

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

Project Name	Vertical Shaft Brick Kiln (VSBK) Programme of Activities for South Africa
Date of Submission of PDD	

Project Developer	
Name	Swisscontact South Africa
Nature of partner	Swisscontact South Africa, as a subsidiary of Swisscontact, is a technology provider and VSBK promoter. Standard Bank Plc have a contractual agreement to act as CME with Swisscontact
Organizational Category	Private Company
Legal Status (if private company)	Not for Profit entity
Street Address	Office B 80 107 Nicolson Street Brooklyn Pretoria 0181
Postal Address (if different to Street Address)	Postnet Suite 173, Private Bag X06 Waterkloof

	0145 Gauteng, South Africa
Website Address	www.swisscontact.co.za
Main Activities	A non-profit organization that focuses on creating opportunities for the poor in various countries in the world. They do this by promoting vocational training, and continuous education, focusing on SME's and promoting climate change initiatives.
Contact Person(s)	Hans Hagnauer
Telephone	Work: +27123465102 Mobile: 027761036417
Fax	+27 12 346 51 06
Email Address	jh@swisscontact.co.za
Project Partners (No LoA Required)	
Name	Standard Bank Plc
Organizational Category	Public Company
Legal Status	Publically Traded Company
Street Address	20 Gresham Street, London, EC2V 7JE, United Kingdom
Postal Address (if different from above)	
Website Address	www.standardbank.com
Main Activities	Standard Bank Plc is a division of Standard Bank of South Africa Ltd and focuses on providing Financial services to the United Kingdom market.
Summary of Financial Performance in last fiscal year	Normalised headline earnings for 2011 were R13,6 billion (\$1,9 billion), total assets were over R1 497 billion (approximately \$185 billion) and we employed approximately 52 000 people (including Liberty) across all geographies. Standard Bank's market capitalisation at 31 December 2011 was R157 billion (approximately \$19 billion).
Contact Person(s)	Geoff Sinclair
Telephone	Work: +44 20 3145 6893 Cell: +44 7769 648 695
Fax	+44 20 3189 6930
Email Address	Geoff.sinclair@standardbank.com
Project Partners (No LoA Required)	
Name	Swisscontact
Nature of partner	Swisscontact is a nonprofit entity established to assist in delivering change and improvement initiatives by effectively utilizing donor funds to achieve the Donor's objectives.
Organizational Category	Private Company
Legal Status (if private company)	Not for Profit entity
Street Address	Doeltschiweg 39, Zurich, 8055 Switzerland

Postal Address (if different to Street Address)	
Website Address	www.swisscontact.org
Main Activities	A non-profit organization that focuses on creating opportunities for the poor in various countries in the world. They do this by promoting vocational training, and continuous education, focusing on SME's and promoting climate change initiatives.
Contact Person(s)	Benjamin Lang
Telephone	Work: +41 44 454 17 17 Direct: +41 44 454 17 07
Fax	+41 44 454 17 97
Email Address	beni.lang@swisscontact.ch
Contractual Arrangements	
Contractual arrangements between various entities involved	Swisscontact South Africa is a subsidiary of Swisscontact and represents their interests in Southern Africa. Swisscontact has contracted with Standard Bank Plc to act as CME for the PoA. Final ownership of the CER's will reside between the CME and the individual CPA's.

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

Technical Summary of the project	
Objective of the Project	The goal of the PoA is to promote and support the uptake of VSBK technology in the brick manufacturing industry in South Africa. By supporting and promoting the implementation of the more energy efficient VSBK technology, compared to the alternative less energy efficient clamp technology used most commonly in South Africa, it aims to increase the energy efficiency by improving the thermal efficiency of South Africa's brick manufacturing facilities. The implementation of the more energy efficient VSBK leads to a reduction in CO2 as a result of the use of less external and internal coal per kg brick fired. The implementation of VSBK's will also contribute to the conservation of fossil fuel energy resources, i.e. coal in the case of South Africa.
<p>Project Description VSBK (Vertical Shaft Brick Kiln) aims to improve the energy efficiency of the brick firing process in South Africa. Clay bricks are still predominantly fired with coal and fly ash in energy inefficient and highly polluting clamp kilns. The proposed project activity includes the switch from the current inefficient kiln technology to the VSBK technology.</p> <p>VSBK has vertical shaft of rectangular cross-section. Green, unfired, bricks are loaded in batches from kiln top. Bricks move down the shaft through pre-heating, firing and cooling zones and are unloaded from bottom. The combustion of coal (internal to the unfired bricks and added externally along with bricks at the top) takes place in the middle of the shaft. This procedure permits to use hot exhaust</p>	

Technical Summary of the project

gasses for gradual preheating of the unfired bricks in a continuous process.

