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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

>>

Indwe Wind Project
15/08/2011
Version 01

A.2. Description of the project activity:

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DNA Wind (Pty) Ltd ("DNA Wind") hereby known as the "Developer" is developing the Indwe Wind Project, a 57.5 MW wind energy facility in the Eastern Cape of South Africa, hereby known as the "Project activity".

The site of the wind farm consists of over 1,000 hectares of land. It has a wind profile that shows extremely high yields over winter, which is favourable to South African energy needs, as well as high annual yields.

The Project activity will generate up to 148,088 MWh/yr and reducing greenhouse gas emissions by 154,833 tCO_2e/yr. The electricity from the wind farm will be fed into the South Africa national grid.

The main purpose of the project is to generate clean renewable electricity through wind power. This generation of this clean electricity will avoid 154,833 tCO_2/yr. Without the project activity, electricity is supplied by the South Africa national grid, which is comprised of almost 100% coal power plants. Greenhouse gas emissions (CO_2) will be avoided from this business as usual baseline scenario of electricity generation from coal power plants.

The project has many sustainable development benefits. They include:

- Significant investment into energy infrastructure in the Eastern Cape of South Africa
- Creation of temporary and permanent jobs in the construction, operation and maintenance of the wind farm
- Increase of tax income to promote the local economy
- Reduction of air pollution through provision of clean, renewable energy
- Reduction of greenhouse gas emissions
- There will be bursary scheme to train local people in the wind industry

A.3. Project participants:

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Name of Party involved ((host) indicates a Host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
South Africa (Host)	DNA Wind (Pty) Ltd	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>> South Africa

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

>> Eastern Cape

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

>>Indwe

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

>>31°25'55.95"S, 27°28'53.17"E

The proposed site is situated in an area approximately 10 km north-east of Indwe, South Africa. The "A" depicted in the below map shows approximately where the location of the wind park will be located within South Africa:

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

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Sectoral scope 01: Energy industries (renewable sources/non-renewable sources)

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

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The Project Activity will consist of the installation of a new up to 57.5 MW wind farm. The technology used will be environmentally sound. The equipment is new and will not be transferred from another party. Electricity from the Project will be fed into the South African national electricity grid.

The scenario existing prior to the project implementation is use of almost 100% coal based power plants generating electricity for the grid. The project will be implemented in one phase and will result in the installation of up to 57.5 MW of wind energy through the installation of up to 23 turbines.
The main parameters of the wind turbine are shown in the table below:

Parameter	Value	Unit
Capacity	57.5	MW
Capacity of individual turbines	2.5	MW
Number of turbines to be installed	23	Turbines
Turbine hub height	80	meter
Rotor diameter	90-95	meter

A 66kV transmission ring will be constructed to transmit the electricity to the national grid.

The baseline scenario is business as usual; therefore, the generation of clean electricity will prevent the creation of greenhouse gas emissions from coal powered plants. As prescribed by the methodology, the baseline is:

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

The baseline scenario is the same as the scenario existing prior to the start of the project activity.

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

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Years	Estimation of annual emission reductions in tonnes of CO_2e
2013	154,833
2014	154,833

2015	154,833
2016	154,833
2017	154,833
2018	154,833
2019	154,833
Total estimated reductions (tonnes of CO_2e)	1,083,831
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (tonnes of CO_2e)	154,833

A.4.5. Public funding of the project activity:

>> No public funding will be used.

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:

>> ACM 0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", v12.1.0, EB58.

This methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system, EB63, v 2.2.1
- Tool for the demonstration and assessment of additionality, EB39, v 5.2
- Guidelines of assessment of investment analysis, EB 62, v5

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

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Compliance of project activity to the Applicability of conditions of ACM 0002 is described as under:

Applicability Condition	This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an)

	existing plant(s); or (d) involve a replacement of (an) existing plant(s).
Justification	As the project activity is a grid-connected renewable power generation project activities that install new wind turbines or (Greenfield plant) where no renewable power plant was operated prior to the implementation of the project activity. Project activity does not involve a capacity addition; involve a retrofit of (an) existing plant(s); or involve a replacement of (an) existing plant(s). **Hence the applicability condition is being met.**

Applicability Condition	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;
Justification	The project activity involves commissioning of a new grid-connected wind-power generation project where no renewable power plant was operated prior to the implementation. **Hence the applicability condition is met.**

Applicability Condition	In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;
Justification	Project activity is construction of a new grid connected wind electricity generation facility. **Hence, the condition is not applicable for project activity.**

Applicability Condition	In case of hydro power plants, one of the following conditions must apply: o The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or o The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or o The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.
Justification	Project activity is the installation of state-of-the art, first-of-its-kind wind power project. **Hence, this condition is not applicable for project activity.**

Applicability Condition	In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is .the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance.
Justification	Project activity is a Greenfield project and does not involve retrofits, replacements, or capacity additions. **Hence, this condition is not applicable for project activity.**

Applicability Condition (Footnote 1)	Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.
Justification	Project activity involve installation of new wind turbines for the generation of electricity, not the hydro electric power that results in a new reservoir or increase in the existing reservoir. **Hence, this condition is not applicable for project activity.**

Compliance of the project activity to the non-applicable conditions is demonstrated as described hereunder.

