LONGYUAN MULILO DE AAR 2 NORTH WIND ENERGY FACILITY

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1 PROJECT DETAILS

1.1 Summary Description of the Project

The purpose of this project (Longyuan Mulilo De Aar 2 North Wind Energy Facility) is to supply the wind-generated electricity to the grid of the Republic of South Africa (RSA).

The project envisages the installation of a new grid connected wind farm at a site where no wind farm was operated prior to the implementation of the activity.[1]

The installed capacity of the wind farm is 144MW. [2] The wind farm consists of 96 wind turbines and the associated infrastructure.[3]

The wind farm is located in the Pixley Ka Seme District close to the town of De Aar in the Northern Cape Province of the RSA, approximately 30 km northeast of the Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility. Longyuan Mulilo De Aar 2 North (RF) (Pty) Ltd is the wind farm developer. An EPC contract was signed on 06/02/2015[4] and the wind farm started commercial operation on 31/10/2017, the produced electricity is supplied to the national grid of the RSA [5].

The energy system of the RSA is dominated by coal-fired power plants and is managed by the state-owned company Eskom which is in charge of generation, transmission and distribution of power to end-users. The energy system of the RSA is integrated into the grid of Southern African Power Pool (SAPP), where South Africa is represented by Eskom.[6]

The greenhouse gas (GHG) emissions from the electricity generation at the wind farm will amount to zero. The reduction of GHG emissions as a result of the project implementation will be achieved due to reduction of CO_2 emissions from combustion of fossil fuel at the existing grid-connected powered plants and plants which would likely be built in the absence of the project.

The total GHG emission reductions at the end of the crediting period are expected to be 4,339,290 t CO_2e, annual average GHG emission reductions are 433,929 t CO_2e/year.

1.2 Sectoral Scope and Project Type

This project falls under sectorial scope: Energy (renewable/non-renewable).

1 Final EIA report, Section 3.2 Description of the proposed activity, pages 29-30, April 2012

2 Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, Section 3 Wind Energy Assessment, page 11, 26/07/2013

3 AECOM, De Aar 2 North Wind Farm, Environmental Exclusion Zones, page 1, 13/06/2017

4 EPC contract, Signature page, page 211, 06/02/2015

5 Eskom, Notice of Commencement of the Facility (De Aar 2 North – 138.96 MW), page 1, 30/10/2017

6 http://www.sapp.co.zw, SAPP SADC Grid Map, main website page

Project type is Renewable energy. Displacement of electricity that would be provided to the grid by more-GHG-intensive means.

1.3 Project Proponent

Organization name	Blue World Carbon Asset Management (Pty) Ltd (Primary project Proponent)
Contact person	Ilya Goryashin
Title	General Manager
Address	http://www.blueworldcarbon.com
Telephone	+27790908139
Email	Ilya.goryashin@blueworldcarbon.com

Organization name	Longyuan Mulilo De Aar 2 North (RF) (Pty) Ltd
Contact person	Bertus van Niekerk
Title	Project Manager
Address	1st Floor, Mazars house, Rialto road, Grand Moorings Precinct, Century City, 7441
Telephone	+27715705168
Email	bertus@mulilo.com

1.4 Other Entities Involved in the Project

Longyuan Mulilo De Aar 2 North (RF) (Pty) Ltd (Longyuan Mulilo) is the wind farm developer. Blue World Carbon Asset Management (Pty) Ltd (BWC) is a carbon consultant employed to develop all necessary VCS documentation, facilitate VCS registration, monitor the present project (monitoring plan), facilitate verification and request of VCUs issuance from VERRA. BWC receives a fee for its services.

Organization name	Longyuan Mulilo De Aar 2 North (RF) (Pty) Ltd (Longyuan Mulilo)
Role in the project	The project owner and the wind farm developer
Contact person	Bertus van Niekerk
Title	Project Manager
Address	1st Floor, Mazars house, Rialto road, Grand Moorings Precinct, Century City, 7441
Telephone	+27715705168
Email	bertus@mulilo.com

Organization name	Blue World Carbon Asset Management (Pty) Ltd
Role in the project	The carbon consultant employed to develop all necessary VCS documentation, facilitate VCS registration, monitor the present project (monitoring plan), facilitate verification and request of VCUs issuance from VERRA
Contact person	Ilya Goryashin
Title	General Manager
Address	http://www.blueworldcarbon.com
Telephone	+27790908139
Email	Ilya.goryashin@blueworldcarbon.com

1.5 Project Start Date

31/10/2017, the day when the wind farm started commercial operation[7]

1.6 Project Crediting Period

31 October 2017 (00:00) – 30 October 2027 (24:00); 10-year total period

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	x

[7] Eskom, Notice of Commencement of the Facility (De Aar 2 North – 138.96 MW), page 1, 30/10/2017

Year	Estimated GHG emission reductions or removals (tCO_2e)
31/10/2017 – 30/10/2018	433,929
31/10/2018 – 30/10/2019	433,929
31/10/2019 – 30/10/2020	433,929
31/10/2020 – 30/10/2021	433,929
31/10/2021 – 30/10/2022	433,929
31/10/2022 – 30/10/2023	433,929
31/10/2023 – 30/10/2024	433,929
31/10/2024 – 30/10/2025	433,929
31/10/2025 – 30/10/2026	433,929
31/10/2026 – 30/10/2027	433,929
Total estimated ERs	4,339,290
Total number of crediting years	10
Average annual ERs	433,929

1.8 Description of the Project Activity

The project comprises only one activity. A single wind farm was constructed close to the town of De Aar in the Northern Cape Province of the RSA, approximately 30 km northeast of the Longyuan Mulilo De Aar Maanhaarberg Wind Energy Facility, and has the total installed capacity of 144 MW[8]. The EPC contract was signed on 06/02/2015[9], and the wind farm started commercial operation on 31/10/2017[10]. The supplier of the wind turbines is United Power. 96 x UP86 turbines were employed by the present project[11]. The operation data for UP86 are given in the following table[12]:

Parameter	Unit	Value
Rated power	MW	1.5
Cut-in wind speed	m/s	3
Cut-out wind speed	m/s	25
Design lifetime	years	20

8 Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, Section 3 Wind Energy Assessment, page 11,26/07/2013

9 EPC contract, Signature page, page 211, 06/02/2015

10 Eskom, Notice of Commencement of the Facility (De Aar 2 North – 138.96 MW), page 1, 30/10/2017

11 AECOM, De Aar 2 North Wind Farm, Environmental Exclusion Zones, page 1, 13/06/2017

12 UP 86 Design Certificate No.: CGC2011461130005, page 3

The Longyuan Mulilo De Aar 2 North Wind Energy Facility has an installed capacity of 144 MW and annually supplies to the grid about 439,600 MWh[13] of electricity. Wind generated electricity is stepped up to 33kV and transported by overhead lines to the De Aar 2 North IPP Substation, where it further stepped up to 132kV. There are 2 suppling lines from the De Aar 2 North IPP Substation to the Ndhlovu Eskom Substation. The supply voltage level is 132kV. Each line is equipped with the electricity maters (main and check). After the Ndhlovu Eskom Substation the generated renewable electricity is transmitted thought the national grid of the RSA.

