Clean Development Mechanism South Africa
Designated National Authority

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

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# Project Design Document (PDD)

| | |
|---|---|
| Project reference number (office | |
| Date received (office use only) | |

**NOTES ON COMPLETING THIS PROJECT DESIGN DOCUMENT**

1. Please provide this PDD in both hard-copy

## Part A: Project Proponent Details

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|---|---|
| **Project Name** | Green Power for South Africa Programme of Activities |
| **Date of Submission of PDD** | 19 December 2011 |

| **Project Developer** | |
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| **Name** | Standard Bank Plc<br><br>Standard Bank Plc will act as the Coordinating/Managing Entity (CME) for the Programme of Activities (PoA), and will provide an open platform for different technology and service suppliers to participate in the programme by developing their own Clean Development Mechanism (CDM) Programme Activities (CPAs). |
| **Organizational Category** | Private Company |
| **Legal Status (if private company)** | Private listed company |
| **Street Address** | 20 Gresham Street<br>London<br>EC2V 7JE |

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|---|---|
| | United Kingdom |
| **Postal Address (if different to Street Address)** | As above |
| **Website Address** | www.standardbank.com |
| **Main Activities** | Standard Bank is a leading African banking group focused on emerging markets globally. It has been a mainstay of South Africa's financial system for over 145 years. It is the largest bank domiciled in Africa (in terms of total assets) and provides a full banking service, divided up into personal and business banking; corporate and investment banking; and investment management and life insurance. Standard Bank Group Limited is listed on the Johannesburg Stock Exchange. |
| **Summary of Financial Performance in last fiscal year** | Please see the summary of last fiscal year under:<br>http://www.standardbank.co.za/site/investor/fina_repo_index01.html |
| **Contact Person(s)** | Geoff Sinclair |
| **Telephone** | Work: +44 20 3145 6890<br>Cell: +44 77 6964 8695 |
| **Fax** | +44 20 3189 6930 |
| **Email Address** | co2@standardbank.com |
| **Project Partners** | |
| **Name** | Standard Bank of South Africa Limited |
| **Nature of partner** | Project Participant |
| **Organizational Category** | Private Company |
| **Legal Status** | A private company with limited liability incorporated under the laws of South Africa |
| **Street Address** | 3 Simmonds Street, Marshalltown, Johannesburg |
| **Postal Address (if different from above)** | PO Box 58088<br>Newville<br>2114<br>South Africa |
| **Website Address** | www.standardbank.com |
| **Main Activities** | Standard Bank is a leading African banking group focused on emerging markets globally. It has been a mainstay of South Africa's financial system for over 145 years. It is the largest bank domiciled in Africa (in terms of total assets) and provides a full banking service, divided up into personal and business banking; corporate and investment banking; and investment management and life insurance. Standard Bank Group Limited is listed on the Johannesburg Stock Exchange. |

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| **Email Address** | co2@standardbank.com |
| **Contractual Arrangements** | |
| **Contractual arrangements between various entities involved** | Standard Bank Plc (CME) and Standard Bank of South Africa Limited are the only project participant in this programme. Each CPA will include individual CPA developers. Standard Bank PlC will enter into Emission Reduction Purchase Agreement with the CPA Developers. Furthermore, Standard Bank of South Africa Limited will be financier of part of the CPAs included under this programme. |

# Part B: Project Overview (Technical Summary, Location and Schedule)

| **Technical Summary of the project** | |
|---|---|
| **Objective of the Project** | The objective of the programme is to offer wind and solar power projects a framework to make use of carbon finance. The programme will promote the development of wind and solar power plants in South Africa and will reduce carbon emissions by replacing coal fired grid electricity. |

**Project Description**

The objective of this programme is to build wind and solar power capacity for South Africa and offer individual wind and solar power developers the opportunity to make use of carbon finance via the CDM to improve the financial viability of the projects, and to contribute to sustainable development.

In South Africa, Eskom as the state-owned electricity supplier dominates the generation capacity. Furthermore, only about 70 % of South African households are connected to the electricity supply grid, leaving 30 % to so-called energy poverty. South Africa also has had a history of supplying cheap electricity due to an over-capacity expansion programme in the 1970s and ample cheap coal[1]. However, in 2008 South Africa was unable to supply the more than 220 TWh of demand, and the country suffered from power cuts.

South Africa is very fortunate in that it regularly experiences great solar and wind conditions. A number of research reports estimate the technical energy supply potential to be 80 TWh for wind and 1 000 TWh for both photo voltaic (PV) and concentrated solar power (CSP) by 2030.