Applicability Condition	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
Justification	Project activity does not involve usage of fossil fuels. **Hence, this condition is not applicable for project activity.**

Applicability Condition	Biomass fired power plants;
Justification	Project activity is a wind-power plant and not a biomass fired power plant. **Hence, this condition is not applicable for project activity.**

Applicability Condition	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/m2.
Justification	Project activity is not a hydro power plant. **Hence, this condition is not applicable for project activity.**

	In addition, the applicability conditions included in the tools referred in methodology are as follows:[1] 1. Tool to calculate emission factor for an electricity system; 2. Tool for the demonstration and assessment of additionality; 3. Combined tool to identify the baseline scenario and demonstrate additionality; 4. Tool to calculate project or leakage CO2 emissions from fossil fuel combustion.
Justification	1. Applicability condition of "Tool to calculate emission factor for an electricity system" is demonstrated in Section B.6. 2. Applicability condition of "Tool for the demonstration and assessment of additionality" is demonstrated in Section B.5 3. Section II (Baseline Methodology Procedure) of the applied methodology Version 12.1.0, ACM0002 and Section I (Scope and Applicability) of Version 03.0.0, "Combined tool to identify the baseline scenario and demonstrate additionality" clearly states that this tool can be applied only for the project activity having the retrofit or replacement of existing grid-connected renewable power plant/unit(s) at the project site. As this project activity is green-field power plant this Tool does not apply to this project activity. 4. This Tool is not applicable to the given project activity because the Project activity will not fire any fossil fuels during the whole crediting period. Moreover, in case of emergency the electricity will be imported from the Grid.

The project activity meets all the applicability conditions of applicable methodology ACM 0002.

Below are the applicability criteria and justification for the use of the Tool to calculate the emission factor for an electricity system, EB63, v 2.2.1

Applicability Condition	The tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).
Justification	Project activity supplies electricity to a grid. **Hence, this condition is applicable for project activity.**

Applicability Condition	The tool is not applicable if the project electricity system is located partially or totally in an Annex-I country.
Justification	Project activity does not supply electricity to a system located partially or totally in

[1] The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants does not apply to this methodology only refers to some steps of this tool.

	an Annex-I country. **Hence, this condition is not applicable for project activity.**

There is no applicability criteria for the other tools applied.

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

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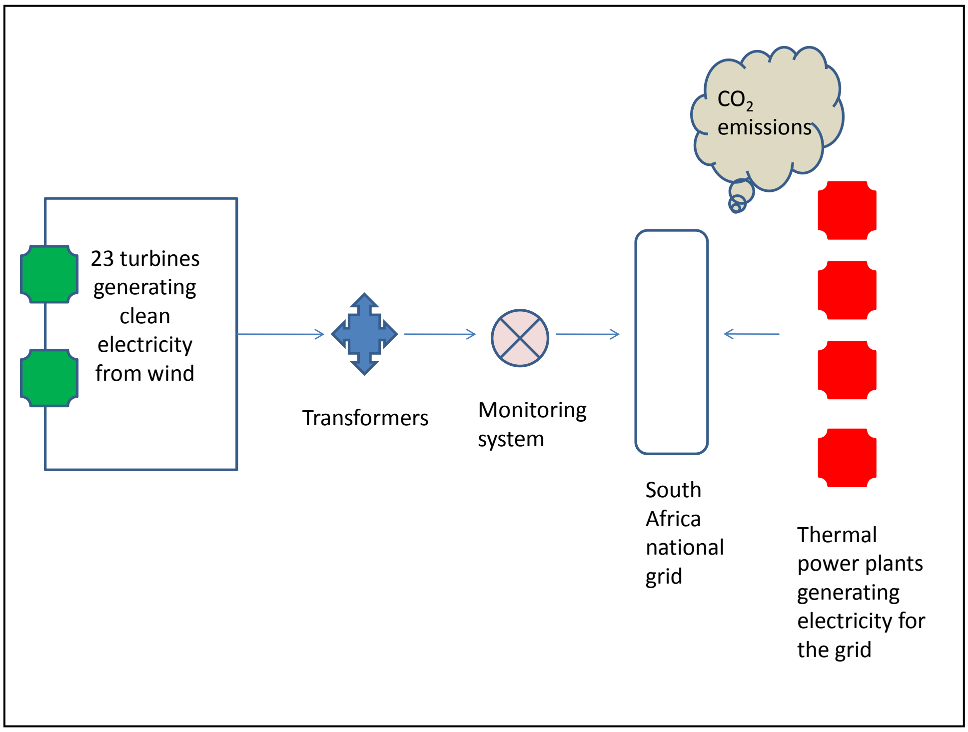
Electricity generated by the Project activity will be fed into the South Africa national grid. Therefore, in accordance with the methodology, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the South Africa national electricity system. Please see below for a flow diagram of the project boundary.



	Source	Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in a fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project activity	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.

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

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In accordance with the methodology, the baseline scenario for the installation of a new grid-connected renewable power plant/unit, is the following:

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

Therefore, the baseline scenario is the generation of equivalent amount of electricity in the South Africa national grid.

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):

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

Define realistic and credible alternatives to the project activity(s) through the following Sub-steps:

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

Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives include:

1. The proposed project activity undertaken without being registered as a CDM project activity;
2. Construction of a coal power plant with equivalent annual power supply
3. Construction of a renewable energy power plant
4. Continuation of the current situation (no project activity or other alternatives undertaken).

Outcome of Step 1a: Identified realistic and credible alternative scenario(s) to the project activity

The Tool for the demonstration and assessment of additionality, EB39, v 5.2 states that identified alternatives should be realistic for similar project developers[2]. As DNA Wind (Pty) Ltd. (www.dnawind.co.za) is specifically focused on wind energy, a fossil fuel power plant and a power plant using renewable energy (alternatives 2 and 3) other than wind are not considered to be realistic

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[2] For example, 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.

alternatives[3]. Therefore, only alternatives 1 and 4 are realistic and credible. However, it will be demonstrated in Step 2, Investment analysis, that alternative 1 is not realistic. Therefore, only alternative 4, Continuation of the current situation (no project activity or other alternatives undertaken), is realistic and credible.