Electricity delivered to the grid by the wind farm would have otherwise been generated by the operation of the grid-connected power plants of the SAPP and by the addition of new generation sources that is reflected in the combined margin CO_2 emission factor of 0.9871 t CO2/MWh adopted for the electricity system of the SAPP.

1.9 Project Location

The project is located on Farm 136 (Portion 1 and Portions 6), 148 (Portions 2, 4 and Remainder), 165 (Portion 1 and Portion 7), 149 (Portion 1), 150 (Portion 4 and Remainder), 151 (Portion 1 and Portion 2) outside of the town of De Aar. De Aar is the main town of the Emthanjeni Local Municipality located in the Northern Cape Province of the RSA (Figure 1.9-1 and Figure 1.9-2).

Geographical latitude: -30.538320. Geographical longitude: 24.262329. Time zone: UTC+2.

Figure 1.9-1: Location of De Aar in the Republic of South Africa

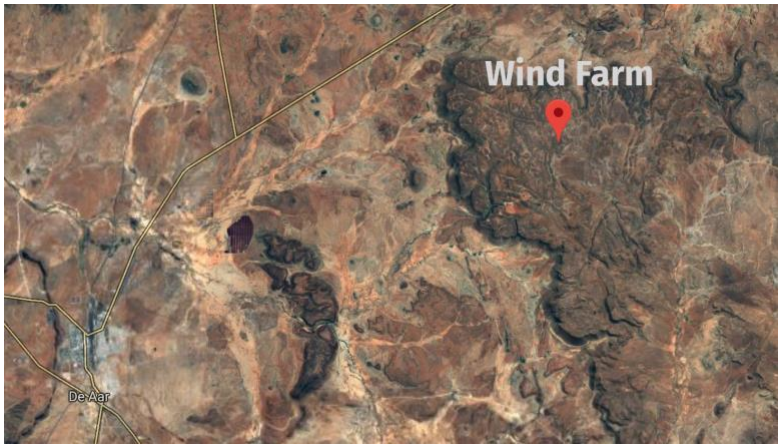

Figure 1.9-2: The wind farm site

The GPS coordinates of wind turbines is specified in Table below[14]:

[13] Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, Section 3 Wind Energy Assessment, P50 Net Energy Output, page 11, 26/07/2013

[14] Confirmation email from the project owner, “Final as built turbine coordinates”

Item	As Built (Latitude & Longitude)	Item	As Built (Latitude & Longitude)	Item	As Built (Latitude & Longitude)
1	S30°30'39.18" E24°13'41.82"	33	S30°32'0.6" E24°24'34.68"	65	S30°32'19.62" E24°17'59.46"
2	S30°31'30.3" E24°13'58.26"	34	S30°31'45.18" E24°24'16.26"	66	S30°32'41.52" E24°17'14.1"
3	S30°31'39.84" E24°13'30.42"	35	S30°32'52.86" E24°14'50.88"	67	S30°30'56.52" E24°24'20.34"
4	S30°31'22.02" E24°23'10.92"	36	S30°32'35.16" E24°15'15.18"	68	S30°32'45.72" E24°17'40.08"
5	S30°32'24.18" E24°13'50.88"	37	S30°32'21.54" E24°15'17.22"	69	S30°31'26.58" E24°24'1.8"
6	S30°33'1.14" E24°18'51.96"	38	S30°31'48.12" E24°13'51.3"	70	S30°31'57.9" E24°18'26.04"
7	S30°30'32.7" E24°13'50.82"	39	S30°31'11.46" E24°23'34.68"	71	S30°31'29.34" E24°18'22.68"
8	S30°30'52.08" E24°13'38.76"	40	S30°32'25.68" E24°15'51.84"	72	S30°31'11.88" E24°18'22.5"
9	S30°31'22.74" E24°13'37.2"	41	S30°31'10.92" E24°24'4.8"	73	S30°30'54.96" E24°18'30.66"
10	S30°31'29.46" E24°13'26.76"	42	S30°31'53.76" E24°16'22.02"	74	S30°30'53.28" E24°18'48.66"
11	S30°31'54.42" E24°13'25.8"	43	S30°31'41.34" E24°16'32.64"	75	S30°31'10.98" E24°18'37.5"
12	S30°30'58.44" E24°14'0"	44	S30°31'24.84" E24°16'41.28"	76	S30°31'40.2" E24°18'38.28"
13	S30°30'39.96" E24°14'17.76"	45	S30°31'11.28" E24°16'58.62"	77	S30°32'22.32" E24°25'10.44"
14	S30°30'40.38" E24°14'39.18"	46	S30°30'57.24" E24°16'59.22"	78	S30°32'44.04" E24°18'53.46"
15	S30°30'40.68" E24°14'54.9"	47	S30°31'5.58" E24°17'23.58"	79	S30°31'28.8" E24°24'48.18"
16	S30°30'54.6" E24°14'59.1"	48	S30°30'46.8" E24°23'47.82"	80	S30°33'0.12" E24°19'21.24"
17	S30°30'55.8" E24°14'43.14"	49	S30°31'45.18" E24°16'51.54"	81	S30°32'25.08" E24°24'42.3"
18	S30°30'53.16" E24°14'23.88"	50	S30°31'41.52" E24°17'53.28"	82	S30°33'44.7" E24°19'17.52"
19	S30°31'12.42" E24°14'30.18"	51	S30°30'59.82" E24°23'44.04"	83	S30°33'27.72" E24°19'19.62"
20	S30°31'21.66" E24°14'55.38"	52	S30°31'53.76" E24°17'31.44"	84	S30°31'26.58" E24°24'22.56"
21	S30°31'12.24" E24°15'12.24"	53	S30°32'7.98" E24°17'423.6"	85	S30°32'13.44" E24°24'21.42"
22	S30°31'1.26" E24°15'31.68"	54	S30°32'27.36" E24°16'46.02"	86	S30°31'28.44" E24°25'11.4"
23	S30°31'19.5" E24°15'36.36"	55	S30°32'46.98" E24°16'19.8"	87	S30°31'18.72" E24°25'25.2"
24	S30°31'34.68" E24°15'14.76"	56	S30°33'43.98" E24°16'33.72"	88	S30°31'36.84" E24°25'39.9"
25	S30°31'18" E24°23'22.44"	57	S30°33'27.24" E24°15'53.46"	89	S30°32'11.82" E24°23'53.1"