The emission reductions in the programme arise from the substitution of electricity from centralized coal-fired power stations with the utilization of solar and wind energy. The renewable energy plants will provide electricity into the national grid system.

The programme will be implemented under the Programme of Activities (PoA) approach and will be designed in a way that individual, national and international project developers and financiers may join the programme to improve the financial viability of the projects with the introduction of carbon

[1] Edkins, M., Marquard, A. and Winkler, H. 2010. *Assessing the effectiveness of national solar and wind energy policies in South Africa*. Pg 12.

| Technical Summary of the project | |
|---|---|
| revenues. | |
| **Project Constraints**<br>Individual plants will need to go through the Environmental Authorization and NERSA licence processes. However, some of the plants are at an advanced stage of the approval process. | |
| **Technology to be employed** | The programme envisages implementation of wind and solar power projects, with capacities varying from small from small (< 5 MW) plants to large (>100 MW) renewable energy developments. The wind conditions are most preferable along the coastline in Eastern and Western Cape. The best solar potential is in the Northern Cape.<br><br>The wind turbines produce electricity by using the natural power of wind to drive a generator. Wind has considerable amounts of kinetic energy when blowing at high speeds. When this kinetic energy passes over the blades of the wind turbines, it is converted into mechanical energy and rotates the wind blades. When the wind blades rotate, the connected generator also rotates, thereby producing electricity.<br><br>The solar power plants will convert sunlight into electricity directly using PV, or indirectly using CSP. In PV plants solar radiation is converted into electricity using semiconductors that exhibit the photovoltaic effect by employing solar panels containing photovoltaic materials such as monocrystalline or polycrystalline silicon. CSP systems use mirrors or lenses to concentrate a large area of sunlight, onto a small area. Electrical power is produced when the concentrated light is converted to heat which drives a steam turbine connected to an electrical power generator.<br><br>The power generated from the project sites will be fed into the grid and hence it will displace the electricity generated from thermal power stations feeding into the national grid.<br><br>There have been no CSP or large (>1MW) PV plants built to date in South Africa. As for wind energy, three pilot projects have been built:<br>- The Darling Wind Farm has an installed capacity of 5.2 MW and is a national demonstration project funded in part by the state entity, CEF (Pty) Ltd and with help of official development aid from the Danish Government;<br>- Eskom's test site at Klipheuwel has a theoretical installed capacity of 3.2 MW. Three small wind turbines have been erected at this experimental wind energy farm so that Eskom can demonstrate and assess their different mechanical and electrical performances; and<br>- Belgian developer Electrawinds installed a single 1.8 MW turbine at the Coega industrial development zone as a public relations exercise ahead of the FIFA World Cup in South Africa in 2010, ahead of a large proposed commercial development which has yet to be completed.<br><br>However, the global wind and solar power capacity was in 2010 over 250 GW, and wind and solar power can be seen as safe and |

