmitters of the SAPS, Eskom and others transmitters found in the Witteberg area.

29. Interference with the Telkom microwave tower.

30. How will the community of Touwsrivier benefit from the project? Approximately 85 percent of the population in the area of Touwsrivier is unemployed. It would be excellent if the project will be able to provide employment opportunities to the community.

31. Approximately 85 percent of the population in the area of Touwsrivier is unemployed. It would be excellent if the project will be able to provide employmentopportunities to the community.

32. The area has an abundance of unskilled labour.

33. Wind turbines have been known to for killing thousands of birds through from collisions. This is likely to be the scenario for the Witteberg birds, especially the many raptor species currently protected in the Witteberg area in areas such as Anysberg Nature Reserve, Witteberg Private Nature Reserve, Zuurkloof Private Nature Reserve, Rietfontein Private Nature Reserve and other private reserves in the immediate area.

34. The University of Cape Town is currently undertaking research on the raptor population in the Witteberg area.

35. How was the location of the proposed project determined? Did ERM determine the location of the intended wind farm, or who suggested the selected property/ies?

36. Did ERM determine the location of the intended wind farm, or who suggested the selected property/ies?

37. What criteria were used in the selection process? Farm Elandskrag 1/269, Janttesfontein RE/164 and Bestenwag 1/150 should not form part of the project site as they are in a natural environment.

38. Farm Elandskrag 1/269, Janttesfontein RE/164 and Bestenwag 1/150 should not form part of the project site as they are in a natural environment.

39. Did Eskom or the Government (or whoever the appropriate institution might be) already agreed to purchase the electricity generated?

40. Who owns the "National Power Grid" and who will be remunerating the wind farm for electricity generated?

41. Approximately 5x5m (foundation) x 60 turbines plus 2500^2 "hard standing" for each turbine – how many m^2/hectares in total is required for the wind farm? 1 hectare = 30 $000m^2$

42. The Professor is against the proposed activity, however, he will only provide a complete testimony once the full proposed plan are made available, i.e. turbine locations, laser light reflection off turbine blades, and projected angle of interception to our proposed site etc.

43. Against the project as it will destroy natural vegetation, increase fire hazards, devaluation of property prices, cause noise and visual pollution.

44. The project will be welcomed in the area as the project will promote green thinking, eco-tourism and provide sustainable electricity supply.

45. The neighboring farmer welcomes the project and is very excited about it, as alternatives to coal generated fuels are important.

46. What remuneration will the land owners receive?

47. Who are the stakeholders referred to in the documentation?

48. When are the wind farms going to be erected?

49. The history of the railway line between Touwsrivier and Matjiesfontein need to be investigated during the EIA phase.

50. All developments of this nature should be kept close to the N1 away from the natural environment and mountains.

For the remainder of the comments please refer to *FSR Witberg Annex D Comments and Responses*[68].

The concerns mentioned above will be addressed through specialist studies during the compilation of the Environmental Impact Assessment (EIA) report. All comments and responses have been recorded by the environmental consultants.

E.3. Report on how due account was taken of any comments received:

Below are the responses to the comments raised during the scoping phase of the Environmental Impact Assessment (EIA):

[68] Environmental Impact Assessment: G7 Renewable Energies (Pty) Ltd. Available online from www.erm.com/G7_Renewable_Energies. Accessed 5 April 2011.

1. Noted. A botanical specialist study will be undertaken during the EIA phase to assess the impact on flora and protected/sensitive habitats. Consideration of site hydrology will also be included in the EIA phase.

2. Noted. A botanical specialist study will be undertaken during the EIA phase and will include the identification of appropriate mitigation and management measures.

3. A botanical specialist study and fauna specialist studies (terrestrial ecology, bats and birds) will be undertaken as part of the EIA phase.

4. A botanical specialist study will be undertaken during the EIA phase and will include the identification of appropriate mitigation and management measures.

5. Noted. A botanical specialist study will be undertaken during the EIA phase and will include the identification of appropriate mitigation and management measures.

6. A botanical specialist study and fauna specialist studies (terrestrial ecology, bats and birds) will be undertaken as part of the EIA phase. These studies will include consideration of the effects of the project on conservation areas.

7. This will be considered as part of the EIA phase.

8. This will be considered as part of the EIA phase.

9. A landscape and visual specialist study will be undertaken as part of the EIA phase.

10. A landscape and visual specialist study will be undertaken as part of the EIA phase.

11. A landscape and visual specialist study will be undertaken as part of the EIA phase. Potential impacts on areas of cultural interest will also be considered as part of the specialist archaeology, palaeontology and cultural heritage study which will be undertaken as part of the EIA phase.

12. A landscape and visual specialist study will be undertaken as part of the EIA phase. A revised site location map has been included in the Draft Scoping Report and Non-technical Executive Summaries.

13. A landscape and visual specialist study will be undertaken as part of the EIA phase.

14. G7 has access to a mesoscale wind atlas for South Africa which can be used to calculate wind speed and consistency across a large area at high-resolution. G7 also has a temporary 15 m wind monitoring mast at the proposed site, and will be erecting three additional 60 m wind monitoring masts to collect detailed data on wind conditions at the site.

15. See above.

16. The three 60 m wind monitoring masts will be erected in October 2010. The data collected from these masts, the 15 m mast and the wind atlas will then be used to design an indicative project layout, which will be presented in the EIR.