Item	As Built (Latitude & Longitude)	Item	As Built (Latitude & Longitude)	Item	As Built (Latitude & Longitude)
26	S30°32'0.84" E24°15'44.88"	58	S30°33'29.94" E24°16'22.14"	90	S30°32'28.26" E24°23'54.84"
27	S30°31'48.18" E24°15'52.44"	59	S30°33'7.44" E24°16'26.4"	91	S30°32'25.32" E24°25'3.42"
28	S30°31'18.24" E24°16'5.76"	60	S30°30'33.78" E24°23'48.48"	92	S30°31'50.28" E24°25'3.42"
29	S30°31'45.18" E24°24'16.26"	61	S30°32'25.08" E24°17'12.6"	93	S30°32'4.74" E24°25'16.86"
30	S30°32'20.46" E24°14'27.36"	62	S30°30'42.48" E24°24'23.58"	94	S30°32'12.72" E24°25'35.22"
31	S30°32'3" E24°14'28.98"	63	S30°32'0.78" E24°18'2.34"	95	S30°32'8.76" E24°23'30"
32	S30°32'9.84" E24°14'46.08"	64	S30°31'44.34" E24°18'25.02"	96	S30°31'55.8" E24°23'38.4"

1.10 Conditions Prior to Project Initiation

Please refer to Section 2.4 (Baseline Scenario)

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is compliant with all relevant laws:

- National Environmental Management Act (No. 107 of 1998)[15];
- The Electricity Regulation Act (No. 4 of 2006)[16] and associated Regulations: New generation capacity (No. R. 721, 2009)[17].

The Environmental Impact Assessment (EIA) of the proposed project was carried out in accordance with the South African legislation by Aurecon South Africa (Pty) Ltd. EIA report was submitted to the Department of Environmental Affairs for a decision and finally approved on the 01/03/2013. Later, on 10/06/2013 the Amendment to Environmental authorization was issued by the Department of Environmental Affairs.

The electricity generation license was granted to the project.

The Carbon Tax Act was signed into the law in 2019, which came into effect from 1/06/2019. As per Clause 3 and Schedule 2 of the Carbon Tax Bill (National Gazette No. 42483 of 23-May-2019), the project owner is not liable for the carbon tax since it does not conduct activities resulting in GHG emissions above the threshold. The project is not affected by the Carbon Tax Bill. In fact, the project proponent would like to sell VCU into the Carbon Tax Offset Scheme, which has not been finalised by the Government yet.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

Longyuan Mulilo De Aar 2 North (RF) (Pty) Ltd is the wind farm developer and the project owner.[18]

15 https://www.gov.za/documents/national-environmental-management-act

16 https://www.gov.za/documents/electricity-regulation-act

17 https://www.gov.za/documents/electricity-regulation-act-regulations-new-generation-capacity

18 Environmental Authorization by the Department of Environmental Affairs, page 1, 10/06/2013; and Power Purchase Agreement between Longyuan Mulilo De Aar 2 North (RF) (Pty) Ltd and Eskom Holdings SOC Ltd, 2014

1.12.2 Emissions Trading Programs and Other Binding Limits

The project has never been included in an emissions trading program or any other mechanism that includes GHG allowance trading.[19]

The Carbon Tax Act was signed into the law in 2019, which came into effect from 1/06/2019. As per Clause 3 and Schedule 2 of the Carbon Tax Bill (National Gazette No. 42483 of 23-May-2019), the project owner is not liable for the carbon tax since it does not conduct activities resulting in GHG emissions above the threshold. The project is not affected by the Carbon Tax Bill. In fact, the project proponent would like to sell VCU into the Carbon Tax Offset Scheme, which has not been finalised by the Government yet.

1.12.3 Other Forms of Environmental Credit

The project has never received any forms of GHG-related environmental credits, including renewable energy certificates.

The project is eligible under the CDM and will seek CDM registration after the end of GHG Accounting Period with VCS programme.

1.12.4 Participation under Other GHG Programs

The project was not seeking registration under Other GHG Programs.

1.12.5 Projects Rejected by Other GHG Programs

The project has never been rejected by any other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

Not applicable

Leakage Management

Not applicable

Commercially Sensitive Information

Not applicable

Sustainable Development

This project satisfies all sustainable development goals of Host Party (DNA). The main benefits of the implementation of the present project are:

[19] Refer to the Declaration signed by the PP

1. Social and economic: Promotion and development of wind power technology in the RSA which in turn will lead to the creation of new job opportunities both during the construction and operation phases and to growth in tax revenues. The project implementation led to creation of 8,987.3 person-month during the construction phase and 14,076 person-month during the operation phase[20]. Sales of carbon credits generated by the project will result in increased foreign direct investment;

2. Environmental: Mitigation of the negative environmental impact. Combustion of fossil fuels (mostly coal) at Eskom's power plants and hereby emissions of the harmful substances into the atmosphere, such as flue gas, coal ash, oxides of sulphur and nitrogen will be reduced due to the implementation of the project; and

3. Other: Contribution to achievement of the national Government goal to generate 10,000 GWh of electricity from renewable energy by 2013[21] and the objective to reduce RSA's GHG emissions by approximately 34.00% below the current emissions baseline by 2020[22].

Further Information

Not applicable

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

ACM0002: "Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources" (Version 19.0)[23]

TOOL01: "Methodological tool: Tool for the demonstration and assessment of additionality" (Version 07.0.0)[24]

TOOL05: "Methodological tool: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" (Version 03.0)[25]

TOOL24: "Methodological tool: Common practice" (Version 03.1)[26]

20 MEDAS, confirmation email, page 1, 14/10/2019

21 http://www.energy.gov.za/files/renewables_frame.html

22 https://www.environment.gov.za/sites/default/files/docs/carbontaxpolicyproposalanupdate.pdf

23 https://cdm.unfccc.int/methodologies/DB/VJI9AX539D9MLOPXN2AY9UR1N4IYGD
(this version of the methodology will be applied throughout the whole document)

24 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf
(this version of the tool will be applied throughout the whole document)

25 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf
(this version of the tool will be applied throughout the whole document)

26 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf
(this version of the tool will be applied throughout the whole document)

TOOL27: "Methodological tool: Investment analysis" (Version 09.0)[27]

2.2 Applicability of Methodology

The ACM0002 methodology is applicable to grid-connected renewable energy power generation project activities that (paragraph 3):

(a) Install a Greenfield power plant;

(b) Involve a capacity addition to (an) existing plant(s);

(c) Involve a retrofit of (an) existing operating plants/units;

(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or

(e) Involve a replacement of (an) existing plant(s)/unit(s).