<table>
<tr><th colspan="2">Technical Summary of the project</th></tr>
<tr><td></td><td>sound technologies.</td></tr>
<tr><td>Greenhouse Gases Targeted</td><td>Carbon dioxide ($CO_2$)</td></tr>
<tr><td>Emission reductions</td><td>The emission reductions under this programme are calculated according to the consolidated CDM methodology “ACM0002: Baseline methodology for grid-connected electricity generation from renewable sources”.<br><br>It is expected that the CPA-001 will generate greenhouse gas emission reductions of 1 247 548 $tCO_2e$ over this crediting period. The table below shows the estimated annual emission reductions.<br><br>
<table>
<tr><th>Year</th><th>Emission reduction per annum (ton $CO_2e$)</th></tr>
<tr><td>1st Nov -31st Dec 2013</td><td>22 092</td></tr>
<tr><td>2014</td><td>126 920</td></tr>
<tr><td>2015</td><td>126 492</td></tr>
<tr><td>2016</td><td>125 974</td></tr>
<tr><td>2017</td><td>125 455</td></tr>
<tr><td>2018</td><td>124 937</td></tr>
<tr><td>2019</td><td>124 419</td></tr>
<tr><td>2020</td><td>123 901</td></tr>
<tr><td>2021</td><td>123 383</td></tr>
<tr><td>2022</td><td>122 864</td></tr>
<tr><td>1st Jan -31st Oct 2023</td><td>101 111</td></tr>
<tr><td>Total estimated reductions (tonnes $CO_2$ e)</td><td>1 247 548</td></tr>
<tr><td>Total number of crediting years</td><td>10</td></tr>
<tr><td>Annual average of the estimated reductions over the crediting period</td><td>124 756</td></tr>
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</td></tr>
<tr><td>Baseline & Additionality Assessment</td><td>The deployment of renewable energy in South Africa has been less than impressive. There has been a shake-up in the market since the blackouts in 2008 and with the establishment of the NERSA Independent Power Producer programme, and the interest in deploying renewable energy projects in South Africa has been given a boost. However, to date renewable energy effectiveness indicators for the last 12 years have been practically zero. The additionality of the individual projects (CPAs) will be justified through barrier analyses and financial additionality by using the additionality tool.<br><br>As indicated above, the consolidated baseline methodology for “grid-connected electricity generation from renewable sources” will be applied. This category comprises grid-connected renewable power generation projects, such as wind and solar power that feed electricity into the national grid.</td></tr>
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| Technical Summary of the project | |
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| | Baseline emissions include only $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline and emission reductions are calculated using the net electricity that is produced and fed into the grid as a result of the implementation of the project activity.<br><br>Furthermore the programme will be installed under the PoA approach, which gives flexibility for the crediting period and location of the installation. The programme is a voluntary action and will face clear barriers such as financial unattractiveness without the carbon revenues, which explains to a large degree the extremely low renewable energy capacity in South Africa. The additionality will be demonstrated in the individual CDM programme activity (CPA) level. |
| **Monitoring** | The monitoring is done in accordance with the methodology ACM0002 and will consist of metering the electricity produced and fed into the grid by each individual solar or wind plant with the help of electricity meters. All data will be gathered in a national database, which then calculates the emission reductions for the PoA. |
| **Type of project/activities** | |
| **a. Energy Supply** | Renewable Energy: wind and solar (PV and CSP) |
| b. Energy Demand | |
| c. Industrial Process | |
| d. Transport | |
| e. Waste Management | |
| f. Forestry/ land use | |
| g. Other | |
| **Project Boundary**<br>The programme will be designed so that individual CDM Project Activities (CPAs) can be included into the programme (PoA) within the Republic of South Africa. Each CPA and power plant will be identified uniquely with the help of addresses and GPS coordinates. A typical CPA will consist of wind and/or solar power units in specific areas. The first CPA is likely to be located 15 kilometres to the north-east of Hanover, off the National Route 1, in the Northern Cape province of South Africa.<br><br>As the programme will replace grid electricity, the project boundary will include the physical installation of the wind/solar plant as well as all the power plants connected to the national grid system. | |
| Indicate Emissions outside the Project Boundary | n/a |

| Location of the Project | |
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| **Province** | Northern Cape Province (CPA001) |
| **Municipality** | Emthanjeni Local Municipality (CPA001) |

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| **Nearest city/large town** | Hanover (CPA001 |
| **Brief description of the location of the project site** | The site envisaged for the first CPA-001 is free of built-structures and falls within the Nama - Karoo Biome. This is the largest vegetation biome in South Africa with a conservation status of "least threatened" (Mucina and Rutherford, 2007).<br><br>This region is characterised by taller grasslands with low diversity of herb species. The dominant agricultural activity is livestock farming, commonly with sheep and goats.<br><br>The Programme is nationwide and will include PV and Wind installation throughout South Africa. |

| **Project Schedule/Timetable** | |
|---|---|
| **Earliest Project Start Date** | Q 4 2013 (for CPA no 1) |
| **When is the expected first year of CER delivery** | 2014 (for CPA no 1) |
| **Project Lifetime** | > 20 years |
| **Project End Date** | 2033 |
| **Crediting Period** | Fixed 10 years crediting prided (Q1 2013- Q4 2023 CPA001)<br><br>The PoA will apply 28 years crediting period. |
| **Current Status or phase of the project** | CPA-001 is at advanced stages of feasibility and environmental impact assessment. The Environmental Authorisation was granted in October 2011 and the start of construction expected Q2 2012, and start of power production Q3 2013. The Programme has commenced validation. |
| **DNA Approval** | Yes |
| **Approval by other bodies** | Individual power plants will need to go through the EIA process and receive a positive Environmental Authorisation. Some of the plants are already at an advanced stage in the EIA process. |

# Part C: Performance against the DNA's Sustainable Development Criteria

South Africa has identified the following sustainable development criteria and indicators against which each CDM project will be assessed. Please provide your interpretation of how this project will address each of these **criteria and indicators** where they are relevant to the project. If the space provided is not sufficient please append additional information as required.

