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 use only)	
Date received (office use only)	

NOTES ON COMPLETING THIS PROJECT DESIGN DOCUMENT

1. Please provide this PDD in both hard-copy (one copy) and electronic formats (MSWord)
2. The information submitted to the DNA in this PIN will remain confidential.
3. Please ensure that all fields are filled in as far as possible to allow for proper consideration of the proposed project. Please indicate if information is not available for any particular item and reasons for the unavailability of information.

Part A: Project Proponent Details

Project Name	Bokpoort CSP (Concentrating Solar Power) Project, South Africa
Date of Submission of PDD	21/05/2012

Project Developer	
Name	Solafrica Thermal Energy (Pty) Ltd
Organizational Category	Private Company
Legal Status	(Pty) Ltd
Street Address	Second Floor, 5 Commerce Square, 39 Rivonia Road, Johannesburg,

	Gauteng, South Africa 2196
Postal Address (if different from above)	As above
Website Address	http://www.solafrica.co.za
Main Activities	Solafrica is a solar thermal energy development company registered to develop a 50MWe parabolic trough concentrated solar thermal power plant in South Africa.
Summary of Financial Performance in last fiscal year	N/A
Contact Person(s)	Mr Nasi Rwigema
Telephone	Work: +27 (0)11 268 4074 Cell: +27 (0)83 324 2097
Fax	+27 (0)86 648 1006
Email Address	nasi@solafrica.co.za
Project Partners Provide the following Information for **all** project partners (copy and paste relevant sections of the table if information is to be provided on more than one partner organisation)	
Name	Emipix (Pty) Ltd (to be renamed ACWA Power Africa Holdings (Pty) Ltd with registration number : 2011/108929/07)
Nature of partner	Development Partner
Organizational Category	Private company
Legal Status (if private company)	(Pty) Ltd
Street Address	1st Floor Block B, Stoneridge Office Park, 8 Greenstone Place, Greenstone Hill, Edenvale, South Africa, 1065
Postal Address (if different to Street Address)	PO Box 55389, Northlands, South Africa, 2116
Website Address	http://www.acwapi.com
Main Activities	Lead developer, owner and operator of independent water and power projects structured on a concession or utility outsourcing contract model.
Contact Person(s)	Prabashen Govender
Telephone	Work: 011 524 8400 Cell: 083 273 1122
Fax	011 524 8498
Email Address	pgovender@acwapower.com
Name	Bold Moves 384 (Pty) Ltd (to be renamed “ACWA Power Solafrica Bokpoort CSP Power Plant (Pty) Ltd”)
Nature of partner	Project Company

Organizational Category	Private company
Legal Status (if private company)	(Pty) Ltd
Street Address	1st Floor Block B, Stoneridge Office Park, 8 Greenstone Place, Greenstone Hill, Edenvale, South Africa, 1065
Postal Address (if different to Street Address)	PO Box 55389, Northlands, South Africa, 2116
Website Address	N/A
Main Activities	Project Company for the Project
Contact Person(s)	Prabashen Govender
Telephone	Work: 011 524 8400 Cell: 083 273 1122
Fax	011 524 8498
Email Address	pgovender@acwapower.com
Contractual Arrangements	
Contractual arrangements between various entities involved	There is a shareholders agreement in place between the entities.

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

Technical Summary of the project	
Objective of the Project	The purpose of the project is to reduce greenhouse gas emissions by installing a greenfield grid connected parabolic trough concentrated solar thermal power plant.

Project Description

This project activity will employ parabolic trough concentrated solar thermal technology to be constructed on a portion of the farm Bokpoort 390 in Groblershoop in the Northern Cape Province, South Africa.

The installed technology uses very precise parabolic shaped, sun tracking mirrors to concentrate and collect sunlight on thermally efficient receiver tubes running through the optical focal line of the parabolic mirror troughs. The parabolic mirror troughs, orientated along the north-south directional plane, are designed to track the sun along one axis as it moves from east to west. A heat transfer fluid (HTF), such as synthetic thermal oil, is heated by the focused sunlight as it circulates through the receivers and is then pumped through a series of heat exchangers where thermal energy is transferred to water. This happens until the temperature of the water side of the system is heated sufficiently to generate medium/high-pressure superheated steam.