The proposed project activity envisages the construction and operation of the wind farm to produce electricity at the site where no renewable power plant has been previously operated and therefore the project falls under item (a)[28]. This project is connected to the grid of the Republic of South Africa.[29]

The project meets all necessary applicability conditions of the ACM0002 to apply (see Table 2-1).

Table 2-1: ACM0002 applicability conditions check

Applicability condition	Applicability	Comment
4(a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	Applicable	The project activity is the installation of the wind farm to produce electricity (greenfield plant).

27 https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf (this version of the tool will be applied throughout the whole document)

28 Final EIA report, Section 3.2 Description of the proposed activity, pages 29-30, April 2012

29 Eskom, Notice of Commencement of the Facility (De Aar 2 North – 138.96 MW), page 1, 30/10/2017

Applicability condition	Applicability	Comment
4(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	Not applicable	The project activity is the installation of a greenfield plant; therefore it does not need to satisfy this applicability condition.

Applicability condition	Applicability	Comment
5. In case of hydro power plants, one of the following conditions shall apply:[30] (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	Not applicable	The project activity is not the installation of a hydro power plant; therefore it does not need to satisfy this applicability condition.

[30] Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the volume of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

Applicability condition	Applicability	Comment
6. In the case of integrated hydro power projects, project proponent shall: (a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	Not applicable	The project activity is not the installation of a hydro power plant, so it does not need to satisfy this applicability condition.
7. The methodology is not applicable to the: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants.	Not applicable	This project does not involve switching from fossil fuels to renewable energy sources, it is also not a biomass fired power plant and therefore it satisfies this criterion.
8. In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance"	Not applicable	The project activity is the installation of a greenfield plant; therefore it does not need to satisfy this applicability condition.

ACM0002 refers to the following tools (paragraph 13):

(a) "TOOL01: Tool for the demonstration and assessment of additionality";

(b) "TOOL02: Combined tool to identify the baseline scenario and demonstrate additionality";

(c) "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion";

(d) "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation";

(e) "TOOL07: Tool to calculate the emission factor for an electricity system";

(f) "TOOL10: Tool to determine the remaining lifetime of equipment";

(g) "TOOL11: Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period".

Tool (a) is applicable as per paragraph 8 of the tool itself and section 5.3.2 of ACM0002.

TOOL01 also refers to the latest version of the guidelines on the assessment of investment analysis which is TOOL27: "Methodological tool: Investment analysis" (Version 09.0) and Guidelines on Common Practice, which is TOOL24: "Methodological tool: Common practice" (Version 03.1).

TOOl27 is applicable as per paragraph 30 of TOOL01 since the project proponents demonstrate that the proposed project is not economically or financially feasible, without the revenue from the sale of carbon credits.

TOOL24 is applicable as per paragraph 58 of TOOL01 since the project proponents apply Common practise analysis in the demonstration of the additionality.

Tool (b) is not used as indicated in reference 2 to paragraph 9 of ACM0002.

Tool (c) is not used since project emissions for the project is zero as described in Section 3.2.2 below.

Tool (d) is applicable as per paragraph 68 of ACM0002 and paragraph 6(a) of the tool.

Tool (e) is not used since ASB0040-2018: Standardized baseline "Grid emission factor for Southern African Power Pool" (Version 01.0) is used to determine the value of the emission factor for an electricity system. The project meets all necessary applicability conditions of ASB0040-2018 to apply (see Table 2-2).

Table 2-2: ASB0040-2018 applicability conditions check

Applicability condition	Applicability	Comment
3 (a) The project activity is implemented in any one of following countries, which are the SAPP member countries, and is connected to the SAPP: (i) Republic of Botswana; (ii) Democratic Republic of Congo; (iii) Kingdom of Lesotho; (iv) Republic of Mozambique; (v) Republic of Namibia; (vi) Republic of South Africa; (vii) Kingdom of Swaziland; (viii) Republic of Zambia, and (ix) Republic of Zimbabwe	Applicable	The project is implemented in the Republic of South Africa[31] and is connected to the grid (item (vi))[32].
3 (b) The CDM approved methodology that is applied to the project activity requires the determination of CO_2 emission factor(s) through the application of the grid tool	Applicable	ACM0002 refers to TOOL07 to calculate the grid emission factors (paragraph 22).
3 (c) The project activity uses the ex-ante options for both the operating margin and build margin grid emissions factors, as described in the grid tool, and therefore no monitoring or recalculation of the emission factor during the crediting period is required.	Applicable	The project uses the ex-ante options for both the operating margin and build margin grid emissions factors.
4. The latest approved and valid values of this standardized baseline are the only values of the CO2 emission factor(s) that shall be applied for the project electricity system in the SAPP member countries listed under sub-para 3(a) above	Applicable	The Standardized Baseline is valid till 06/10/2021.[33]

Tool (f) is not used since the project is a greenfield plant.

Tool (g) is not used since this is the first crediting period.

2.3 Project Boundary

The spatial extent of the project boundary includes the proposed renewable energy power plant and all power plants physically connected to the grid of the SAPP (Figure 2-1).

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

[31] Environmental Authorization from the Department of Environmental Affairs, page 5, 01/03/2013 and Amendment to Environmental Authorization by the Department of Environmental Affairs, page 1, 10/06/2013

[32] Eskom, Notice of Commencement of the Facility (De Aar 2 North – 138.96 MW), page 1, 30/10/2017

[33] https://cdm.unfccc.int/methodologies/standard_base/2015/sb4.html, Validity Column

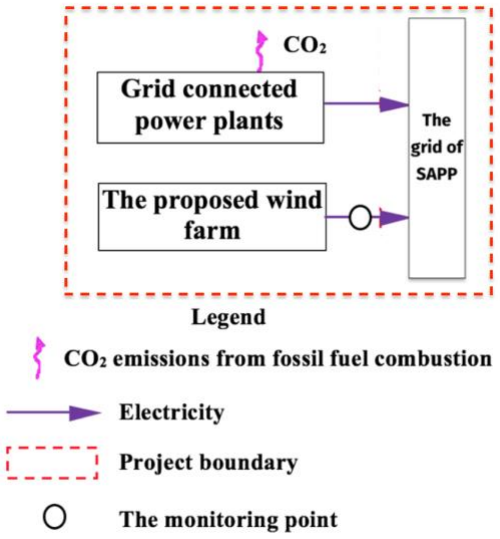

Figure 2-1: Project boundary

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
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	Not applicable
Project	GHG emissions from electricity generation in the proposed wind farm	CO_2	No	GHG emissions for a wind power generation project are equal to zero (no fossil fuel auxiliary consumption)
		CH_4	No	GHG emissions for a wind power generation project are equal to zero
		N_2O	No	GHG emissions for a wind power generation project are equal to zero
		Other	No	GHG emissions for a wind power generation project are equal to zero

2.4 Baseline Scenario

According to paragraph 22 of ACM0002, if the project activity is the installation of a Greenfield power plant, the baseline scenario 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.