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

All of the previously mentioned alternatives, including the only realistic and credible alternative, are in compliance with mandatory laws and regulations. The relevant laws and regulations include:

- 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;
- Environment Conservation Act of 1989.

Outcome of Step 1b: Identified realistic and credible alternative scenario(s) to the project activity that are in compliance with mandatory legislation and regulations taking into account the enforcement in the region or country and EB decisions on national and/or sectoral policies and regulations.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

Option I: It is to be noted that, as the proposed project will earn revenues not only from the carbon credit revenue but also from electricity sales. Simple cost analysis does not apply as the project generates economic benefits other than the CDM related income through the sale of electricity generated by the project activity.

Option II: The investment comparison analysis method is applicable to projects whose alternatives are similar investment projects. Only on such basis, a comparison analysis can be conducted. The investment comparison analysis is not suitable to the project type or decision-making context because an alternative electricity production project does not exist in South Africa. Therefore the investment comparison analysis method is not an appropriate method.

Option III: Per Section V-19 of "Guidance on the Assessment of Investment Analysis (v.5)", "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". As a result, Option III is determined to be an appropriate analysis method to conduct the investment analysis. Benchmark analysis can be transparently demonstrated using equity IRR as the financial/economic indicator compared against a relevant and justifiable industry benchmark hurdle rate. Per the EB 39 Annex 10 Methodological Tool guidance (V. 5.2), "the purpose of the equity IRR calculation is to determine the final return on the initial equity investment". Equity IRR is the key determinant for the project developer to invest or not to invest, therefore equity IRR is used.

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

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[3] http://www.eskom.co.za/content/2008EskomPoster.jpg There are no coal mines in the region. The region is also water scarce so a hydropower plant is not realistic.

A benchmark analysis using post-tax equity IRR was chosen and conforms to Sub-step (b) of the Additionality Tool (v.5.2) and Guidelines on the Investment Analysis (v.5). The Additionality Tool indicates that the project returns should be compared to a benchmark value that is "based on parameters that are standard in the market, considering the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer" (sub-step 2b para5). South Africa does not have an established wind market (non-existing wind power market in South Africa). In the absence of an established wind market in South Africa, the equity IRR benchmark is based on the required return on equity from a relevant national authority, the South African National Energy Regulator (NERSA).

As per the Guidelines on the Investment Analysis (v.5), "benchmarks supplied by a relevant national authorities are also appropriate if the DOE can validate that they are applicable to the project activity and the type of IRR calculation presented" (section IV, point 12, p.3). According to data from the "NERSA Consultation Paper, Review of Renewable Energy Feed-In Tariffs" report published in March 2011 (p.22), the required equity IRR of renewable energy projects in South Africa is 17%.

Therefore, based on the benchmark equity IRR of 17%, the calculation and comparative analysis of financial indicators for the proposed project are carried out in sub-step 2c.

Sub-step 2c: Calculation and comparison of financial indicators (only applicable to Options II and III):

The relevant parameters used to calculate the equity IRR of the project are included in the following table:

Parameter	Value	Unit	Basis of assumption
Wind Turbine Capacity	2.5	MW	Proposal from manufacturer
No. of Wind Turbines	23		See *Environmental Impact Assessment (EIA) authorisation*
Total Capacity	57.5	MW	*Calculation*
Plant Load Factor	29.4%		Independent Energy report
Project Lifetime	20	Years	Proposal from manufacturer
Estimated Net Generation	148,088	MWh/yr.	Calculation
Interest Rate	9.00	%	Prime Lending Rate at time of Investment Decision (August 2011)
Tariff Rate	0.66	R/kWh	NERSA Revenue Application Decision (February 2010)
Annual escalation in Tariff	4.2%	%	REBID Documentation
O&M cost annual	17.07	Million R	OEM equipment supplier quotes
Inflation	4.2%	%	REBID Documentation
Total Investment /	R 738.53	Million R	OEM equipment supplier quotes

CAPEX			
Depreciation of capital assets	50% / 30% / 20%	%	South Africa Revenue Services
Tax rate	28.00%	%	South Africa Revenue Services
CER Price	10	Euro	Best estimate based on current market conditions

Notes:

1. For the purpose of estimating the tariff price for the project, the average standard price of electricity of R0.66 /kWh for 2012/13 has been employed. In February 2010, NERSA approved Eskom's Multi-Year Price Determination 2 tariff application resulting in a percentage price increase on the average standard electricity tariff in South Africa of 24.8% from April 2010, followed by another average increase of 25.8% from April 2011 and a further price increase of 25.9% from April 2012. The tariff rate cost is determined according to NERSA's tariff decision, the average standard price of electricity is R0.52/kWh for 2011/2012 and R 0.66/kWh for 2012/2013. These rates are indicated in the NERSA Revenue Application Decision (February 2010).
2. Plant Load Factor has been determined using an independent wind prospecting report.
3. CER Price is based on current market conditions and estimates of forward selling opportunities.

In accordance with the benchmark analysis guidance, the equity IRR of 17% for the project activity serves as a benchmark to assess the financial attractiveness of the project. The proposed project is not considered as financially attractive if its financial indicators are lower than the benchmark requirements. As shown in the below 'Impact on CDM Project Viability' table, the equity IRR of the project without CDM income is 11.59%, and with CDM income is 16.29%. The calculated Benchmark equity IRR is 17% therefore the equity IRR calculation without CDM is not financially attractive. However with CDM-related income, the Indwe Wind equity IRR increases, making the project more financially attractive.