The technology generates electricity in a similar way to conventional power stations by using steam to drive a steam turbine generator. The fundamental principle of the technology is to collect the energy carried by sunrays, allowing the heat transfer fluid (HTF) to absorb the collected energy and then converting the thermal energy first into steam and then into electricity.

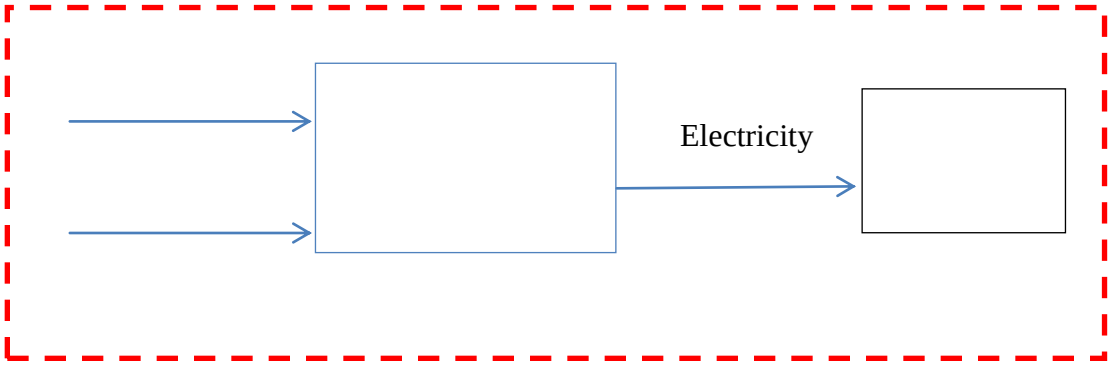
Project Constraints

There are no constraints affecting project operations or commissioning.

Technology to be employed	Parabolic trough concentrated solar thermal technology will be employed at the project site utilizing the thermal energy carried by sun's rays to create steam. The steam is then used to drive a steam turbine to generate electricity.
Greenhouse Gases Targeted	This project will target CO_2.
Emission reductions	Total emission reductions: 2,115,333 tCO_2e* Annual average emission reductions: 211,533 tCO_2e/year *A ten year fixed crediting period has been selected for this project activity.

Technical Summary of the project	
Baseline & Additionality Assessment	Baseline: The baseline scenario is the purchase of electricity from Eskom. Additionality: The additionality of the project activity is demonstrated using barrier analysis, as per the 'Tool for the assessment and demonstration of additionality'. It is proved that the project, when compared to similar technologies, is the first-of-its-kind in the applicable geographical area, South Africa.
Monitoring	The following parameters will be monitored in the project activity: – The annual quantity of net electricity output supplied by the project plant to the grid. – The annual quantity of diesel combusted in the CSP plant. – The weighted average net calorific value of diesel.
Type of project/activities	*Identify which type of activity is involved in this project - and for each, provide brief details*
a. Energy Supply	This project activity generates electricity by capturing the thermal energy of the sun's rays to convert water into steam to drive a steam turbine generator.
b. Energy Demand	N/A
c. Industrial Process	N/A
d. Transport	N/A
e. Waste Management	N/A
f. Forestry/ land use	N/A
g. Other	N/A

Project Boundary



Technical Summary of the project	
Indicate Emissions outside the Project Boundary	There are no significant and measurable net emissions of GHGs that are attributable to the project outside of the project boundary.