17. An existing 132 kV dual traction overhead transmission passes through the north of the site. It is anticipated that the energy generated by the wind farm will be connected to the national grid via these transmission lines. A new substation will be built (within the site area) to facilitate connection to the transmission lines. The wind farm will be connected to the substation via either underground cables or short overhead transmission lines (within the site area only).

18. A site map, including the location of the existing transmission lines, is provided in the Draft Scoping Report and Non-technical Executive Summaries.

19. A specialist noise study will be undertaken as part of the EIA phase. This study will also consider potential vibration effects.

20. Noted.

21. Noted. Specialist landscape and visual and socioeconomic studies will be undertaken as part of the EIA phase.

22. Noted. Specialist landscape and visual, fauna and flora, and socio-economic studies will be undertaken as part of the EIA phase.

23. Noted. Historic buildings and potential impacts on these resources will be address by the specialist archaeology, palaeontology and cultural heritage study which will be undertaken as part of the EIA phase.

24. Specialist landscape and visual and socio-economic studies will be undertaken as part of the EIA phase.

25. EMF will be considered as part of the EIA phase.

26. EMF will be considered as part of the EIA phase.

27. EMF will be considered as part of the EIA phase.

28. EMF will be considered as part of the EIA phase.

29. EMF will be considered as part of the EIA phase.

30. During the construction period only limited numbers of local people would be directly employed by the project; namely for site security, manual labour, transportation of goods and other similar services. The turbine assembly and testing would be undertaken by a highly-skilled team of turbine construction specialists (the majority of which would likely be from overseas as a workforce of this type is not currently available in the South African market).

As part of the project, opportunities to train South African's to be skilled wind farm construction staff will be identified.

31. See above.

32. See above.

33. A specialist bird study will be undertaken as part of the EIA phase. This study will include assessment of potential impacts to birds and bird populations including habitat loss, disturbance, displacement, collision risk and barriers to movement.

34. Noted.

35. The site location was chosen by G7 (the developer). G7 has access to a mesoscale wind atlas for South Africa which was used to calculate wind speed and consistency across a large area at high-resolution. Following the identification of a number of suitable sites G7 erected a number of 15 m wind monitoring masts to begin monitoring wind conditions at the potential sites. G7 also commissioned a pre-feasibility study which considered a number of environmental and social issues. Following this feasibility study five priority wind farm sites were selected; Witberg Wind Farm in one of the priority sites.

36. See above. The site location and land owner agreements were determined by G7.

37. The sites were chosen based on a number of factors including wind resource, proximity to grid, land availability and a number of environmental and social considerations. Further details regarding the site selection process and G7 pre-feasibility study (mentioned above) are provided in the Draft Scoping Report.

38. Noted.

39. The energy would be sold to the National Energy Regulator of South Africa (NERSA) under a Power Purchase Agreement (PPA) with the project. No agreement has been signed to date but G7 has begun consultations with NERSA.

40. See above. The PPA would be agreed with NERSA. Eskom owns the national grid and is responsible for maintaining the grid and distributing energy.

41. The detailed footprint of the development has not yet been defined. It is currently anticipated that the turbines, hard-standing, substation and temporary laydown area may occupy up to approximately 155,500 m² (15.5 ha). In additional to these components there would be access roads (up to 6 m wide) and the development may also require borrow pits and an on-site cement batching plant (subject to the appropriate permissions). The detail of the development will be determined during the detailed design phase and will be reported in the EIR.

42. Noted. The detailed development design, including the site layout, has not yet been determined. An indicated project layout will be provided as part of the EIR.

43. Noted. Specialist botanical, socio-economic, noise and landscape and visual studies will be undertaken as part of the EIA phase.

44. Noted.

45. Noted.

46. The owners of the land portions included in the site area have signed a lease-agreement with G7 for the duration of the project.

47. Project stakeholders include a wide range of Interested and Affected Parties (I&APs) including national, regional and local government; public organisations; research institutions; private companies; local communities and landowners; and members of the public. A full list of the current stakeholder for the project is provided in *Annex C* of the Draft Scoping Report. This list will be updated and amended throughout the EIA process.

48. The construction timescales for the project are not yet determined. The construction timescale is dependent on the project receiving all the necessary permissions and on securing a PPA with NERSA for the sale of the energy produced by the wind farm.

49. Historic buildings (including the railway) and potential impacts on these resources will be address by the specialist archaeology, palaeontology and cultural heritage study which will be undertaken as part of the EIA phase.

50. Noted.

For the remainder of how the comments were accounted for please refer to *FSR Witberg Annex D Comments and Responses*[69].

[69] Environmental Impact Assessment: G7 Renewable Energies (Pty) Ltd. Available online from www.erm.com/G7_Renewable_Energies. Accessed 5 April 2011.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Annex 3

BASELINE INFORMATION

Application of the "Tool to calculate the emission factor for an electricity system" Version 02.1.0

The methodological tool to calculate the emission factor for an electricity system determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "build margin" (BM) as well as the "combined margin" (CM). The operating margin refers to existing power plants whose electricity generation would be affected by the proposed CDM project activity. The build margin reflects the power units whose construction would be affected by the proposed CDM project activity. The tool follows seven steps in order to calculate the operating margin, build margin and the combined margin:

Step 1: Identify the relevant electricity systems.
Step 2: Choose whether to include off-grid power plants in the project electricity system (optional).
Step 3: Select a method to determine the operating margin (OM).
Step 4: Calculate the operating margin emission factor according to the selected method.
Step 5: Identify the group of power units to be included in the build margin (BM).
Step 6: Calculate the build margin emission factor.
Step 7: Calculate the combined margin (CM) emissions factor.