Impact of CDM on Project Viability	
Benchmark Equity IRR	17.00%
Equity IRR without CDM income	11.59%
Equity IRR with CDM income	16.29%

Sub-step 2d: Sensitivity analysis (only applicable to Options II and III):
A sensitivity analysis is included for variables that account for more than 20% of either total project costs or total project revenues in order to demonstrate our conclusion holds under reasonable variations in the critical assumptions. The critical variables that are tested under the sensitivity analysis are the following:

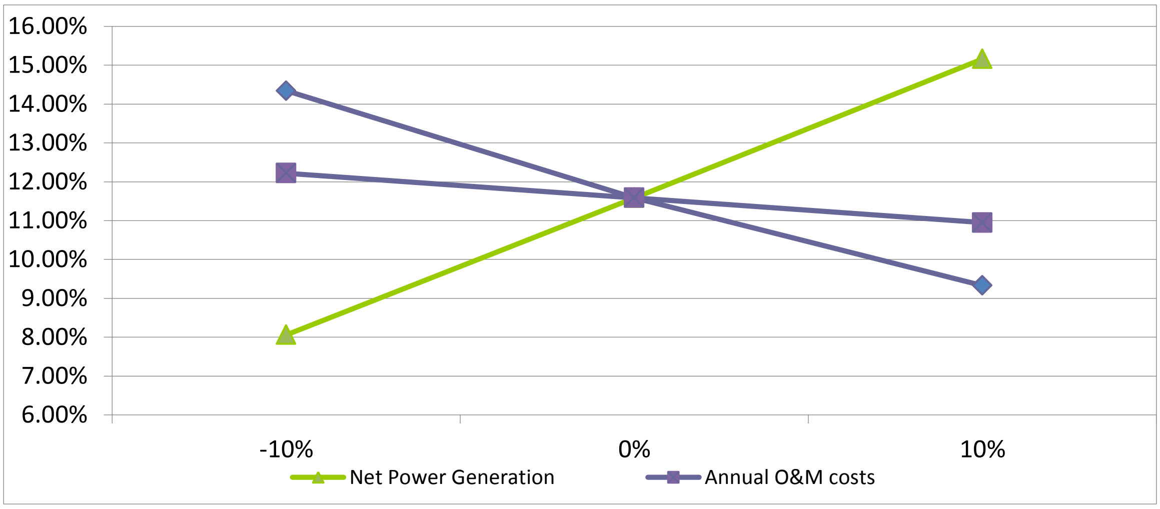
- Capital Expenditure
- Annual operating and maintenance (O&M) Costs
- Net Power Generation

The below table and figure provide the results of the sensitivity analysis when tested for -10% and +10% variation. The results demonstrate that none of the variables impact the equity IRR in such a way to exceed the provided financial benchmark. It is unlikely that any of the variables will fluctuate to a point whereby the equity IRR benchmark would be exceeded.

Sensitivity Analysis of Critical Variables Table

Parameter	-10%	0%	10%
Capital Expenditure	14.34%	11.59%	9.33%
Annual O&M costs	12.22%	11.59%	10.95%
Net Power Generation	8.06%	11.59%	15.16%

Sensitivity Analysis of Critical Variables Figure



The results demonstrate that none of the variables impact the equity IRR in such a way to exceed the provided financial benchmark. It is unlikely that any of the variables will fluctuate to a point whereby the equity IRR benchmark of 17% would be exceeded. The below table shows by how much each of the tested variables would have to increase in order for the benchmark equity IRR threshold to be achieved. These fluctuations represent significant deviations from quoted or verified figures (CapEx, O&M, plant load factor), therefore not deemed likely to occur.

Parameter	**% Increase / Decrease required to surpass 17% benchmark equity IRR**
Capital Expenditure	-18.0%
Annual O&M costs	-84.4
Net Power Generation	15.1%

The cost of capital expenditure is unlikely to decrease because the value used is from a bankable quote provided to the project participant by a turbine supplier. It is extremely unlikely that the supplier would decrease the price below the quote that has been presented. Furthermore, it is more likely that the cost of turbines will increase as the cost of steel is projected to increase: “Steel prices are set to jump by up to 66 per cent this year, top executives and analysts have said"[4]. O&M costs are unlikely to decrease by 84% as labor costs will increase at least by the consumer price index and possibly even more as labor costs, one of the main components comprising O&M, are increasing. "Some economists warn that rising labour costs are eroding South Africa's status as an investment destination since its workforce is already more expensive and less productive than those found in many of its emerging market rivals"[5]. Finally, net power generation is not expected to increase by 15.1% as the generation was calculated based on more than 2 years historical data and calculation.

The sensitivity analysis demonstrates that the investment analysis provides a valid argument in favour of additionality as it consistently supports, across a realistic range of assumptions, the conclusion that the project activity without CDM is not financially/economically attractive as compared to the equity IRR benchmark.

Outcome of Step 2: As the sensitivity analysis concluded that: (1) the proposed CDM project activity is unlikely to be the most financially/economically attractive (as per Step 2c para 11a) or is unlikely to be financially/economically attractive (as per Step 2c para 11b), Step 3 will not be applied.

The project timeline is summarized below:

Date	**Milestone**
Prior consideration form submitted to the UNFCCC and DNA	14 October 2010
Letter of No Objection from DNA	04 November 2010
Full Environmental Authorisation given by Department of Environmental Affairs	27 June 2011
Investment Decision – Issuance of REBID Process Documents	August 2011
Start of project activity (purchase order for the turbines)	Expected June 2012
Start of validation	15 October 2011
Expected registration	July 2012

Step 4: Common practice analysis

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

There are currently 2 other wind farms, which are operational in South Africa.