The project is the installation of a new grid-connected wind farm that connects with and delivers electricity to the grid of the SAPP. The baseline scenario of the proposed project is:

Electricity delivered to the grid by the wind farm would have otherwise been generated by the operation of the grid-connected power plants of the SAPP and by the addition of new generation sources that is reflected in the combined margin CO_2 emission factor of 0.9871 t CO2/MWh adopted for the electricity system of the SAPP.

2.5 Additionality

The additionality of the project is demonstrated and assessed using TOOL01. This tool provides for the following step-wise approach:

(a) Step 0 Demonstration whether the proposed project activity is the first-of-its-kind;

(b) Step 1 Identification of alternatives to the project activity;

(c) Step 2 Investment analysis;

(d) Step 3 Barriers analysis; and

(e) Step 4 Common practice analysis.

The project proponents start with Step 1.

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

There are two alternatives available to the wind farm developer[34], viz:

(a) The proposed project undertaken without being registered as a CDM/VCS project activity;

(b) Continuation of the current situation (no project activity undertaken).

Both the alternatives are credible, realistic and are in conformity with the applicable mandatory legal and regulatory requirements as the implementation of project activity is a voluntary initiative, is not mandated by any legal requirement and there is no legal requirement on the choice of a particular technology or restriction on the use of wind energy. Moreover, the approved methodology ACM0002 also prescribes the baseline and where the approved methodology prescribes baseline, discussion on alternatives is not necessary.

[34] As per paragraph 8 of TOOL01

Step 2 Investment analysis

The project proponents demonstrate that the proposed project is not economically or financially feasible, without the revenue from the sale of certified emission reductions taking into account the latest version of the guidelines on the assessment of investment analysis, TOOL27: "Methodological tool: Investment analysis" (Version 09.0)[35], available on the UNFCCC website (as per paragraph 30 of TOOL01).

Sub-step 2a: Determine appropriate analysis method

Since the baseline does not require any investment and is outside the direct control of the project developer, additionality is demonstrated using benchmark analysis, which is in conformity with paragraph 32 of TOOL01 and paragraph 17 of TOOL27.

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

Project IRR has been chosen as the financial indicator, as the project is financed by a mix of debt and equity. Project IRR is one of the financial indicators prescribed by TOOL01 and TOOL27 for additionality demonstration. Hence, the financial indicator selected is in conformity with paragraph 15 of TOOL27 and sub-step 2b of TOOL01. Commercial lending rate has been selected as benchmark for the project activity, which is in conformity with paragraph 15 of TOOL27.

The commercial lending rate at the time of decision making was 12.98%. Commercial lending rate has been sourced from term lending rate published in June 2013 issue of Quarterly Bulletin published by the South African Reserve Bank[36], which was the latest bulletin available at the time of decision making – August 2013.[37]

The benchmark therefore conforms to paragraph 10 of TOOL27.

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

An investment decision to implement the project was taken by the project partners in August 2013, as clearly stated in the Extractions of the Resolution of the Board on 08/08/2013.

Various input parameters and assumptions used in the financial indicator calculation are given in the following table:

35 EB101, Annex 11, https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-27-v9.0.pdf

36 South African Reserve Bank, Quarterly Bulletin, June 2013, Statistical Table - "Term lending rates and amounts paid out by banks" (p. S-11)

37 Submission date of the third window of the REIPPPP programme. Resolution of the Board of Directors, 08/08/2013

Table 3.5.1-1: Input data to calculate IRR

Parameter	Unit	Value	Acceptable data source/comment
Capacity of the wind farm	MW	144	- Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, Section 3 Wind Energy Assessment, page 11, 26/07/2013
Load factor of the wind farm (PLF)	Ratio	0.2865	- Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, 26/07/2013, Appendix 3 Financial Model, page 36 PLF provided to banks and equity financiers while applying the activity for financing based on P90 Net Energy Output: [38] 0.2865=361,400MWh/144MW/8760
Transmission and transformation losses	ratio	0	Not applicable. 0.2865 is the net capacity factor of the wind farm.
Auxiliary electricity consumption	ratio	0	Not applicable. 0.2865 is the net capacity factor of the wind farm.
Electricity tariff	ZAR/MWh	655.1	- NERSA's decision on Eskom's Revenue Application for the Third Multi-Year Price Determination period 2013/14 to 2017/18, page 2, 28/02/2013 Eskom's standard average electricity price.
The cost of transportation of electricity to the consumer	ZAR/MWh	0	Not applicable. Included into O&M costs
Wheeling charges	ZAR/MWh	0	Not applicable

[38] 28.65% is the PLF used by the PP in the financial model at the point of decision making while applying to the bank for the finance. The higher PLF of 34.85%, which represents P50 Net Energy Output, is used in the evaluation of GHG emission reductions in order to be more accurate. The actual PLF for the first year of wind farm operation is around 35.5%, which is close to P50 Net Energy Output. It should be noted that even at the PLF of 34.85% and the PLF of 35.5% the project remains additional. Please refer to IRR spreadsheet.

Parameter	Unit	Value	Acceptable data source/comment
Total investment cost	ZAR in million	2,605.588	- Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, 26/07/2013 Costs are as follows: 1. Total equipment installed cost: ZAR906,315,000 2. Civils: ZAR979,186,800 3. Network and substation: ZAR54,613,800 4. Contingency: ZAR77,604,624 (4% of the project CAPEX) Which is ZAR2,017,720,224 in total and below are the additional costs related to pre-project expenses and interest during construction[39]: 5. Development and Owners cost: ZAR221,011,880 *6.* Financing costs and other provisions: ZAR366,856,087
Debt/Equity ratio	Ratio	70/30	- Bloomberg New Energy Finance, Research note – Clean Energy, , Section 4, page 8,13/09/2011.[40] Debt equity ratio applicable to other wind power projects in RSA.
Cost of debt	%	12.98%	- South African Reserve Bank, Quarterly Bulletin, June 2013, Statistical Table - "Term lending rates and amounts paid out by banks" (p. S-11)
Repayment period	Years	15	- The World Bank, Facilitating Private Sector Financing for Infrastructure Investments, March 2010, slide 20 Typical minimum debt tenor.
Initial grace period	Years	1	- The World Bank, Debt Servicing Handbook, June 2009, page 24 The maximum grace period is 3 years. Since in the financial model the implementation of the project is expected to take one year, moratorium has been assumed for construction period only.