Location of the Project	
Province	Northern Cape
Municipality	!Kheis Municipality
Nearest city/large town	Upington
Brief description of the location of the project site	The site is located within the !Kheis Local Municipality, and is 20 km north of the town Groblershoop. The GPS coordinates are: 28° 43' 26.96" S 21° 59' 34.88" E

Project Schedule/Timetable	
Earliest Project Start Date	December 2012 which is the expected financial close date.
When is the expected first year of CER delivery	2016
Project Lifetime	A minimum of twenty years
Project End Date	June 2035
Crediting Period	A fixed ten year crediting period has been selected for this project activity. The duration of the period is from 01 July 2015 to 31 June 2025.
Current Status or phase of the project	The project activity is in the preparation stage and was recently awarded preferred bidder status during the second bidding window for the Renewable Energy Independent Power Producer Programme (REIPPP).
DNA Approval	This project has not been previously submitted to the DNA for approval.
Approval by other bodies	The project has received an Environmental Authorisation on the 14-06-2011 from Government regarding the project's Environmental Impact Assessment.

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.

1. Economic: Does the project contribute to national economic development?

The deployment of the project activity will have a favourable macro-economic impact by reducing South Africa's dependence on fossil fuel generated power and assisting the country in meeting its growing electricity demand.

Economic benefits will extend through the local municipalities jurisdiction which will be derived from the project activity's favourable effects on local employment rates, demand for infrastructure and housing as well as the increased contribution to municipal rates and taxes for the !Kheis Local Municipality.

2. Social: Does the project contribute to social development in South Africa?

The operational phase of the solar power plant will create approximately 50 job opportunities. This includes approximately 20 unskilled jobs, 20 moderately-skilled jobs and 10 highly skilled jobs.

The local community will be directly involved with the project by including 10% of local or regional ownership in the project through a Broad Based Black Economic Empowerment programme. An organisation called LoveLife will receive a 5% share in the project with the remaining 5% going into a bespoke community trust benefitting community members within a 50km radius. There will be further socio-economic development contributions of 1, 25% to LoveLife in addition to their dividend stream. An enterprise development programme will be established to support Black Economic Empowerment (BEE) farming initiatives for the majority within a 50km radius of the project. The programme will receive 0, 45% of the revenue.

The increase in the demand for services such as accommodation, transportation, security, general maintenance and catering will generate additional indirect socio-economic benefits for the local community members.

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	*The environmental impact assessment was completed and approved. The environmental management plan focusses on protecting the riparian area due to the aridity of the region.* *A license in respect of biodiversity impacts has been received from the Northern Cape Department of Nature Conservation and the Department of Agriculture, Forestry and Fisheries. A condition of the license is the establishment of a suitable offset programme to be approved by both Departments.*
ii) That **pollution and degradation of the environment** are avoided, or where they cannot be altogether avoided, are minimised and remedied	*Concentrated solar thermal power technology does not produce the polluting emissions or safety concerns associated with conventional electricity generation technologies resulting in a relatively low level of environmental impacts. It is a clean technology which contributes toward a better quality environment for employees and nearby communities.* *There is an Environmental Management Plan that will prevent or mitigate any environmental impacts should they arise.*
iii) That the **disturbance of landscapes and sites that constitute the nation's**	*No cultural, historical or palaeontological components aside from stone flakes of human origin were found during the investigation, nor were*

cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied	*there any buildings, graves or burial grounds in the area. Approval for the destruction of the stone flakes was granted by the South African Heritage Resources Agency as these are of low importance.*
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	*The project activity will produce solid construction waste during the initiation phase of the project and during its operational phase. The solid waste will be managed and disposed of in a responsible manner. A Waste Management License has been obtained from the Department of Environment Affairs.*
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	*This project activity will make use of diesel which is a non-renewable resource for limited start up and anti-freeze activities. However, the project will displace grid electricity, thereby indirectly reducing the exploitation of non-renewable natural resources (coal) from coal-fired power stations, as well as helping to lessen the associated environmental impacts of coal mining.*
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.	*Thermal energy carried by the sun's rays is converted into electricity through the use of parabolic trough solar thermal technology. This process is responsible and equitable and the solar resource is non-depletable.*
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	*A reputable engineering firm will be carrying out project implementation.*
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	*The overall environmental impact will be positive; since the project will reduce the volume of greenhouse gases emitted to the atmosphere. The project will also displace grid electricity, thereby indirectly reducing the exploitation of non-renewable natural resources (coal) from coal-fired power stations, as well as helping to lessen the associated environmental impacts of coal mining. Significant social benefits will flow into the local community from the project.*
Other comments **Please provide any other comments on how this project contributes to sustainable development in South Africa** On a global scale, the project makes a contribution to greenhouse gas emission reduction.	