1. Darling 5.2 MW wind farm which has been operational since 2008.
2. Klipeuwal 3.2 MW wind farm, which has been fully operational since 2003.

[4] Marsh, Peter. "Steel price forecast to rise by up to two-thirds". Financial Times. 23 January 2011. http://www.ft.com/cms/s/0/758d30da-2720-11e0-80d7-00144feab49a.html#axzz1bEf1Sq67

[5] Stoddard, Ed. "South Africa's gold miners set to strike". Reuters. 27 July 2011. http://www.reuters.com/article/2011/07/27/safrica-strikes-overnighter-idUSL6E7IR1FH20110727

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

The two operational wind farms in South Africa are not similar to the project activity because both are funded by public sources of funding while the project activity is fully funded by a private sector company.

1. Darling Wind Farm is funded by public sources of funding including the Central Energy Fund, the Danish government and the Development Bank of Southern Africa[6].
2. Klipeuwal is a demonstration wind farm, which is government owned and ESKOM operated.

Furthermore, the two other wind farms are small demonstration projects. The project activity is 57.5 MW while the two other wind farms are:

1. 5.2 MW
2. 3.2 MW

Therefore, the other options are publicly funded and of a small demonstration size and are not similar to the project activity which is publicly funded and large scale.

As Sub-steps 4a and 4b are satisfied, i.e.(i) similar activities cannot be observed the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The Tool to calculate the emission factor for an electricity system, EB63, v.2.2.1, was used to calculate the South Africa Grid Emission Factor (GEF).

Step 1 Identify the relevant electricity systems

The relevant electricity system for the project activity is the South Africa electricity grid that consists of 13 coal power ESKOM power plants, 1 Independent Power Producer (IPP) coal plant and 1 IPP CDM hydropower plant.

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

Option I, only grid power plants are included in the calculation, is applied.

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

The ex-ante option is selected. The emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. A 3-year generation-weighted average, based on the most recent data available at the time of submission of the

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[6] Donor Funded project as evidenced by “Being the first of its kind, the project received a grant from the Danish government as well as funding from State owned CEF (Pty) Ltd.” Source: http://www.darlingwindfarm.co.za/

Project Design Document (PDD) to the Designated Operational Entity (DOE), is used. Data from 2007 – 2009 is used.

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

The simple Operating Margin (OM) emission factor option is applied. The simple OM is calculated based on Option A of the Tool, Based on the net electricity generation and CO_2 emission factor of each power unit.

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

Where:
$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = CO2 emission factor of power unit *m* in year *y* (tCO2/MWh)
m = All power units serving the grid in year *y* except low-cost / must-run power units
y = The relevant year as per the data vintage chosen in Step 3

Option A1 was selected as fuel consumption and electricity generation data for power unit *m* is available.

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

Where:
$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type *i* consumed by power unit *m* in year *y* (Mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
m = All power units serving the grid in year *y* except low-cost/must-run power units
i = All fossil fuel types combusted in power unit *m* in year *y*
y = The relevant year as per the data vintage chosen in Step 3

Step 5 Calculate the build margin (BM) emission factor

The build margin is calculated using 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.

The sample group of power units m used to calculate the build margin was be determined as per the following procedure, consistent with the data vintage selected above:
(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently (SET5-units) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

The annual generation of the 5 most recently built power plants (Majuba, Kendal, Matimba, Lethabo and Tutuka), excluding registered CDM project activities, was approximately 119,000 GWh in 2009, the most recent available information. These plants are identified as $AEG_{SET\text{-}5\text{-}units}$.

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

The total generation of the system, including registered CDM project activities, was approximately 216,216 GWh. Combined, the Majumba and Kendal power plants generated 21% of the total generation. These plants are identified as SET≥20%.

(c) From SET5-units and SET≥20% select the set of power units that comprises the larger annual electricity generation (SET_{sample}); Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. Ignore steps (d), (e) and (f).

The larger generation is generated by SET5-unit. However, as all of these plants started to supply to the grid more than 10 years ago (the newest was commissioned in 1996), SET≥20% will be used. Steps (d), (e) and (f) will be ignored.

The build margin is calculated, as follows:

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

Where:
$EF_{grid,BM,y}$ = 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/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, 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.

Step 6 Calculate the combined margin (CM) emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on the following method: (a) Weighted average CM, the preferred option.

The weighted average combined margin emissions factor is calculated as follows:

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

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year *y* (tCO2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

The following default values will 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;

ACM0002
Project emissions

In accordance with ACM0002, project emissions are 0:

$$PE_y = 0$$

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. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

In accordance with ACM0002, baseline emissions are calculated according to the below equation:

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

As the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, option (a) is applied for the calculation of**:**

(a) Greenfield renewable energy power plants

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

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

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

Leakage

In accordance with the methodology, no leakage emissions are considered.