**NOTE: For all indicators which are of relevance to the project show how the performance of the project against these indicators can be objectively monitored and measured on an ongoing basis.**

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|---|---|
| **1. Economic: Does the project contribute to national economic development?**<br>Load shedding is a major problem in South Africa and is hindering the fast growing economy of the country. Renewable energy production is one important way to help improve electricity availability and to meet the growing electricity demand without further exploitation of non-renewable energy in order to bring the economy back to its normal growth in a long term perspective. Furthermore the programme will contribute to national economic development by bringing foreign exchange into the country. | |
| **2. Social: Does the project contribute to social development in South Africa?**<br>The project will create job opportunities. Manpower is required, especially for construction and commissioning as well as maintenance and monitoring of the programme activity. The programme is expected to stimulate the renewable energy industry in the country. It will also lead to skills development in the renewable energy sector. | |
| **3. Environmental: Does the project conform to the National Environmental Management Act principles of sustainable development**? | |
| i) That the **disturbance of ecosystems and loss of biological diversity** are avoided, or where they cannot be avoided, are minimised and remedied | Building of new power plants will always result in disturbance to the environment / ecosystem. However, renewable energy power plants are typically significantly smaller than conventional power stations. Furthermore wind and solar power are environmentally safe and sound. Each power plant built under this programme will need to comply with the national EIA legislation and will have to receive a positive Envionmental Authorisation from the environmental authority prior to construction and commissioning. |
| ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are minimised and remedied | The pollution and degradation of the environment as a consequence of the programme is significantly lower than the 'business-as-usual' situation. The programme will provide clean renewable energy and hence reduce the consumption of non-renewable natural resources, such as coal, uranium and oil. |
| iii) That the **disturbance of landscapes and sites that constitute the nation's cultural heritage** is avoided, or where it cannot be altogether avoided, is minimised and remedied | The programme is not expected to impact on landscapes or sites of cultural significance. However, the sites selected will comply with national environmental legislation and will also be influenced by a public participation process. |
| iv) That **waste is avoided**, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner | Waste will be generated only in the manufacturing and construction stages of the activity and will be handled according to the relevant regulations. The production of electricity through solar radiation and wind will not generate any waste. |
| v) That **the use and exploitation of non-renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource | The programme is a sustainable solution to reduce the use of fossil-based electricity and to prevent electricity demand rapidly overtaking available electricity supply which leads to the exploitation of fossil fuels and the depletion of natural resources. This is one way to ensure sustainable electricity supply for the economic growth of the country. |
| vi) That the **development, use and exploitation of renewable resources is responsible and equitable**, and takes into account the consequences of the depletion of the resource | The programme will make use of renewable resources, specifically solar radiation and wind power to generate electricity. Hence the programme increases the availability of renewable resources in South Africa. |