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Environmental	Impact on local environmental quality	• Impact of the project on air quality • Impact of the project on water pollution • Impact of the project on the generation or disposal of solid waste • Any other positive or negative environmental impacts of the project (such as impacts on noise, safety, visual impacts, or traffic)	• The project's impact on air quality will be positive since the project will reduce the volume of greenhouse gases emitted to the atmosphere. • The project will not change the current local water availability or access. The project will not impact on the current local water quality. This project activity has received confirmation of the availability of water for it's intended uses and is in the process of obtaining a water license. • The project activity (in implementation and operation) will produce negligible amounts solid waste. A waste management license has been received for the disposal of this waste. • The design of the CSP plant will incorporate the necessary acoustic design aspects required.
	Change in usage of natural resources	• Impact of the project on community access to natural resources • Impact of the project on the sustainability of use of water, minerals or other non renewable natural resources • Impact of the project on the efficiency of resource utilisation	• The project activity will use water from the Orange River for the wet cooling process. Confirmation of water availability has been received from the Department of Water Affairs. A water use license has been applied for to the Department of Water Affairs. The level of water quality will not be affected by the project activity. • The project activity does not make use of minerals or any other non-renewable natural resources. • The project will use solar energy to generate electricity which is a renewable source of energy. In South Africa electricity is produced primarily by conventional coal-fired power stations. This project activity displaces fossil fuel generated electricity thereby improving resource utilisation. The project activity is considered to have a high level of resource utilisation. • The support for the BEE farming initiative will improve local community access to agricultural land and to water allocations from the Department of Water Affairs.
	Impacts on biodiversity and ecosystems	• Changes in local or regional biodiversity arising from the project	• The region where the technology of the project activity will be installed is an arid area. An environmental management plan is in place for the project activity. • A biodiversity offset programme will be implemented to offset the local impacts of the removal of tree and aloe species on site.

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
Economic	Economic impacts	• Impact of the project on foreign exchange requirements • Impact of the project on existing economic activity in the area • Impact of the project on the cost of energy • Impact of the project on foreign direct investment	• The project will contribute to foreign reserve earnings for South Africa via the carbon credit sales revenue. • The project will generate additional temporary employment in the construction phase, and will result in permanent employment during the operational phase (20 unskilled, 20 moderately skilled and 10 highly skilled jobs). • The project will export electricity to the grid at a higher cost than the traditional combustion of fossil fuel generated electricity. However, the expected revenue from the certified emission reductions (CERs) will be used to assist in overcoming this barrier. • Significant foreign direct investment for the country will occur as 50% of the project shareholding will come from international equity.
	Appropriate technology transfer	• Positive or negative implications for the transfer of technology to South Africa arising from the project • Impacts of the project on local skills development • Demonstration and replication potential of the project	• There will be a transfer of technology from a developed country to a developing country. • There will be a transfer of knowledge as the personnel responsible for the operation and maintenance of the plant will receive the necessary training. The O&M company is made up of a partnership between a local black owned firm and an experienced international power sector O&M company • The project can serve as an example to other potential solar power plant operations in South Africa on the importance of exploring alternative energy sources and the possible generation of CERs.