Emissions reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:
ER_y = Emission reductions in year *y* (t CO2e/yr)
BE_y = Baseline emissions in year *y* (t CO2/yr)
PE_y = Project emissions in year *y* (t CO2e/yr)

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

Data / Parameter:	**GEF**
Data unit:	tCO_2/MWh
Description:	
Source of data used:	Eskom reports, Kelvin plant reports and Bethlehem CDM monitoring report
Value applied:	1.046
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	This is calculated ex-ante, once per crediting period

Data / Parameter:	$\mathbf{FC_{i,m,y}}$
Data unit:	t_{coal}/yr
Description:	Amount of fossil fuel type I consumed by power plant m in year y
Source of data used:	Eskom and Kelvin plant reports
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	This is used in the ex-ante grid emissions factor calculation

Data / Parameter:	**$NCV_{i,,y}$**
Data unit:	GJ/t_{coal}
Description:	Net calorific value of coal
Source of data used:	Eskom and Kelvin plant reports
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	This is used in the ex-ante grid emissions factor calculation

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tCO_2/GJ
Description:	CO2 emission factor of fossil fuel type I used in power unit m in year y
Source of data used:	Eskom and Kelvin plant report
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**$EG_{m,y}$**
Data unit:	MWh
Description:	Net electricity generated by power plant m in year y
Source of data used:	Eskom reports, Kelvin plant reports and Bethlehem CDM monitoring report
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied:	
Any comment:	

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

>>

The weighted average combined margin emissions factor for solar and wind projects is summarized below:

Wind and solar projects		
$OM_{2007-2009}$	1.045	tC02/MWh
BM_{2009}	1.050	tC02/MWh
$CM_{2007-2009}$	**1.046**	**tC02/MWh**

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

$CM_{2007-2009}$	1.046	tC02/MWh
Generation	148,088	MWh/yr
ER	**154,834**	**tCO2/yr**

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

>>

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2013	0	154,833	0	154,833
2014	0	154,833	0	154,833
2015	0	154,833	0	154,833
2016	0	154,833	0	154,833
2017	0	154,833	0	154,833
2018	0	154,833	0	154,833
2019	0	154,833	0	154,833
Total (tonnes of tCO_2e)	0	1,083,833	0	1,083,833

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/unit to the grid in year y
Source of data to be used:	Electricity meters on the project activity site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	148,088
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording
QA/QC procedures to be applied:	Cross check measurement results with records for sold electricity
Any comment:	

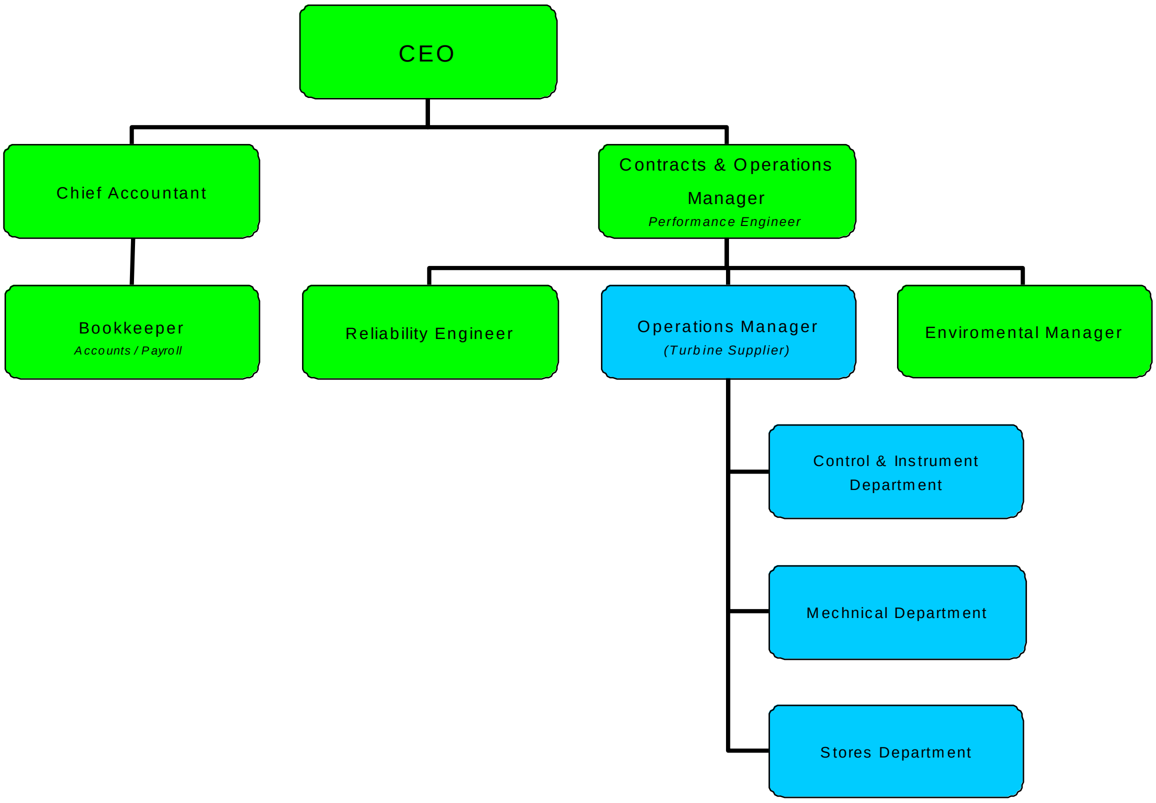
B.7.2. Description of the monitoring plan:

>>

1. Project Management

The Indwe Wind Project has a clearly defined organizational structure of a Chief Executive Officer (CEO), Chief Accountant and Contracts and Operations Manager.

The CEO has overall responsibility of the project and will manage both internal staff and the turbine supplier Operations and Maintenance (O&M) team who are contracted to manage the O&M of the plant.



Organogram of proposed Structure

Key roles are as follows:

- CEO, responsible for:
    a. Management of Staff
    b. Reporting to Board
    c. Enforcing contractual obligations
- Chief accountant
    a. Billing and invoicing of utility (buyer of electricity)
    b. Payment of O&M team
    c. General audit and accounting function
- Contracts and Operations Manager
    a. Directly managing the turbine supplier O&M contract
    b. Performance enhancement
    c. Responsible from the project side with regard to ensuring metering is calibrated and audited
- Environmental Manager
    a. Compliance to Environmental Management Plan, a condition of the Environmental Authorization

2. Management of monitoring, measurement and reporting

The Contracts and Operations Manager will have overall management of the data collection. The Chief Accountant will use this data to bill the offtaker.