[39] Board Resolution Note

[40] http://www.energy.gov.za/IPP/BNEF_RN_Southafrica_2011_09_15.pdf

Parameter	Unit	Value	Acceptable data source/comment
Operations and Maintenance (O&M) costs	ZAR/WTG	280,545 (year 1-3) 469,177 (year 4 onwards)	- Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, 26/07/2013, Appendix 5, page 49 ZAR26,932,289/year (Year 1) ZAR45,040,978/year (Year 4)
Administrative expenses	ZAR /year	0	Not applicable. Included into O&M costs
Escalation for tariff, O&M cost and administrative expenses	%	5.9	- South African Reserve Bank, Quarterly Bulletin, June 2013, CPI inflation the beginning of 2013, page 25
Lease rent	ZAR /year	7,549,636	- Board resolution note
Insurance premiums	ZAR /year	3,993,129	- Board resolution note
Social Development fee	ZAR /year	8,639,910	- Board resolution note
The useful lifetime of the project	Years	20	- UP 86 Design Certificate No.: CGC2011461130005, page 3 Technical specifications from the machinery supplier
The period of assessment	Years	20	The period of assessment is operating lifetime of the wind farm, which is in conformity with paragraph 6 of TOOL27
Depreciation rate (SLM) - I year - II year - III year	ration	0.50 0.30 0.20	- Income Tax Act of South Africa[41]
Salvage value - Land - Other assets	Percent	0 2	Land salvage value is not applicable since the wind farm owner is renting the land. - E.ON Energy Research Center, Repowering of Wind Turbines: Economics and Optimal Timing, November 2011, Table A.4, page 36 (2% = 28,500/1,382,531)
Income tax rate	%	28.00	South African revenue service[42]
ZAR exchange rate	ZAR/EUR	13.2	Reserve Bank official website[43]

41 http://www.saica.co.za/integritax/2011/1927._Renewable_energy_incentives.htm

42 http://www.sars.gov.za/

43 https://www.resbank.co.za/Research/Rates/Pages/SelectedHistoricalExchangeAndInterestRates.aspx

Based on the above parameters and assumptions, the project IRR works out to 8.30%, as against the benchmark of 12.98%.

Since the project IRR is less than the benchmark, the project activity is additional.

Latest NERSA average tariff has been used in the financial indicator calculation.

In 08/2011, the Department of energy abandoned the Refit scheme in favour of a tender mechanism. Refit scheme was introduced in 03/2009 and guaranteed purchase prices (ZAR 1250/MWh) and long term contracts of 20 years. However, the tariffs that had been established in 2009 were due to be significantly reduced at a review on 26/05/2011 before the programme was dissolved completely. Under tender mechanism bidders have to propose tariff which will fall under technology dependent cap (ZAR 1,150/MWh has been fixed for onshore wind power projects under this cap). The proposed prices should make a single adjustment on April 1 each year in line with expected decreasing costs. In selecting the bidders 70.00% weight is given to financial aspects of the project and 30.00% to economic development which includes job creation, local content, ownership, management control, preferential procurement, enterprise development and socio economic development. Hence, the tariff the project likely to get was not known at the time of decision making. Eskom's standard average electricity price available at the point of decision-making was ZAR 655.1/MWh. However, it was observed that the project remains additional even if the highest applicable tariff of ZAR 1,150/MWh[44] is taken into consideration, as the IRR works out to 11.11% as against the benchmark of 12.98%.

The proposed project is not economically feasible. Therefore, the project is additional.

Sub-step 2d: Sensitivity analysis

The following variables have been selected for the sensitivity analysis:

- Investment cost
- Generation and Electricity tariff
- Operations and Maintenance (O&M) costs.

All the selected parameters except the last two constitute 20.00% of project cost/revenue. Though O&M cost and administrative costs constitute less than 20.00%, it was considered appropriate to subject them to sensitivity analysis as they account for substantial costs. The parameters have been subjected to 10.00% variation on either side. As stated earlier, the tariff which the project operator will get is not known. However, even at a tariff of ZAR 1,150/MWh (which represents the cap), the project remains additional. Generation is based on the figures provided to the lenders. The actual PLF for the first year of wind farm operation is around 35.5%. At this PLF the project IRR works out to 11.27% assuming that all other parameters stay the

44 IRR of 10.00%, corresponding to the tariff of ZAR 1,150/MWh, can be calculated by putting "1" in the cell 'C106' in the financial worksheet. Reader are requested not to change the tariff in cell 'D13' because it will lead to escalation in tariff of 5.90% which is correct, as the maximum tariff is fixed and no escalation is allowed.

same. The project remains additional[45]. Investment cost is based on detailed studies, offer letter and the offer letters. With the country experiencing inflation of about 5.90%, any reduction in investment cost is ruled out. As regards O&M cost, they are expected to only go up as these expenses are subject to inflation and any reduction is hypothetical. Therefore, 10.00% variation is considered appropriate in the project context.

The results of the sensitivity analysis are displayed in Table 3.5.1-2.

Table 3.5.1-2: Sensitivity analysis of the project IRR

Variable	**Variation**		
	-10.00%	0.00%	+10.00%
Investment Cost	9.40%	8.30%	7.36%
Load factor or electricity tariff	6.95%	8.30%	9.58%
O&M Cost	8.49%	8.30%	8.10%

As evident, the financial indicator does not breach the benchmark even under most optimistic assumptions. Therefore, the project conforms to Sub-step 2d of Additionality Tool

The investment analysis provides a valid argument in favour of additionality.

Step 4: Common practice analysis

The common practise analysis was done as per TOOL24: "Methodological tool: Common practice" (Version 03.1):

Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

The capacity of the project is 144 MW, thus the applicable capacity range is 72 – 216 MW.

Step 2: identify similar projects (both CDM and non-CDM).

Wind farms within the capacity range that located in South Africa and started commercial operation before 06/02/2015 summarised in Table 3.5.1-3. [46,47]

[45] Refer to IRR spreadsheet.

[46] Eskom, List of fact sheets, Statistical table 2, 31/03/2015 (Refer for Eskom's power stations) http://www.eskom.co.za/IR2015/Documents/Eskom_fact_sheets_2015.pdf; and

[47] Eskom, Bid Window 1 preferred bidders
http://www.eskom.co.za/Whatweredoing/Pages/RE_IPP_Procurement_Programme.aspx

Table 3.5.1-3: Similar projects (both CDM and non-CDM)

Project	Capacity	COD	CDM/non-CDM
Noblesfontein Wind Farm	75	2014	CDM
Dorper Wind Farm	100	2014	CDM
Red Cap Kouga Wind Farm	80	2014	CDM
Jeffreys Bay Wind Farm	138	2014	CDM
Cookhouse Wind Farm	140	2014	CDM

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

$N_{all} = 0$

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

Since $N_{all} = 0$, $N_{diff} = N_{all} = 0$.