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 • How the project is aligned with local developmental objectives • Impact of the project on the provision of, or access to, basic services to the area • Impact of the project on the relocation of communities if applicable • Contribution of the project to a any specific sectoral objectives (for example, renewable energy targets)	• The project supports the emission mitigation actions of South Africa. According to a letter sent to the United Nations Framework Convention on Climate Change (UNFCCC) on 29/01/2010, South Africa committed to "taking nationally appropriate mitigation actions to enable a 34% deviation below the 'Business as Usual' emissions growth trajectory by 2020 and a 42% deviation below the 'Business as Usual' emissions growth trajectory by 2025". The project will displace electricity consumption from a predominantly coal-fired grid, which will result in a reduction in all of the negative impacts associated with coal mining. • The project will create 50 permanent jobs. • The project activity does not involve the relocation of any communities. • The South African Government's economic policy is defined in the New Growth Path. This document indicates that the key social development deliverable the policy is aiming to support is the creation of new jobs in South Africa. Unemployment is recognised as key problem in the country that needs to be addressed. This project will create jobs during the installation and operational phases of the programme, thereby supporting Government's policy objectives. • The project has been endorsed by the !Kheis Local Municipality in whose boundaries it falls. • The project has been selected under the DoE's REIPPP programme.

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
	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) • Impact of the project on community social structures • Impact of the project on social heritage • Impact of the project on the provision of social amenities to the community in which the project is situated • Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes	• The project will create 50 jobs in the operations phase which includes 20 unskilled, 20 moderately skilled and 10 highly skilled jobs. The creation of jobs is important since the Bokpoort CSP Project is located in an area with very little established industry and, therefore, very few existing employment opportunities. It is the project developer's policy to actively recruit labour from local communities wherever possible during the construction and operational phases of the plant. • It is the intention of the project developer to involve the local community directly with the project by including 10% of local or regional ownership in the project through a Broad-Based Black Economic Empowerment programme. An organisation called loveLife will hold a 5% share in the project with the remaining 5% being held by a bespoke community trust benefitting community members within a 50km radius. There will be further socio-economic development contributions of 1, 25% to loveLife in addition to their dividend stream. An enterprise development programme will be established to support Black Economic Empowerment (BEE) farming initiatives for the majority within a 50km radius of the project. This programme will receive 0, 45% of the revenue.

Indicators in Support of the Project Approval Criteria		
Category	**Indicator**	**Comment**

Indicators in Support of the Project Approval Criteria			
Category		**Indicator**	**Comment**
General	General Project Acceptability	• Is the distribution of project benefits deemed to be reasonable and fair?	• The project contributes to sustainable development from an economic, environmental and social perspective. The local community and environment benefits from the project activity and these benefits are considered to be reasonably and fairly distributed. • It is the intention of the project developer to involve the local community directly with the project by including 10% of local or regional ownership in the project through a Broad-Based Black Economic Empowerment programme. An organisation called loveLife will receive a 5% share in the project with the remaining 5% going into a bespoke community trust benefitting community members within a 50km radius. There will be further socio-economic development contributions of 1, 25% to LoveLife in addition to their dividend stream. An enterprise development programme will be established to support Black Economic Empowerment (BEE) farming initiatives for the majority within a 50km radius of the project. The programme will receive 0, 45% of the revenue. • The financial benefit of the project is reasonably distributed as the carbon credits are sold to the mutual benefit of the contracting parties and the CER distribution has been accepted by all shareholders in the Project Company.

Part D: Finance

Project Costs	
Development Costs (R's)	Confidential
Installed Costs (R's)	Confidential
Other Costs (R's)	N/A
Total Project Costs (R's)	Confidential
Sources of Finance	
Equity	Approx. 22-28%
Debt (long term)	Approx. 82-88%
Debt (short term)	N/A
Amount not identified (R's)	N/A
Total CDM Contribution sought	Confidential
Expected Price of CER in case of a contract to purchase for: A period of 7 years A period of 10 years A period of 14 years (2x7 years)	Uncertain = approximately spot price
Indicate the **projected Internal Rate of Return** for the project with and without CER revenues.	Confidential
Constraints on tradability of carbon credits	There are no constraints related to tradability of Solafrica Thermal Energy's carbon credits
Preliminary discussions with potential purchasers	Some early discussions with EU compliance buyers have been held