The day to day measurements will be continuously read and stored in the Supervisory Control and Data Acquisition (SCADA) system for record retrieval. The data will be audited at least annually by independent auditors, in accordance with the Power Purchase Agreement (PPA).

Data will be recorded by electronic meters that will record kilowatt hour (kWh) generated. In addition, the off-taker will have their own meter and recording system to compare the wind projects meter. The data will be transferred into emissions reductions spreadsheets to be presented during verification.

The staff will be trained in monitoring electricity generation as well as ensuring a documented audit trail is processed and stored.

No additional CDM training will be required as the CDM monitoring, in line with the methodology, requires no actions separate to those required by monitoring techniques of the project activity. The electricity generation data to be collected must be collected for general plant operation.

3. Back up plan

In case of instances that impact the data collection, back up procedures will be in place to ensure accurate monitoring data will be collected.

The SCADA system has uninterrupted power supply (UPS) backup systems as well as back up drives. In addition, if the meter is impacted by maintenance, the 2nd meter (owned by the off-taker) will be used in this period.

The data from the meter owned by the purchaser of the electricity (either Eskom or Independent System Operator), will be recorded continuously and recorded on a monthly basis.

4. Calibration

Calibrations will be conducted as required by the manufacturer and PPA with the offtaker. The project developer will conduct calibrations for the meter at the project site while offtaker will calibrate their meter. All calibration certificates will be stored.

Meters will be inspected by the project developer and Eskom and sealed to prevent tampering.

5. Data management

All monitoring data and records will be archived in electronic or paper format. Copies of all sales receipts will also be retained. All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. The data shall be recorded in the below format.

Date	Start meter reading (KWh)	End meter reading (KWh)	Electricity generated (KWh)

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):

>>
Doug Jenman
Executive Director DNA Wind
15/08/2011

(Project participant as listed in Section A.3)

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:

>>
June 2012 (expected purchase order date for wind turbines)

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

>> 20 years

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:

>> 01/11/2012 or the date of registration, whichever is later

C.2.1.2. Length of the first crediting period:

>> 7 renewable two times for a total of 21 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>N/A

C.2.2.2. Length:

>>N/A

SECTION D. Environmental impacts

>>

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

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In accordance with the Environment Conservation Act of 1989, an Environmental Impact Assessment was completed. The resulting Environmental Impact Report was approved on 19 May 2011 by the Department of Environmental Affairs.

Potential impact	Mitigation measure
Disturbance of bats	Collision monitoring and consideration of stopping operation at times when bats are most vulnerable
Disturbance of birds	Collision monitoring, abbreviation of construction and maintenance, lower levels of noise, painting of turbines, marking power lines, use of bird friendly power hardware
Soil degradation and topsoil erosion	Rehabilitate disturbed areas, develop a comprehensive stormwater management plan, stabilize any erosion features which may develop, existing infrastructure will be used as much as possible
Noise disturbance	Possible relocation of one of the turbines depending on the findings of an operational phase noise analysis, reduction of the number of simultaneous activities during construction, construction only during set hours, consideration of noise emissions specifications when selecting turbine equipment,
Increased risk of veld fires	Establish emergency procedures, train personnel to respond to fires, establish fire breaks where appropriate
Positive social impacts	Positive social impacts include: creation of employment and business opportunities, positive impact on tourism,

Impacts of the project will be monitored, management plans will be developed and proper rehabilitation will occur to keep all impacts at a minimum.

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:

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Environmental impacts are not considered significant and mitigation measures will be implemented for the minor impacts. The approval of the Environmental Impact Report on 19 May 2011 by the Department of Environmental Affairs demonstrates the acceptance of the host country.

SECTION E. Stakeholders' comments

>>

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

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The questions and comments of local stakeholders presented below were invited through public adverts in local media – specifically the *Midland News* and the *Daily Dispatch*. The local community leadership was also alerted of the meeting and extended the invitation to their surrounding community. In addition, site notices were placed at nearby farms on R56 Regional Road. Lastly, a compiled list of relevant stakeholders (local, national and international) including NGOs, local community & government were invited to the meeting.

A public meeting was then held in the Emalahleni Library Hall in Indwe on 17 August 2010. The location for the meeting was chosen by community representatives for its accessibility. A project description document was provided in English, Afrikaans & Xhosa. Once the local chairperson officially opened the meeting, all in attendance were asked to introduce themselves. This was followed by an explanation of the project and the Environmental Impact Assessment draft report, followed by clarifications and questions. This presentation was followed by detailed introduction of the Clean Development Mechanism by a representative of Africa Carbon Credit Exchange – Mr. John Fay. The carbon credit application process and how Rainmaker Energy would be applying this for their wind energy facilities was outlined. A sustainable development exercise was then conducted using three categories – environment, social and technological & economic development. Consensus agreement was reached that the project provided overall positive impacts. A questionnaire was then completed by all meeting attendees that asked “Name & Signature, What is your impression of the meeting? What do you like about the project? What do you not like about the project?”

In addition, a municipal focus group meeting was held on 16 August 2010 with the Chris Hani District Municipality Planning Committee in Queenstown to ensure local government consultation. The project was explained to the committee and notified it will be applying to receive CERs under the CDM of the Kyoto Protocol.