Step 1: Identify the relevant electricity systems

Eskom generates 95% of the total electricity in the national grid[70]. The remaining 5% is private or municipal power generation. Excluding the remaining 5% is, apart from simplicity, a conservative approach, as lower efficiencies and higher GHG emissions are assumed in these smaller and older power generation plants.

Eskom generates, transmits and distributes electricity to industrial, mining, commercial, agricultural and residential customers as well as to redistributors. Some assumptions have to be made to calculate the conservative electricity baseline.

The regional generation and consumption of Eskom transmission grids are interlinked and no distinction can be made between provincial or sectoral generation and consumption. For example: Cape Town, although located close to a nuclear power station, receives electricity via the transmission line from coal-fired power stations in Mpumalanga. The whole SA transmission system is taken as a homogenous mix of electricity supply by all generators.

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[70] Eskom. Company Information. Available online from http://www.eskom.co.za/live/content.php?Category_ID=59. [Accessed 10 February 2011]

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

Option 1 was selected for the purposes of the calculation of the emission factor for this project. Hence, only grid power plants are included in the calculation. This is reflective of the project baseline where electricity was sourced from the national grid.

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

In accordance with the tool, the calculation of the operating margin emission factor ($EF_{grid,OM,y}$) must be based on one of the following methods:

- Simple OM; or
- Simple adjusted OM; or
- Dispatch data analysis OM; or
- Average OM.

Of these four methods anyone can be used, however the simple OM method can only be used if low-cost/must-run resources constitute less than 50 % of total grid generation. The Tool states that:

''Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.''

Hydro and Nuclear, classified as both low-cost and must-run power plants, constituted 5% of the national grid in 2005 and therefore the Simple OM method can be applied. The Simple OM method was selected for the calculation of the grid emission factor.

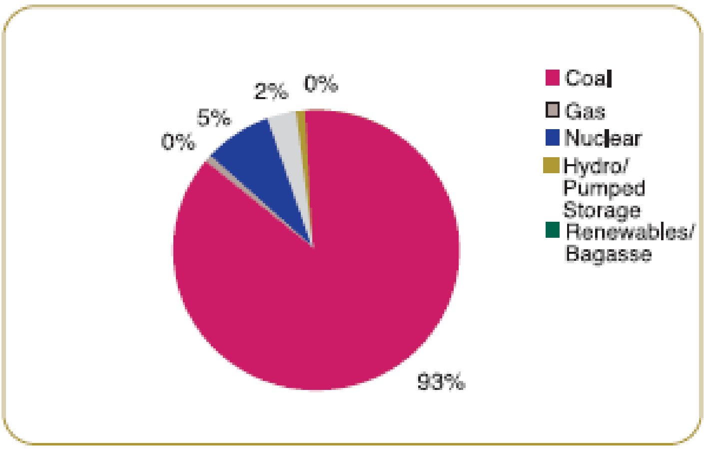

Figure 1: South African electricity sources 2005 (NERSA Booklet, 2005)

For the Simple OM the emission factor can be calculated using either of the two following data vintages:

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex post option: The year in which the project activity displaces grid electricity, required emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1, or y-2) should be used throughout all crediting periods.

The latest data available from the Eskom website (November 2010) was the electricity generation and fuel consumption for 2007/2008 – 2009/2010. This data is available from the CDM calculations webpage found on the Eskom website[71].

For the purposes of this project, the ex ante option was selected for the calculation of the operating margin. Hence, the conservative electricity baseline was calculated using the method below based on the ex ante option. A 3-year average was used, based on the most recent data available at the time of submission which was the data available for 2007/2008, 2008/2009 and 2009/2010.

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

Simple OM

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{m} EG_{m,y}} \qquad \textbf{(1 and 2)}$$

Where:

$EF_{grid,OMsimple,y}$	= Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,m,y}$	= Amount of fossil fuel type *i* consumed by power plant/unit m in year y (mass or volume unit)
$NCV_{i,y}$	= Net calorific value (energy content) fossil fuel type *i* in year y (GJ/mass or volume)
$EF_{CO2,i,y}$	= CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/GJ)

[71] Eskom. 2010. CDM Calculations. Available online from http://www.eskom.co.za/live/content.php?Item_ID=4226. [Accessed 2 February 2011]

$EG_{m,y}$	= Net electricity generated and delivered to the grid by power plant/unit m in year y (MWh)
m	= All power plants/units serving the grid in year y except low-cost/must-run power plants/units
i	= All fossil fuel types combusted in power plant/unit m in year y
y	= Three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

Table 1: Summary of calculation of simple operating margin emission factor

$\mathbf{EF_{grid,OMsimple,y} = \sum_{i,m} FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y} / \sum_m EG_{m,y}}$	t CO_2/MWh	1.02
$FC_{coal,m,y}$	tonne	122,999,328
$NCV_{coal,y}$	GJ/tonne	18.4
$EF_{CO2,coal,y}$	t CO_2/GJ	0.0946
$EG_{m,y}$	MWh	216,507,158

The simple operating margin was calculated based on the ex ante option. The information was available from the Eskom website[72] for 2007/2008 – 2009/2010 and the lower calorific values and emission factors were taken from the IPCC 2006 Guidelines. The power plants not included were low-cost/must-run which were identified as nuclear, hydro, low-cost biomass and solar generation.