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| vii) That **a risk averse and cautious approach** is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions | The programme will adopt a risk averse and cautious approach, if applicable. |
| vii) That **negative impacts on the environment and on people's environmental rights** be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied | Building of new power plants will always result in the disturbance of the environment. However, renewable energy power plants are typically significantly smaller than conventional power stations. Furthermore wind and solar power are environmentally safe and sound. Each power plant build under this programme will need to comply with the national EIA legislation and will have to receive a positive Environmental Authorisation from the environmental authority prior construction and commissioning. |
| **Other comments**<br>The programme's impacts on the environment and economy are positive in nature. Furthermore the programme will contribute towards to the government's 10 000GWh target of energy to be produced from renewable energy sources. | |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **Environmental** | Impact on local environmental quality | • Impact of the project on air quality<br>• Impact of the project on water pollution<br>• Impact of the project on the generation or disposal of solid waste<br>• Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic) | The programme does not cause significant, negative environmental impacts on air quality, water pollution, waste management, noise, visual impacts, traffic, or safety. The programme's impacts on environment are rather of a positive nature as the programme activities will produce renewable energy and will thus reduce the pressure on fossil fuel based grid electricity. |
| | Change in usage of natural resources | • Impact of the project on community access to natural resources<br>• Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources<br>• Impact of the project on the efficiency of resource utilisation | The programme reduces the need for fossil fuel based grid electricity by producing renewable energy generation capacity. Although no direct effects on cutting down fossil exploitation, the programme contributes to preventing expansion of fossil fuel exploitation due to the growing electricity demand by generating additional production capacity, which is based on renewable sources. |
| | Impacts on biodiversity and ecosystems | • Changes in local or regional biodiversity arising from the project | Building of new power plants will always result in disturbances to the environment. However, renewable energy power plants are typically significantly smaller than conventional power stations. Furthermore wind and solar power technologies are environmentally safe and sound. Each power plant build under this programme will need to comply with the national EIA legislation and will have to receive a positive Environmental Authorisation from the environmental authority prior construction and commissioning. |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **Economic** | Economic impacts | • Impact of the project on foreign exchange requirements<br>• Impact of the project on existing economic activity in the area<br>• Impact of the project on the cost of energy<br>• Impact of the project on foreign direct investment | The Programme will not have an impact on foreign exchange requirements. However it will bring foreign currencies to South Africa through the sale of CERs and through direct foreign investments in projects.<br><br>The programme will lead to increased job opportunities within the construction, commissioning and maintenance sectors related to the renewable energy projects.<br><br>Programme activity impacts on energy costs are positive. The electricity demand in South Africa will continue its rapid growth and will increase electricity prices. However, the programme will generate additional power generation capacity. |
| | Appropriate technology transfer | • Positive or negative implications for the transfer of technology to South Africa arising from the project<br>• Impacts of the project on local skills development<br>• Demonstration and replication potential of the project | To date there has been almost no wind or solar power generation capacity in South Africa. The programme will require technical skills to develop, construct, commission and maintain these renewable projects. The programme will lead to a transfer of knowhow to South Africa. |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **Social** | Alignment with national provincial and local development priorities | • How the project is aligned with provincial and national government objectives<br>• How the project is aligned with local developmental objectives<br>• Impact of the project on the provision of, or access to, basic services to the area<br>• Impact of the project on the relocation of communities if applicable<br>• Contribution of the project to a any specific sectoral objectives (for example, renewable energy targets) | As a summary, the programme fulfils the South African government's objectives in the following areas:<br>• Renewable Energy Generation<br>• Enhancing economic development<br>• Reduction on reliance of fossil fuels<br>• Job creation<br>• Promotion of CDM<br>• Greenhouse gas reduction<br><br>No community is expected to be relocated due to the programme activity. The sites will be selected according to the national environmental legislation, will include a public participation process, and will be authorized by the national environmental authority. |
| | Social equity and poverty alleviation | • Impact of the project on employment levels? (specify the number of jobs created/lost; the duration of time employed, distribution of employment opportunities, types of employment, categories of employment changes in terms of skill levels and gender and racial equity)<br>• Impact of the project on community social structures<br>• Impact of the project on social heritage<br>• Impact of the project on the provision of social amenities to the community in which the project is situated<br>• Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes | The programme activity involves the creation of job opportunities in construction, commissioning and maintenance, and will also lead to the transfer of knowhow.<br><br>As result of the programme, the power generation capacity will be increased based on clean and renewable energy sources. |

| Indicators in Support of the Project Approval Criteria | | | |
|---|---|---|---|
| **Category** | | **Indicator** | **Comment** |
| **General** | General Project Acceptability | • Are the distribution of project benefits deemed to be reasonable and fair? | The project will provide benefits in all areas of sustainable development, including the aspects mentioned above. Hence, the programme activity generates benefits that are reasonable and fair. |

## Part D: Finance

| **Project Costs** | |
|---|---|
| **Development Costs (R's )** | 106 315 216 *(CPA001)* |
| **Installed Costs (R's)** | Capex: 1 679 051 362 *(CPA001)* |
| **Other Costs (R's)** | OPEX: 3 826 386 *(CPA001)* |
| **Total Project Costs (R's)** | 2 196 211 961 *(CPA001)* |
| **Sources of Finance** | |
| **Equity** | The total equity required (CPA001) is ZAR 549 052 990.<br><br>The first CPA will have 4 equity partners:<br>Scatec Solar AS<br>Linde BBBEE Holding<br>The Standard Bank of South Africa Limited<br>Old Mutual Life Assurance Company (South Africa) Limited |
| **Debt** (long term) | 75.0% to be provided by The Standard Bank of South Africa Limited *(CPA001)* |
| **Debt** (short term) | n/a |
| **Amount not identified (R's)** | n/a |
| **Total CDM Contribution sought** | It is expected that CPA-001 will generate greenhouse gas emission reductions of 1 247 548 $tCO_2e$ over a 10 year crediting period. |
| **Expected Price of CER** in case of a contract to purchase for:<br>A period of 7 years<br>A period of 10 years<br>A period of 14 years (2x7 years) | n/a |
| Indicate the **projected Internal Rate of Return** for the project with and without CER revenues. | Real project IRR without CERs: 13.49% *(CPA001)* |
| **Constraints on tradability of carbon credits** | None |
| **Preliminary discussions with potential purchasers** | Yes. Standard Bank will be the CER purchaser. |