E.2. Summary of the comments received:

>>

The questions were a mix of inquiries to how the project will be implemented and statements supporting the project. Questions were asked regarding: project benefits to the local community, opportunities to utilize local labour and jobs that will be created during construction and operation, inquiries regarding meeting Black Economic Empowerment (BEE) programs to be created by the project, the projects relationship to the Dorper Wind Farm that is also being, in part, developed by Rainmaker, turbine noise and impact on local farmers, height and lifespan of the wind turbines, what will happen to turbines after decommissioned, routes to be used to transport turbines, length of construction period, relationship to a proposed coal mine and power station, inquiries about the investors in the project and business registration of Rainmaker, impact on local traffic during maintenance, and inquiries to other local sites they are investigating for development.

Questions received at the Chris Hani District Municipality Planning Committee included the following: consideration of the project of the Municipality Spatial Development Framework and the District’s Environmental Management Plan, location and ownership of land of project site, cost-effectiveness of wind energy, community benefits, interaction with Eastern Cape Traditional Leaders to develop further projects and inquiries into who is financing the project.

In addition to the received comments, contact information was provided for all attendees should they have any further questions or concerns regarding the project and its application for CDM.

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

>>

All questions were answered satisfactorily and all comments were positive. Therefore, no further action is required.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	DNA Wind (Pty) Ltd
Street/P.O.Box:	70c Oxford Rd
Building:	70c Oxford Rd, Riviera
City:	Johannesburg
State/Region:	Gauteng
Postcode/ZIP:	2146
Country:	South Africa
Telephone:	+27 (0)11 486 4488
FAX:	+27 (0)86 632 8688
E-Mail:	info@dnawind.co.za
URL:	www.dnawind.co.za
Represented by:	
Title:	Project Manager
Salutation:	Mr.
Last name:	Jenman
Middle name:	n/a
First name:	Doug
Department:	Development
Mobile:	+27 82 41 52515
Direct FAX:	+27 86 582 1792
Direct tel:	+27 21 685 5411
Personal e-mail:	doug@dnawind.co.za

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

Not applicable

Annex 3

BASELINE INFORMATION

Plant names	Installed capacity	Commissioning	Fuel type	2007			2008			2009		
	(MW)	date		t/yr fuel	tCO2	MWh/yr	t/yr fuel	tCO2	MWh/yr	t/yr fuel	tCO2	MWh/yr
Bethlehem (CDM	7	2009	Hydro							0	0	1,497
Majuba	3,843	4/1/1996	Coal	12,853,342	23,584,913	23,680,971	12,554,406	23,036,388	22,676,924	12,261,833	22,499,539	22,340,081
Kendal	3,840	10/1/1988	Coal	15,986,131	29,333,345	26,517,420	15,356,595	28,178,194	23,841,401	13,866,514	25,444,008	23,307,031
Matimba	3,690	12/4/1987	Coal	14,862,323	27,271,242	29,021,742	13,991,453	25,673,261	26,256,068	14,637,481	26,858,674	27,964,141
Lethabo	3,558	12/22/1985	Coal	18,314,572	33,605,859	25,701,723	16,715,323	30,671,357	23,580,232	18,170,227	33,340,997	25,522,698
Tutuka	3,510	6/1/1985	Coal	10,627,575	19,500,799	20,980,242	11,231,583	20,609,108	21,504,122	10,602,839	19,455,410	19,847,894
Duvha	3,450	1/18/1980	Coal	12,425,531	22,799,913	23,622,732	11,393,553	20,906,311	21,769,489	11,744,606	21,550,467	22,581,228
Matla	3,450	9/29/1979	Coal	13,795,309	25,313,352	24,549,833	12,689,387	23,284,068	21,863,400	12,438,391	22,823,510	21,954,536
Kriel	2,850	5/6/1976	Coal	9,059,934	16,624,296	17,762,398	9,420,764	17,286,392	18,156,686	8,504,715	15,605,511	15,906,816
Arnot	1,980	9/21/1971	Coal	6,210,700	11,396,166	11,905,060	6,395,805	11,735,820	11,987,281	6,794,134	12,466,724	13,227,864
Hendrina	1,895	5/12/1970	Coal	7,794,220	14,301,806	13,756,351	7,122,918	13,070,017	12,296,687	6,905,917	12,671,837	12,143,292
Grootvlei	1,200	6/30/1969	Coal	130,748	239,912	237,138	674,538	1,237,726	1,249,556	1,637,371	3,004,452	2,656,230
Komati	1,000	6/30/1969	Coal	0	-		0	-		664,497	1,219,302	1,016,023
Camden	1,600	12/21/1966	Coal	3,218,873	5,906,389	5,171,057	3,876,211	7,112,555	6,509,079	4,732,163	8,683,162	7,472,070
Kelvin	600	1964	Coal	961,900	1,765,014	1,235,061	1,205,600	2,212,185	1,384,109	236,500	433,960	276,678
Total (w/out CDM project)	36,466		-	126,241,158	231,643,006	224,141,728	122,628,136	225,013,384	213,075,034	123,197,188	226,057,551	216,216,582
% generation of 5 newest plants (exc CDM)												55%
Generation of plants comprising >20% gen												21%
Emission factor tCO2/MWh						1.033			1.056			1.046

Item	Value	Unit	Description
NCV	19.397	GJ/ton coal	Net calorific value (http://www.eskom.co.za/live/content.php?Item_ID=4226)
EF	0.0946	tonCO_2/GJ	Coal emission factor (IPCC default value 2006)
EF coal	1.835	tonCO2/ton coal	
Plants in the BM			

Plants highlighted in yellow are in the build margin. The baseline data is from Eskom reports[7], Kelvin plant reports and Bethlehem CDM monitoring report.

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[7] http://www.eskom.co.za/content/calculationTable.htm

Annex 4

MONITORING INFORMATION

Please refer to Section B.7.2