Therefore, the power plants evaluated to be included were coal-fired and liquid fuel OCGT power stations. The net energy generation and fuel consumption data were taken from the Eskom website[3].

[72] Eskom. 2010. CDM Calculations. Available online from http://www.eskom.co.za/live/content.php?Item_ID=4226. [Accessed 2 February 2011]

Table 2: Breakdown of calculation of emission factor for the simple operating margin

Power Station	MWh (Net)	FC (tons)	Weight Ave	EF_i	$EF_{OMSimple,y}$
Arnot	12,373,402	6,466,880	5.7%	0.94	0.05
Duvha	22,657,816	11,854,563	10.5%	0.94	0.10
Hendrina	12,732,110	7,274,352	5.9%	1.02	0.06
Kendal	24,555,284	15,069,746	11.3%	1.10	0.12
Kriel	17,275,300	8,995,138	8.0%	0.93	0.07
Lethabo	24,934,884	17,733,374	11.5%	1.27	0.15
Matimba	27,747,317	14,497,086	12.8%	0.94	0.12
Majuba	22,899,325	12,556,527	10.6%	0.98	0.10
Matla	22,789,256	12,974,362	10.5%	1.02	0.11
Tutuka	20,777,419	10,820,666	9.6%	0.93	0.09
Camden	12,373,402	6,466,880	2.9%	0.94	0.05
Grootvlei	22,657,816	11,854,563	0.6%	0.94	0.10
Total	**216,507,158**				**1.02**

Step 5: Identify the group of power units to be included in the build margin

The sample of power units *m* used to calculate the build margin costs of either:

- The set of five power units that have been built most recently, or
- The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and have been built most recently.

For the purpose of calculating the emission factor, the five power units that have been built most recently were:

- Kendal, commissioned in 1988
- Lethabo, commissioned in 1985
- Majuba, commissioned in 1996
- Matimba, commissioned 1987
- Tutuka, commissioned 1985

The generation of these power plants collectively is 172,584,063 MWh over 3 years (2007/2008-2009/2010). This is 27% of the total generation of the power plants connected to the grid. Hence, the build margin will be calculated using the fossil fuel consumption and generation of these power plants.

In terms of vintage of data, project participants can choose between one of the following two options:

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

- Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 was selected for this project so the build margin will be updated after the first crediting period.

Step 6: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \textbf{(13)}$$

$EF_{grid,BM,y}$	= Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	= Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$	= CO_2 emission factor of power unit *m* in year *y* (tCO_2/GJ)
m	= Power units included in the build margin
y	= Most recent historical year for which power generation is available

The CO_2 emission factor of each power unit m ($EL_{EL,m,y}$) should be determined as per the guidance in step 3(a) for the simple OM, using options B1, B2, B3, using for y the most recent historical year for which power generation data is available and using for m the power units included in the build margin.

Table 3: Summary of calculation of the build margin

$EF_{grid,OMsimple,y} = \sum_m EG_{m,y} * EF_{EL,m,y} / \sum_m EG_{m,y}$	t CO_2/MWh	1.06
$EG_{m,y}$	MWh	118,981,845

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

$$EF_{EL,m,y} = \frac{\sum_i FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_m EG_{m,y}} \quad \textbf{(2)}$$

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) fossil fuel type *i* in year y (GJ/mass or volume)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year y (tCO_2/GJ)

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

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

i = All fossil fuel types combusted in power plant/unit m in year y

y = either three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

Table 4: Summary of calculation of emission factor per power unit in build margin

$EF_{EL,m,y} = \sum_{i,m} FC_{i,m,y} * NCV_{i,y} * EF_{CO2,i,y} / \sum_m EG_{m,y}$	t CO_2/MWh	**1.06**
$FC_{i,m,y}$	ton	70,677,399
$NCV_{i,y}$	GJ/ton	18.94
$EF_{CO2,i,y}$	t CO_2/GJ	0.0946
$EG_{m,y}$	MWh	118,981,845

Table 5: Breakdown of calculation of emission factor of build margin

Power Station	MWh (Net)	FC (tons)	Weight Ave	$EF_{EL,m,y}$	EF_{BM}
Kendal	22,340,081	12,556,527	18.8%	1.00	0.19
Matimba	23,307,031	15,069,746	19.6%	1.08	0.21
Majuba	27,964,141	14,497,086	23.5%	0.95	0.22
Lethabo	25,522,698	17,733,374	21.5%	1.29	0.28
Tutuka	19,847,894	10,820,666	16.7%	0.97	0.16
Total	118,981,845				1.06

Step 7: Calculate the combined margin emissions factor

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad \textbf{(14)}$$

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

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

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

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

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

- Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods.

- All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Alternative weights can be proposed, as long as $w_{OM} + w_{BM} = 1$, for consideration by the Executive Board, taking into account the guidance as described below. The values for $w_{OM} + w_{BM}$ applied by project participants should be fixed for a crediting period and may be revised at the renewal of the crediting period.