Increased efficiency of the VSBK leads to fewer losses of heat/energy making the best use of the firing fuel thus reducing energy consumption and CO₂ emissions by up to 50% compared to the clamp kilns. It also contributes to the conservation of fossil fuel energy resources. The energy efficiencies are matched by improving the operational environment for the workers and will require additional training due to increased complexities of the operation. The lowered cost of firing bricks will assist in making clay brick manufacturers more competitive and lead to job retention in a weak construction market.

Project Constraints

No constraints to project development, commissioning and implementation have been identified. The only constraint to the project is the capital outlay that the project developers have to make and their ability to access financing.

Technology to be employed

Vertical Shaft Brick Kiln (VSBK) technology is an energy efficient Technology for firing clay bricks. It is particular suited to the needs of brick production in developing countries.

The VSBK is a vertical kiln with stationary fire and moving brick arrangement. Figure below shows the VSBK principle in a schematic diagram. The kiln operates like a counter current heat exchanger, with heat transfer taking place between the air (moving upwards) and the bricks (moving downwards). A typical VSBK consists of one or more shafts located inside a rectangular brick structure. The shafts are 1 to 1.25 meters wide with nominal lengths of 1 m, 1.5m, 1.75m or 2.0 m.

The inside surface is a brick wall lined with refractory fireclay bricks. The gap between the shaft wall and outer kiln wall is filled with insulating materials. Provision for peepholes and thermocouple probes are provided along the shaft height to monitor the position of fire as well as temperature profile of the kiln. The shaft is loaded from the top in batches of green (unfired) bricks. Each batch typically contains four layers of bricks set in a predetermined pattern. The kiln itself can be divided into three distinct sections. The top section is the brick preheating zone, the middle section is the firing and heat soaking zone and the lower section is the brick cooling zone. Fuel is usually added in two forms; internal fuel and external fuel. The internal fuel is added to the clay prior to brick moulding. In most cases coal is used as external fuel in VSBK.

The supply of combustion air is force draft induced in the South African kiln by means of the forced draught system. The air required for combustion enters from the bottom of the kiln. It