Step 5: calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

$F=1-N_{diff}/N_{all} = 1 – 1 = 0$; $N_{all}-N_{diff} = 0 – 0 = 0$

The project is not a common practice within a sector in South Africa, since
$F < 0.2$ and $N_{all}-N_{diff} < 3$.

Therefore, no similar activities were identified.

The project is additional.

2.6 Methodology Deviations

Not applicable

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 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. ACM0002 assumes that electricity

delivered to the grid by the wind farm 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 as follows:

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

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project in year *y* (MWh)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* (tCO_2/MWh)

Standardized baseline ASB0040-2018 is selected for the project (the applicability of ASB0040-2018 is justified Section 2 above). Table 1 of this standardized baseline provides the value of the combined margin CO_2 emission factor for the project electricity system applicable to wind and solar power generation for the determination of baseline emissions of 0.9871 t CO_2/MWh.

3.2 Project Emissions

Since the project activity uses wind energy to generate electricity the project emissions are equal to zero:

$$PE_y = 0$$

Where:

PE_y	=	Project emissions in year *y* (tCO_2)

3.3 Leakage

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

3.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

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

The ex-ante calculations are shown below.

PE_y = 0 and LE_y = 0;

The estimated amount of electricity supplied by the wind farm to grid during the crediting period, baseline emissions and emission reductions are presented in Table 3-1.

Table 3-1: Emission reductions, Baseline emissions,
Quantity of net electricity generation supplied by the wind farm to the grid

Year	$EG_{facility,y}$ (MWh/a)[48]	BE_y (tCO_2/yr)	ER_y (tCO_2/yr)
31/10/2017 – 30/10/2018	439,600	433,929	433,929
31/10/2018 – 30/10/2019	439,600	433,929	433,929
31/10/2019 – 30/10/2020	439,600	433,929	433,929
31/10/2020 – 30/10/2021	439,600	433,929	433,929
31/10/2021 – 30/10/2022	439,600	433,929	433,929
31/10/2022 – 30/10/2023	439,600	433,929	433,929
31/10/2023 – 30/10/2024	439,600	433,929	433,929
31/10/2024 – 30/10/2025	439,600	433,929	433,929
31/10/2025 – 30/10/2026	439,600	433,929	433,929
31/10/2026 – 30/10/2027	439,600	433,929	433,929

Calculation example:

$BE_{year\ 1} = EG_{PJ,year\ 1} \times EF_{grid,CM,year1}$ = 439,600 MWh x 0.9871 t CO_2/MWh = 433,929 t CO_2

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
31/10/2017 – 30/10/2018	433,929	0	0	433,929
31/10/2018 – 30/10/2019	433,929	0	0	433,929
31/10/2019 – 30/10/2020	433,929	0	0	433,929
31/10/2020 – 30/10/2021	433,929	0	0	433,929
31/10/2021	433,929	0	0	433,929

[48] Garrad Hassan, Technical Due Diligence of the De Aar 2 North Wind Farm in South Africa, Section 3 Wind Energy Assessment, P50 Net Energy Output, page 11, 26/07/2013

– 30/10/2022				
31/10/2022 – 30/10/2023	433,929	0	0	433,929
31/10/2023 – 30/10/2024	433,929	0	0	433,929
31/10/2024 – 30/10/2025	433,929	0	0	433,929
31/10/2025 – 30/10/2026	433,929	0	0	433,929
31/10/2026 – 30/10/2027	433,929	0	0	433,929
Total	4,339,290	0	0	4,339,290

4 MONITORING

4.1 Data and Parameters 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 calculated ex ante
Source of data	ASB0040-2018, Table 1, page 5
Value applied	0.9871
Justification of choice of data or description of measurement methods and procedures applied	Standardized baseline ASB0040-2018 is selected for the project (the applicability of ASB0040-2018 is justified Section 3.1.2 above). Table 1 of this standardized baseline provides the value of the combined margin CO_2 emission factor for the project electricity system applicable to wind and solar power generation for the determination of baseline emissions of 0.9871 t CO_2/MWh
Purpose of Data	Calculation of baseline emissions
Comments	This value was appointed as a constant for the whole crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project in year *y*
Source of data	On-site measurement by electricity meters, yielding the net electricity supplied to the grid of the RSA. There are two main meters installed in the De Aar 2 North IPP Substation on 132kV side[49]. Each meter is accompanied with the check meter. Monthly reports with the records for delivered electricity to the Ndhlovu Eskom Substation are submitted by Eskom to PP.
Description of measurement methods and procedures to be applied	There are two main meters installed in De Aar 2 North IPP Substation on 132kV side. Each meter measures the grid electricity export and the import from grid. PP calculates the difference between the measured quantities of the grid electricity export and the import from grid. Each meter is accompanied with the check meter for the cross check. The exported and imported electricity is continuously measured and recorded. Data are digitally archived at least on a monthly basis. On the Ndhlovu Eskom Substation measurement of the electricity supplied to the grid is also carried out by Eskom. Monthly reports with the records for delivered electricity to the Ndhlovu Eskom Substation are submitted by Eskom to PP. PP compares and calculates the difference between two measurements. The lowest value shall be used for calculations of the baseline emissions. Longyuan Mulilo's personal, including the plant manager, will be responsible for implementation and overall control as well as collection of all data, and submit the data to BWC.
Frequency of monitoring/recording	Continuous measurement
Value applied	Estimated values for the purpose of ex-ante calculation emission reductions: 31/10/2017 – 30/10/2018: 439,600 MWh 31/10/2018 – 30/10/2019: 439,600 MWh

[49] Longyuan Engineering South Africa (Pty) Ltd, 132/33kV De Aar 2 North IPP Substation, Proposed station electric diagram, page 1

	31/10/2019 – 30/10/2020: 439,600 MWh 31/10/2020 – 30/10/2021: 439,600 MWh 31/10/2021 – 30/10/2022: 439,600 MWh 31/10/2022 – 30/10/2023: 439,600 MWh 31/10/2023 – 30/10/2024: 439,600 MWh 31/10/2024 – 30/10/2025: 439,600 MWh 31/10/2025 – 30/10/2026: 439,600 MWh 31/10/2026 – 30/10/2027: 439,600 MWh
Monitoring equipment	The meter class is 0.2S. Landis+Gyr E650 (or similar) electricity meters shall be used. Serial numbers of currently installed main meters are: 37108386 and 37108384. Meters are installed at the on-site substation.
QA/QC procedures to be applied	Electricity meters will be calibrated as per the requirements of the Power Purchase Agreement, clause 12.6.7, when the difference between measurements at the Ndhlovu Eskom Substation and De Aar 2 North IPP Substation is more than 0.5%
Purpose of data	Calculation of baseline emissions
Calculation method	PP compares and calculates the difference between measurements in the De Aar 2 North IPP Substation and measurements in the Ndhlovu Eskom Substation. The lowest value shall be used for calculations of the baseline emissions
Comments	-

4.3 Monitoring Plan

The monitoring plan of project is devised as per approved consolidated baseline and monitoring methodology ACM0002 and TOOL05.