Table 6: Calculation of the combined margin for non-intermittent generation in the first crediting period

$\mathbf{EF_{grid,CM,y} = EF_{grid,OM,y} * w_{OM} + EF_{grid,BM,y} * w_{BM}}$	t CO_2/MWh	**1.04**
$EF_{grid,OM,y}$	t CO_2/MWh	1.02
w_{OM}	(%)	0.5
$EF_{grid,BM,y}$	t CO_2/MWh	1.06
w_{BM}	(%)	0.5

In conclusion, the emission factor for the South African grid for 2007/2008 – 2009/2010 was calculated to be 1.04 t CO_2/MWh.

Annex 4

MONITORING INFORMATION

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Annex 5

BARRIER ANALYSIS

Eskom Incentive Programmes

The PNCP was initiated towards the end of 2007 and companies were invited to submit tenders before May 2008. The programme was initiated to encourage the generation of decentralised energy (electricity and heat) from waste fuel (cogeneration). The programme set a target of 900.0 MW. A PPA was drafted following consultation with the bidders and released in March 2008[73]. Although it is not clear how many projects qualified under the PNCP, it appears as though PPAs were offered to developers totalling less than 50.0 MW[74]. This is a long way off from the initial target of 900.0 MW. In September 2009, Dave Long (regional manager for Sappi) stated that '*nearly two and a half years after the establishment of the Pilot National Cogeneration Programme (PNCP), nothing has been announced nor any PPAs signed, yet. Project developers had a 1% success rate of signing a PPA under the PNCP.*[75]'

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[73] Eskom 2009 Annual Report. 2009. *Executing the Build Programmes*. Available online from http://www.eskom.co.za/annreport09/ar_2009/business_power_purchase.htm. [Accessed 16 November 2010].

[74] South African Department of Energy. May 2009. *Creating an enabling environment for distributed power generation in the South African electricity supply industry*. Page 5. Available online from www.ameu.co.za/.../Cogen%20WG%20-%2020090419_ Special%20Dispensation%20Cogen.pdf. [Accessed 16 November 2010].

[75] Engineering News. 16 September 2009. *SA's cogeneration sector needs to be 'rescued'*. Available online from http://www.engineeringnews.co.za/article/sappi---cogen-3-2009-09-16. [Accessed 16 November 2010].

A number of reasons for the failure of this programme have been cited[76], but one of the major reasons was the risk allocation in the PPA[77]. According to the publishers of Engineering News, as of March 2010 the PCNP has proven unable to bring new capacity on stream[78]. The programme failed owing to the failure to negotiate a bankable PPA with Eskom with risk sharing between parties. A number of projects initiated under the PNCP applied for carbon credits with the Designated National Authority of South Africa. These projects were not accepted under the PNCP and are proceeding on the basis that they can access carbon credits.

A second programme established by Eskom was the Medium-Term Power Purchase Programme (MTPPP). The MTPPP was initiated in 2008 to bring IPP capacity on line quickly from a range of new and refurbished generation projects. Eskom was considering proposals received up to 1 December 2008 and up to 3 000MW in size under this programme. In September 2009, Eskom suspended the procurement process for the MTPPP. Although the procurement process has re-commenced, there are still only two IPPs approved under the MTPPP. These applications are still under consideration by NERSA[79]. Eskom is now considering only 500.0 MW of electricity under this programme which is a far cry from the initial target of 3,000.0 MW.

The failure of both of these programmes is re-iterated by the publisher of Engineering News and the Research Channel, 'these power procurement programmes have, so far, proven unable to bring new capacity on stream. Eskom suspended the programmes in 2009, owing to issues surrounding its ability to recover the costs associated with purchasing power from IPPs. Until the necessary policy framework and funding is in place, it appears highly unlikely that the private sector will be supplying any electricity to the national grid in the short term[80].' The failure of both of these programmes also calls into question the stability, consistency and accessibility of the REFIT.

Renewable Energy Feed In Tariff (REFIT) Timeline

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[76] South African Department of Energy. May 2009. *Creating an enabling environment for distributed power generation in the South African electricity supply industry*. Page 5. Available online from www.ameu.co.za/.../Cogen%20WG%20-%2020090419_ Special%20Dispensation%20Cogen.pdf. [Accessed 16 November 2010].

[77] South African Department of Energy. May 2009. *Creating an enabling environment for distributed power generation in the South African electricity supply industry*. Page 5. Available online from www.ameu.co.za/.../Cogen%20WG%20-%2020090419_ Special%20Dispensation%20Cogen.pdf. [Accessed 16 November 2010].

[78] Creamer Media. March 2010. *South Africa's Electricity Industry 2010*. Page 25. Available online from http://www.esco.org.za/pdf/new/Electricity_Overview%202010.pdf. [Accessed 16 November 2010].

[79] Eskom concludes two power purchase contracts, four more close. Available online from, http://www.engineeringnews.co.za/article/eskom-concludes-two-power-purchase-contracts-four-more-close-2010-05-19. [Accessed 8 December 2010].

[80] Creamer Media. March 2010. *South Africa's Electricity Industry 2010*. Page 9. Available online from http://www.esco.org.za/pdf/new/Electricity_Overview%202010.pdf. [Accessed 16 November 2010].