Technical Summary of the project

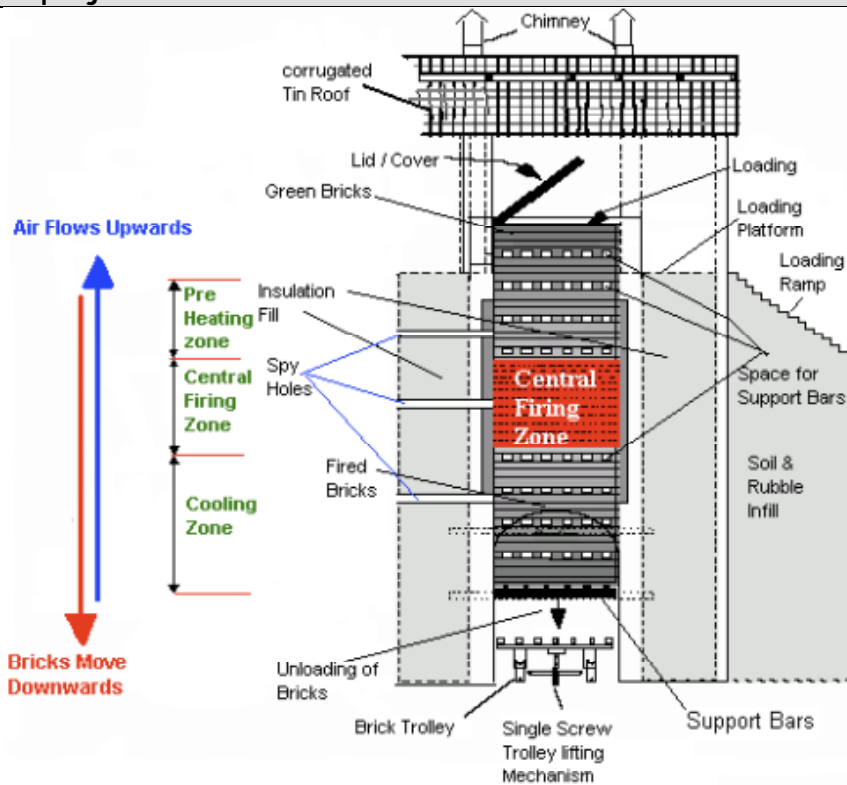


Figure 2.1

Schematic Diagram of a Typical VSBK

The VSBK is being transferred into South Africa from the Indian Sub-Continent where it has been proven to be efficient in India, Nepal, Pakistan and Bangladesh. The VSBK has been proven to be successful in small volume production and in brick and mortar construction method. The approach being adopted by the project is to follow the design principles from India and adapting these to the South African conditions and requirements.

Yes, Swisscontact has access to the technology developers who have been intimately involved in the knowledge transfer process into South Africa.

Greenhouse Gases Targeted	CO ₂
Emission reductions	PoA: Expected 100,000 tonnes CO ₂ equivalent per Annum CPA1: Expected 5,000 tonnes CO ₂ equivalent per Annum
Baseline & Additionality Assessment	The CDM methodologies applied to this project are "Fuel Switch, process improvement and energy efficiency in brick manufacture", Reference: AMS-III.Z, Version 03, Sectoral Scope EB 54. The methodology also refers to the latest approved versions of: <ul style="list-style-type: none"> • " Tool to calculate project or leakage CO₂ emissions from fossil fuel

Technical Summary of the project	
	<p>combustion", Version 02, EB 41</p> <ul style="list-style-type: none"> • "Standard for the development of eligibility criteria for the inclusion of a project activity as a CPA under the PoA", Version 01.0, EB63 Annex 3 • ""Demonstration and assessment of additionality" Version 06.0.0, EB65 Annex 21 <p>The baseline scenario is a "business as usual" scenario, where no project activity is undertaken.</p> <p>The first CPA will use the first-of-kind argumentation in accordance with version 6 of the additionality tool.</p>
Monitoring	The volume of coal consumed per kg of fired brick in the VSBK will be compared to the baseline scenario. The volume of coal is determined by monitoring the production volumes of saleable clay bricks, monitoring the volumes of internal and external fuel consumed during the production process. These parameters coupled with the quality of fossil fuels utilized in the production process will determine the emissions of CO ₂ produced during VSBK production. This will be compared to the baseline fuel consumed per kg of fired material and the reduction in CO ₂ will be calculated.
Type of project/activities	
a. Energy Supply	NA
b. Energy Demand	N/A
c. Industrial Process	Applicable to Clay brick production and reduction of fossil fuel consumed during the firing process.
d. Transport	N/A
e. Waste Management	N/A
f. Forestry/ land use	N/A
g. Other	N/A
Project Boundary	
The PoA project boundary for the PoA is defined as the Republic of South Africa. For the individual CPA the project boundary refers to the brick production facility and the brick firing within the physical boundary of the operational site.	
Indicate Emissions outside the Project Boundary	N/A

Location of the Project	
Province	All provinces are potential areas where CPA's can be rolled out
Municipality	To be Confirmed for each CPA
Nearest city/large town	To be confirmed per CPA
Brief description of the location of the project site	<p>To be confirmed for each CPA</p> <p>CPA1: Langkloof Steenwerwe (Pty) Ltd Location outside Jeffreys Bay in the Eastern Cape Province of South Africa and therefore lies within the geographic boundary of South Africa. GPS coordinates: S 34 03 059 E 24 50 413</p>

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Project Schedule/Timetable	
Earliest Project Start Date	1 July 2012
When is the expected first year of CER delivery	2014
Project Lifetime	28 Years
Project End Date	2040
Crediting Period	The crediting period is 10 years for each underlying CPA.
Current Status or phase of the project	The PoA is currently under validation with site visit having taken place and the Draft Validation Report has been submitted. The first CPA is in process of finalizing planning and fund raising based on participation in the PoA
DNA Approval	The project submitted a PIN on 13 September 2011 and received a Letter of No Objection dated; 27 October 2011
Approval by other bodies	N/A

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?