The following monitoring procedures shall be applied:

1. Monitoring period

The monitoring period starts from the date of commissioning of the project.

2. Data monitored and sources

The generated electricity is continuously measured and recorded at least on monthly basis by the wind farm personnel. The quantity of net electricity generation that is produced and fed into the grid in year y shall be determined on the basis of electricity meters. The metering instruments shall be installed in accordance with the requirements of the Grid and the Distribution Metering Codes at the point of supply which defines the commercial boundary between the wind farm owner and the grid. Readings of the electricity meters shall be cross-checked tax invoices and Eskom's monthly reports. Data on electricity supply will be digitally archived and submitted to BWC.

The sources of data for calculation of GHG emission reductions in the course of monitoring shall be the records for delivered electricity to RSA grid.

The emission reductions shall be calculated using the formulas in Section 3.2.

3. The monitoring team

The wind farm staff shall undergo the necessary training related to operation and maintenance of the wind farm. The maintenance personnel of the wind farm are responsible for daily control over the monitoring plan implementation.

The Plant Manager of the wind farm is responsible for timely calibration of all instrumentation in accordance with requirements of the power purchase agreement. Longyuan Mulilo's personal will be responsible for implementation and overall control as well as collection of all data, and submit the data to BWC.

Specialists of BWC will calculate GHG emission reductions with data that will be provided by Longyuan Mulilo.

In case of any doubts as to the accuracy of the data, the specialists of Longyuan Mulilo shall check and correct the data. The preliminary version of the monitoring report shall be submitted to the specialists of Longyuan Mulilo for review. In case any mistakes are found in the calculations of GHG emission reductions, the specialists of BWC shall correct these calculations accordingly.

4. Data storage

All data collected as part of monitoring plan should be archived electronically and be kept at least for 2 years after the end of the crediting period.

5. Instrumentation calibration

The instrumentation calibration and check-out shall be carried out in accordance with the requirements of the power purchase agreement. Longyuan Mulilo will be responsible for the calibration or replacement of the meters.

6. Emergency situations

If any instrument that is used in the monitoring process fails, Longyuan Mulilo shall remedy the situation as soon as possible and if necessary shall replace the instrument. Electricity meters are

equipped with the check meters. In case of failure of main meter, the reading of check meter will be used. In case both meters (main and check) fail net electricity generation will not be accounted for which is conservative. In case of breakdown of any of the wind turbines the electricity generation will go down, and amount of electricity supplied to the grid by the wind farm will be reduced. All accidents that may occur at the wind farm shall be recorded by Longyuan Mulilo. Information on major accidents shall be included in the monitoring report.

5 SAFEGUARDS

5.1 No Net Harm

The wind power is one of the cleanest sources of renewable energy, with no associated emissions and waste products. Socio-economic impact is positive. Possible negative impacts are discussed in the ensuing paragraphs below:

1) Impact on biodiversity and ecosystems

Reptiles may be forced out of their underground shelters during the construction phase. Birds and bats may be impacted through collision with the blades of the wind turbines as well as collision with the associated power line during the operational phase.

Proposed mitigation measures: Length of road and cable trenches shall be reduced; relocation of facility to a lower sensitivity area; adjusting the schedule of operational turbines according to the results of ongoing monitoring of the bird and bat numbers and movement in the area; minimising the length of any new power lines.

2) Noise impact

The noise from construction machines has some impact on the surrounding area during the construction phase, which will only have a localized effect and is not expected to increase the ambient noise levels in nearest towns.

Proposed mitigation measures: all equipment should be maintained regularly and have appropriately filled silencers; personal should be specially trained. When working near to potentially sensitive receptor, coordinate the working time with periods when the receptors are not at home where possible.

During the operation phase the cumulative contribution of the wind turbines and the transformer substation on the noise environment at the communities around the site will be within acceptable levels.

3) Impact on natural resources

The impact on the natural resources is the loss of arable land due to the construction of the turbines and associated infrastructure. However, most of the current cultivation or grazing practices will still be possible between the structures.

Proposed mitigation measures: Monitoring of the noise level

4) Impact on the atmosphere

The main impact is related to formation of dust during the construction period from land excavation and transportation vehicles. It should be mentioned that combustion of fossil fuels (mostly coal) at the Eskom power stations and hereby emissions of the harmful substances into the atmosphere, such as flue ash, oxides of sulphur and nitrogen will be reduced due to the project implementation.

Proposed mitigation measures: Dust pollution monitoring and following procedures for dealing with dust pollution

5.2 Environmental Impact

The Environmental Impact Assessment (EIA) of the proposed project was carried out in accordance with the South African legislation by Aurecon South Africa (Pty) Ltd. EIA report was submitted to the Department of Environmental Affairs for a decision and finally approved on the 01/03/2013. Later, on 10/06/2013 the Amendment to Environmental authorisation was issued by the Department of Environmental Affairs.

5.3 Local Stakeholder Consultation

The project owner appointed Aurecon South Africa (Pty) Ltd to undertake the Scoping and Environmental Impact Assessment and associated Public Participation Process (PPP) in terms of the NEMA EIA Regulations and VCS requirement.

Public Advertisements were placed in Local newspapers, the Echo and Die Volksblad, notifying the broader public of the initiation of the EIA and inviting them to register as Interested and Affected Parties (I&APs) from 4 November 2011.

Holding a public meeting on Wednesday, 30 November 2011 to present and discuss the findings of the DSR at the De Aar Civic Hall from 16:00-18:00. Notes of the public meeting were sent to all those who attended on 8 November 2011.

I&APs had 40 days, until the 5 January 2012 to submit their written comments on the DSR, however due to a mailing error the period was extended to 9 January 2012. Cognisance was taken of all comments when compiling the final report, and the comments, together with the project team and proponent's responses thereto, were included in final report.

The Final Scoping Report (FSR) was made available to the public for review and comments until 7 February 2012 at the same locations as the DSC from 18 January 2012. All registered I&APs were informed of the lodging of the FSR by means of a letter posted on 17 January 2012. The FSR outlined the full range of potential environmental impacts and feasible project alternatives and how these were derived. Moreover, it included a Plan of Study for EIA, which outlined the proposed approach to the EIA phase, including the requisite specialist investigations to be undertaken.

The further details are given in the final EIA report.

5.4 Public Comments

The VCS PD was published for Global Stakeholder Consultation process for the period of 25/09/2019 – 25/10/2019. No negative comments were received