The REFIT was introduced by the National Energy Regulator of South Africa (NERSA) to encourage the uptake of grid-connected renewable energy projects[81]. The REFIT is a policy instrument that guarantees prices for the supply of renewable energy onto the South African national electricity grid over a specified time period[82].

The REFIT guidelines were first released in May 2008[83]. After an extensive stakeholder and public consultation period, NERSA released the final guidelines on the 26 March 2009[84]. The progression of the REFIT has been captured below:

Date	Action Taken
July 2007[85]	The Renewable Energy Feed-in Tariff (REFIT) study of NERSA was commissioned[86].
May 2008[87]	Draft REFIT guidelines published for consultation[88]
26 March 2009[89]	Guidelines for the REFIT Phase I are approved. The guidelines establish the institutional framework, the role of the key players and

[81] Imbewu Sustainability Legal Specialists and The Renewable Energy and Energy Efficiency Partnership. 2009. *South African Policy and Regulation Review.* Available online from www.reeep-sa.org/projects/doc_download/56-south-africa-2009. [Accessed 16 November 2010].

[82] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[83] National Energy Regulator of South Africa (NERSA). May 2008. Draft Guidelines South African Renewable Energy Feed-in Tariff. Available online from http://www.ameu.co.za/library/industry-documents/nersa/REFIT%20guidelines%20draft%20080515%20pdf.pdf. [Accessed 16 November 2010].

[84] Department of Public Enterprises. April 2009. Nersa Decision on Renewable Energy Feed in Tariff (REFIT). Available online from http://www.dpe.gov.za/news-3. [Accessed 16 November 2010].

[85] National Energy Regulator of South Africa (NERSA). July 2009. Renewable Energy Feed-in Tariff Phase II. Available online from http://www.nersa.org.za/Admin/Document/Editor/file/NERSA%20REFIT%20%20consultation%20paper%2002%20Dec%202008.pdf. [Accessed 16 November 2010].

[86] National Energy Regulator of South Africa (NERSA). July 2009. Renewable Energy Feed-in Tariff Phase II. Available online from http://www.nersa.org.za/Admin/Document/Editor/file/NERSA%20REFIT%20%20consultation%20paper%2002%20Dec%202008.pdf. [Accessed 16 November 2010].

[87] National Energy Regulator of South Africa (NERSA). May 2008. Draft Guidelines South African Renewable Energy Feed-in Tariff. Available online from http://www.ameu.co.za/library/industry-documents/nersa/REFIT%20guidelines%20draft%20080515%20pdf.pdf. [Accessed 16 November 2010].

[88] National Energy Regulator of South Africa (NERSA). May 2008. Draft Guidelines South African Renewable Energy Feed-in Tariff. Available online from http://www.ameu.co.za/library/industry-documents/nersa/REFIT%20guidelines%20draft%20080515%20pdf.pdf. [Accessed 16 November 2010].

[89] Department of Public Enterprises. April 2009. Nersa Decision on Renewable Energy Feed in Tariff (REFIT). Available online from http://www.dpe.gov.za/news-3. [Accessed 16 November 2010].

	the tariff conditions. The tariff for wind is disclosed in the guidelines.[90]
July 2009[91]	REFIT Phase II consultation paper was released by NERSA.[92] Phase II governs Concentrated Solar Power (CSP), Photovoltaic (PV), biomass and biogas.
3 September 2009[93]	NERSA public hearing on REFIT Phase II[94].
29 October 2009[95]	NERSA approves REFIT Phase II[96].
February 2010[97]	Regulatory Rules on selection criteria for renewable energy projects under the REFIT Programme are published for comment[98]

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[90] National Energy Regulator of South Africa. March 2009. South Africa Renewable Energy Feed-in Tariff. Available online from http://www.innovent.com.uy/site/content/legislacion/south_africa_renewable_energy_feed_in_tariff.pdf [Accessed 28 February 2011].

[91] National Energy Regulator of South Africa (NERSA). July 2009. Renewable Energy Feed-in Tariff Phase II. Available online from http://www.nersa.org.za/Admin/Document/Editor/file/NERSA%20REFIT%20%20consultation%20paper%2002%20Dec%202008.pdf. [Accessed 16 November 2010].

[92] National Energy Regulator of South Africa (NERSA). July 2009. Renewable Energy Feed-in Tariff Phase II. Available online from http://www.nersa.org.za/Admin/Document/Editor/file/NERSA%20REFIT%20%20consultation%20paper%2002%20Dec%202008.pdf. [Accessed 16 November 2010].

[93] National Energy Regulator of South Africa (NERSA). August 2009. *Notice of the Energy Regulator Public Hearing on the Renewable Energy Feed-in Tariff (REFIT) Phase II.* Available online from www.sessa.org.za/component/docman/doc_download./82-public-hearing-announcement-refit-phase-2. [Accessed 16 November 2010].

[94] National Energy Regulator of South Africa (NERSA). August 2009. *Notice of the Energy Regulator Public Hearing on the Renewable Energy Feed-in Tariff (REFIT) Phase II.* Available online from www.sessa.org.za/component/docman/doc_download./82-public-hearing-announcement-refit-phase-2. [Accessed 16 November 2010].