It is considered viable that long-term economic benefits for the community and/or society in general can be realised with the potential establishment of energy efficiency developments. Positive impact as the project results in foreign currency cash flows into RSA in the form of Euros being paid for CERs generated. At national, regional and local level, investment in energy efficiency initiatives, such as the proposed POA, is supported. It is important that at the national level (South Africa being signatories to the Kyoto Protocol) positive policy is enacted to encourage these types of developments. The improved competitiveness that the project will bring to clay brick manufacturers over time will assist in retaining jobs. During the construction phase of the VSBK installations there will be significant job creation for the local construction industries.

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

Impacts on the social environment as a result of the development of the projects are expected to occur during

both the construction and operation phases:

- The potential positive impacts associated with the construction phase include Creation of local employment and training opportunities.

The potential positive impacts associated with the operational phase include the training of employees to become more skilled workers, better occupational health and safety for workers in the clay brick production.

3. Environmental: Does the project conform to the National Environmental Management Act principles of sustainable development?

Please provide brief comment for each of these below.

i) That the disturbance of ecosystems and loss of biological diversity are avoided, or where they cannot be avoided, are minimised and remedied

None identified as the projects are being implemented on existing industrial sites. The equipment will be installed on sites currently in use.

ii) That pollution and degradation of the environment are avoided, or where they cannot be altogether avoided, are minimised and remedied

None identified as the projects are being implemented on existing industrial sites. The equipment will be installed on sites currently in use. The reduction in coal fired during the production process will reduce pollution as a direct result of the project. PM 10 emissions will substantially be reduced.

iii) That the disturbance of landscapes and sites that constitute

None identified as the projects are being implemented on existing

<p>the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied</p>	<p>industrial sites. The equipment will be installed on sites currently in use.</p>
<p>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</p>	<p>The project will result in higher rework of unfired brick waste and reduce the volume of fired brick waste experienced under current operating mechanisms.</p>
<p>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</p>	<p>Coal consumption during the firing process will reduce as a direct impact of the VSBK. This will result in more efficient use of finite resource, coal over the life of the project.</p>
<p>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.</p>	<p>Not applicable to this project</p>
<p>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</p>	<p>Adherence to the conditions of the Environmental Authorisation for each CPA will ensure that a risk averse and cautious approach is adopted. This will be enhanced further by the use of the more energy efficient technology, control systems and procedures.</p>
<p>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</p>	<p>It is not foreseen that the implementation of the project activities will impact on any environmental rights of people. The implementation of the projects will only benefit the people in the surrounding area as the atmospheric emissions will improve in the immediate surrounding areas.</p>
<p>Other comments Please provide any other comments on how this project contributes to sustainable development in South Africa (optional)</p>	

Indicators in Support of the Project Approval Criteria			
Category	Indicator	Comment	
Environmental	Impact on local environmental quality	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • Impact on air quality: air quality is improved. The projects will comply with all requirements of the legislation on Air Quality : Act N°39 of 2004. • Impact on water pollution: no water pollution is expected as a result of the project activities. • Impact on the generation or disposal of solid waste: any waste products (e.g. oil, plastic) will be disposed in accordance with relevant waste management legislation such as the Environmental Conservation Act N°79 of 1989. • Positive environmental impact: the uptake of the CPAs offers the opportunity to address energy needs in an environmentally responsible manner, contributing to the mitigation of climate change through the reduction of greenhouse gas emissions. • Impact on noise: Noise levels are not impacted on. • Visual impact: No visual impact foreseen.
	Change in usage of natural resources	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Impact on community access to natural resources: use of coal is essentially a consumptive use of a natural resource, and as a result of the projects, the consumption of coal will be reduced. In the longer term, this makes coal longer available in South Africa. • Impact on sustainable use of water: Lowered water during the production cycle will result in a lowered use of water. • Impact on efficiency of resource utilization: As per bullet one above
	Impacts on biodiversity and ecosystems	<ul style="list-style-type: none"> • Changes in local or regional biodiversity arising from the project 	None foreseen as the project activities will be implemented on industrial sites. This aspect will be covered in EIAs for the project activities.
Indicators in Support of the Project Approval Criteria			
Category	Indicator	Comment	

Indicators in Support of the Project Approval Criteria		
Category	Indicator	Comment
Economic	Economic impacts	<ul style="list-style-type: none"> • 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
	Appropriate technology transfer	<ul style="list-style-type: none"> • Impact of the project on foreign exchange requirements: No impact foreseen • Impact on existing economic activity in the area: The expenditure during the construction phase will create business opportunities for the regional and local economy. • Impact of the project on the cost of energy: No impact foreseen. • Impact on foreign direct investment: The sale of CERs will result in foreign income but it is unlikely that the projects will result in foreign investment.
		<ul style="list-style-type: none"> • Positive implication for the transfer of technology to South Africa arising from the project: the proposed project has a great implication for the transfer of the VSBK technology in all regions of South Africa where the majority of clay bricks are manufactured by clamp technology. • Impact on local skills development: Higher level of skills are required to operate the VSBKs compared to the clamps and the skills in the local areas will be developed for this purpose. • Demonstration and replication potential of the project: There are nearly 150 brick makers in RSA, operating clamp kilns. The POA could cover these brick manufacturers so there is real potential to replicate the technology.