[95] Edkins, M., Marquard, A. And Winkler, H. Energy Research Centre. University of Cape Town. June 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Available online from http://www.erc.uct.ac.za/Research/publications/10Edkinesetal-Solar_and_wind_policies.pdf. [Accessed 16 November 2010].

[96] Edkins, M., Marquard, A. And Winkler, H. Energy Research Centre. University of Cape Town. June 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Available online from http://www.erc.uct.ac.za/Research/publications/10Edkinesetal-Solar_and_wind_policies.pdf. [Accessed 16 November 2010].

[97] National Energy Regulator of South Africa (NERSA). February 2010. *Rules on selection criteria for renewable energy projects under the REFIT programme.* Available online from http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Regulatory%20Rules/RULES%20FOR%20SELECTION%20CRITERIA%2019%20Feb10.pdf. [Accessed 16 November 2010].

[98] National Energy Regulator of South Africa (NERSA). February 2010. *Rules on selection criteria for renewable energy projects under the REFIT programme.* Available online from http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Legislation/Regulatory%20Rules/RULES%20FOR%20SELECTION%20CRITERIA%2019%20Feb10.pdf. [Accessed 16 November 2010].

Annex 6

PRIOR CONSIDERATION

F-CDM-Prior consideration

Prior Consideration of the CDM Form

This form is to be used by project participants in order to submit the notification of the commencement of the project activity and the intention to seek CDM status.[1]

Date of submission:	03/08/2010
SECTION 1: PROJECT DETAILS	
1. Title of the CDM project activity:	*Grid Connected Wind Power Plant in Witberg, South Africa*
2. Precise geographical location: (Geo-coordinates, Town/City, Country)	33°17'23.59"S 20°25'58.93"E, Witberg, Western Cape, South Africa
3. Name of project proponent (Name, Title, Company, Country)	G7 renewable energies(Pty) Ltd, South Africa
4. Brief description of the proposed project activity: (include brief description of technology to be employed and source of baseline emissions to be reduced)	The project involves the installation of a wind power plant which will produce an estimated 315,360 MWh of electricity per year. The electricity will be supplied onto the South African national electricity grid and displace the generation of traditional coal-based electricity. The project will reduce greenhouse emissions through the displacement of electricity from the national grid. Currently, the South African national grid is predominantly coal-based and, as such, has an associated high greenhouse gas emission factor.
SECTION 2: CONTACT INFORMATION	
Name of the entity:	
Contact details of authorized representative:	☐ ☐ Mr. x Ms.
Last name: Rolland	Telephone: +27 (0) 21 409 7024
First name: Nicolas	Fax: +27(0) 86 514 1735
Email: nicolas@g7energies.com	Address: 125 Buitengracht Street, Cape Town 8001, South Africa
Signature:	

History of the document

Figure 3: Prior Consideration Form


You forwarded this message on 06/08/2010 11:46 AM.

From: Andrews, Joslin (ZA - Johannesburg)

Sent: Fri 06/08/2010 09:00 AM

To: 'Ndiafhi Tuwani'; Lufuno Mukwevho

Cc: Oldacre, Peter (ZA - Johannesburg); ti.stein@enbw.com

Subject: Prior consideration for grid connected wind power plant in Witberg, South Africa

Dear Ndiafhi and Lufuno

I hope you are both well. Please find attached the prior consideration for a grid connected wind power plant in Witberg, South Africa. This project is seeking registration under the Clean Development Mechanism.

Grid connected wind power plan...

Please contact me should you have any questions or concerns.

Kind Regards,

Joslin Andrews
Senior Consultant | Sustainability and Climate Change – Johannesburg
Deloitte & Touche
Deloitte Place, Building 5, The Woodlands, 20 Woodlands Drive, Woodmead, 2052, South Africa

Figure 4: Email sent to DNA with prior consideration attached


From: Andrews, Joslin (ZA - Johannesburg)

Sent: Fri 06/08/2010 12:11 PM

To: 'cdmregistration@unfccc.int'

Cc: Oldacre, Peter (ZA - Johannesburg); ti.stein@enbw.com

Subject: Prior consideration for grid connected wind power plant in Witberg, South Africa

To the UNFCCC Secretariat

Please find attached the prior consideration for a grid connected wind power plant in Witberg, South Africa. This project is seeking registration under the Clean Development Mechanism.

Grid connected wind power plan...

Please contact me should you have any questions or concerns.

Kind Regards,

Joslin Andrews
Senior Consultant | Sustainability and Climate Change – Johannesburg
Deloitte & Touche
Deloitte Place, Building 5, The Woodlands, 20 Woodlands Drive, Woodmead, 2052, South Africa
Tel/Direct: +27 (0)11 806 5952 | Fax: +27 (0)11 388 4322 Mobile: +27 (0)84 299 6873
josandrews@deloitte.co.za | www.deloitte.com

Figure 5: Email sent to UNFCCC with prior consideration attached

From: Andrews, Joslin (ZA - Johannesburg)
To: Feinberg, Jade (ZA - Johannesburg)
Cc:
Subject: FW: Prior consideration for grid connected wind power plant in Klawer, South Africa
Sent: Tue 01/03/2011 02:23 PM

My apologies, the first acknowledgement e-mail didn't reflect the fifth CDM prior consideration form submitted.

From: Victoria Kekana
Sent: Friday, August 06, 2010 10:06 AM
To: 'josandrews@deloitte.co.za'
Cc: Lindiwe Olga Chauke; Ndiafhi Patrick Tuwani; Lufuno Leonard Mukwevho; Takalani Martin Rambau
Subject: FW: Prior consideration for grid connected wind power plant in Klawer, South Africa

Dear Joslin

The DNA office within the Department of Energy acknowledges receipt of CDM prior consideration forms which were electronically submitted on Friday the 6th August 2010 by your organisation for the following projects:

(i) Grid Connected Wind Power Plant in Klawer, South Africa
(ii) Grid Connected Wind Power Plant in Lamberts Bay, South Africa
(iii) Grid Connected Wind Power Plant in Richtersveld, South Africa
(iv) Grid Connected Wind Power Plant in Roggeveld, South Africa
(v) Grid connected Wind Power Plant in Witberg, South Africa

They will be filed accordingly.

Regards
Victoria Kekana

Figure 6: Email reply from the DNA to acknowledge receipt of prior consideration form

Extra line breaks in this message were removed.
From: Andrews, Joslin (ZA - Johannesburg)
To: Feinberg, Jade (ZA - Johannesburg)
Cc:
Subject: FW: Prior consideration for grid connected wind power plant in Witberg, South Africa
Sent: Tue 01/03/2011 02:23 PM

-----Original Message-----
From: Anabel Rett [mailto:ARett@unfccc.int] On Behalf Of CDM Registration and Issuance
Sent: 19 August 2010 04:34 PM
To: Andrews, Joslin (ZA - Johannesburg)
Subject: Re: Prior consideration for grid connected wind power plant in Witberg, South Africa

Dear Ms. Andrews,

Thank you very much for your email. We hereby confirm receipt.

Kindly confirm that the entity name on the website is correct.

Kind regards,

Your CDM team
UNFCCC secretariat

Figure 7: Email reply from the UNFCCC secretariat to acknowledge receipt of the prior consideration form

In addition, the project completed a Project Idea Note and received a 'Letter of No Objection' from the South African DNA. This is given below:

DE 10

energy

Department:
Energy
REPUBLIC OF SOUTH AFRICA

Private Bag X 19, Arcadia 0007, Travenna Building 71 Meintjies Street, Sunnyside, 0002 Pretoria Tel: 012 444 4111, Fax: 012 444 4501

G7 Renewable Energies (Pty) Ltd
125 Buitengracht
Walton on Thames
Cape Town
8001
South Africa

South African
Designated National Authority
For the
Clean Development Mechanism
Of the
Kyoto Protocol to the United Nations
Framework Convention on Climate Change
Office of the Director General in the
Department of Energy
DNA Contact Address
Lindiwe Olga Chauke
Tel: +27 (0) 12 444 4116
Fax: +27 (0) 12 444 4501
Email:lindiwe.chauke@energy.gov.za
DNA@energy.gov.za

Attention: Nicolas Rolland

RE: LETTER OF NO OBJECTION FOR GRID CONNECTED WIND POWER PLANT IN WITBERG, SOUTH AFRICA.

The South African Designated National Authority (DNA) for the Clean Development Mechanism (CDM) of the Kyoto Protocol to the United Nations Framework Convention on Climate Change has reviewed the Project Idea Note (PIN) for the project submitted by G7 Renewable Energies (Pty) Ltd in respect of Grid Connected Wind Power Plant in Witberg, South Africa, herein referred to as the Project.

The objective of the proposed project is to generate electricity from wind turbine. The electricity will be supplied into the South African national grid and displace the generation of traditional coal based electricity. The project involves the installation of a wind power plant which will produce estimated 470 000MWh of electricity per year with an installed capacity of up to 180MW. The proposed project activities will result in an estimated emission reduction of 484 100 tCO_2e average per year over a 21 year period. The proposed project activities will be located at Laingsburg Municipality in the Western Cape Province.

Based on information contained in the said PIN, which information has been relied upon exclusively, the DNA has carried out an initial evaluation of the contribution of the Project to sustainable development in South Africa, when measured against the sustainable development criteria for CDM projects, as published from time to time by the DNA (the sustainable development criteria).

Letter of No Objection

As an authorized representative of the DNA, I confirm that the above mentioned initial evaluation indicates that the Project does not appear to show any substantive conflicts with the sustainable development criteria.

As such, the Designated National Authority has no objection to G7 Renewable Energies (Pty) Ltd continuing with further developments and investigation of the Project.

In line with South Africa's National Government objectives regarding Broad Based Black Economic Empowerment it is expected that all project proposals submitted for review and approval should indicate the level of participation and ownership of Historically Disadvantaged South Africans in the project.

The attention of the addressee is drawn to the requirements for the submission of a Project Design Document and application for a DNA Letter of Approval, which requirements are published from time to time by the DNA and are available on the DNA official website http://www.energy.gov.za or on request from the DNA. This letter of approval is required for a project to proceed to registration with the CDM Executive Board.

The provision by the DNA of this Letter of No Objection shall in no way compromise the opinion, independence or transparency of the DNA when subjecting the Project Design Document to the process required for the granting of final approval and in no way implies that final approval of the project is or will be provided.

Yours faithfully,

Ms N Magubane

Director General: Energy

Date: 04/11/2010

Figure 7: Letter of No Objection from the DNA