Indicators in Support of the Project Approval Criteria

	Category	Indicator	Comment
Social	Alignment with national provincial and local development priorities	<ul style="list-style-type: none"> • 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) 	<p>Alignment with sectoral, national and local development objectives: The programme supports the initiative in South Africa to build a greener economy.</p> <p>The programme contributes and is in line with the following Air Pollution Control Legislation found in South Africa:</p> <ul style="list-style-type: none"> • Atmospheric Pollution Prevention Act, 1965 • National Environmental Management Act, 1998 • National Environmental Management: Air Quality Act 39 of 2004 • The 2007 National Framework for Air Quality Management in the Republic of South Africa
	Social equity and poverty alleviation	<ul style="list-style-type: none"> • 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 	<ul style="list-style-type: none"> • Impact on employment levels: creation of employment and business opportunities during the construction phase: It is estimated that 5,500 labour days are used to construct six shafts. Once the process and learning is optimised the labour days per shaft could reduce to between 4,000 and 4,500. If we assume an average of 4,200 labour days to construct 6 shafts we would spend 700 days per shaft multiplied by the 1272 shafts targeted, this would lead to close to 900'000 labour days over the next 10 years. • Impact on community social structures: Additional work opportunities will be created during the construction phase with positive consequences. • Impact on social heritage: None identified • Impact on provision of social amenities to the communities: None as a direct consequence of the project. As mine operators there is a positive impact through the social and labour plans • Contribution of the project to the development of previously underdeveloped areas or specially designated development nodes: No significant impact foreseen

Indicators in Support of the Project Approval Criteria		
Category	Indicator	Comment
General	General Project Acceptability <ul style="list-style-type: none"> • Are the distribution of project benefits deemed to be reasonable and fair? 	<p>The public will be able to access low energy building materials at affordable costs.</p> <p>Higher skills will result in more discretionary income in the region, thus creating demand for other services and products in the local economy</p>

Part D: Finance

Project Costs	
Development Costs (R's)	R500,000 per shaft depending on individual building cost structure and the volume of shafts constructed per phase. A typical site will consist of 18 shafts. This number will be CPA dependent
Installed Costs (R's)	R500,000 to R600,000 dependent on site specific requirements such as slopes, additional ground preparation and other construction related issues. A typical site will consist of 18 shafts.
Other Costs (R's)	There are working capital costs which will be CPA specific: <ul style="list-style-type: none"> • Depending on volume of low energy bricks required for preparation ahead of the start of the VSBK to be produced in parallel with existing operations • Training of staff to ensure that knowledge transfer is correct
Total Project Costs (R's)	Sum of the identified capital costs above plus CPA specific costs
Sources of Finance	
Equity	CPA dependent
Debt (long term)	CPA Dependent: <ul style="list-style-type: none"> • Main stream financing institutions • IDC
Debt (short term)	CPA Dependent
Amount not identified (R's)	CPA dependent
Total CDM Contribution sought	CPA Dependent. CPA1 barrier analysis is "First of its kind" as defined by Version 6 of the additionality tool
Expected Price of CER in case of a contract to purchase for: A period of 7 years A period of 10 years	The crediting period per CPA is defined as 10 years however the pricing is subject to negotiation between the CPA and the CME. Current pricing is 3.57 Euro but it is anticipated that 6-8 Euros is achievable in the short to medium term.

A period of 14 years (2x7 years)	
Indicate the projected Internal Rate of Return for the project with and without CER revenues.	Each CPA is led by their internal requirements however an industry related rate of return is subject to the prevailing market conditions. However the project is using 'First of its kind" barrier analysis for additionality
Constraints on tradability of carbon credits	No
Preliminary discussions with potential purchasers	No direct discussions have yet begun between the CPA and the CME