

# CLIMATE INVESTMENT FUNDS

CTF/TFC.6/8  
October 26, 2010

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Meeting of the CTF Trust Fund Committee  
Washington, DC  
November 12, 2010

## **SOUTH AFRICA - ESKOM RENEWABLES SUPPORT PROJECT PROJECT INFORMATION DOCUMENT (PID)**

**PROJECT INFORMATION DOCUMENT (PID)  
APPRAISAL STAGE**

Report No.: AB5916

<b>Project Name</b>	South Africa - Eskom Renewables Support Project
<b>Region</b>	AFRICA
<b>Sector</b>	Renewable energy (100%)
<b>Project ID</b>	P122329
<b>Borrower(s)</b>	ESKOM HOLDINGS LTD.
<b>Implementing Agency</b>	ESKOM HOLDINGS LTD.
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<b>Environment Category</b>	<input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD (to be determined)
<b>Date PID Prepared</b>	July 30, 2010
<b>Date of Appraisal Authorization</b>	August 10, 2010
<b>Date of Board Approval</b>	October 12, 2010

## 1. Country and Sector Background

**The GoSA has determined that national sustainable development and global climate change necessitate South Africa's transition to a low carbon economy over the long term.** It announced (and reconfirmed in a letter to UNFCCC in late January 2010) that it is ready to reduce the growth in emissions to 34 percent below current expected levels by 2020 and 42 percent by 2025, on the condition that it is provided with the necessary finance, technology and capacity building and that a legally binding climate deal is agreed. South Africa has developed and is now beginning to implement a sophisticated long-term low carbon strategy, which sets credible emissions goals and guides its long-term choices of energy sources especially renewables to stabilize and then reduce its carbon emission.

**Demand pressures arising from increased access and economic growth have been especially severe for South Africa.** GDP per unit of electricity consumed in South Africa in 2006 was only 60 percent that of the average UMIC, 40 percent of Brazil and 30 percent of Mexico; in fact, it was at par with the average low-income country. The capital- and energy-intensive nature of the economy stems from both rapid urbanization and electrification, and a mechanized manufacturing sector that requires heavy use of electric power. Mining, another energy intensive activity, also plays an important role.<sup>1</sup> South Africa is a globally leading producer of gold and platinum, and the production cycles (extraction, processing, and supply) of both are highly energy-intensive. Even in a slow GDP growth scenario, electricity demand is expected to exceed supply around 2013 (without the proposed project); thereafter a shortage of electricity will negatively impact on households, the provision of basic services, small business and industry, manufacturing and mining activities in the country.

**The Government has responded with an approach to energy security which is underpinned by the long-term need for low carbon growth.** The approach includes: (a) accelerating improvements in energy efficiency, investing in clean energy, and pursuing regulatory and economic instruments to stabilize greenhouse gas emissions over the medium term and to reduce them over the long term, as envisaged in the GoSA's low-carbon strategy; (b) assigning priority in the near term to increasing generation capacity and reliability of electricity; and (c) priority development of renewable resources

<sup>1</sup> Mining constitutes only 7 percent of GDP, but plays a much more significant role through its contribution of intermediate goods for the next stage of production.

**The GoSA's near-term crisis response primarily focuses on four areas:** (i) accelerating an energy efficiency program which targets low-cost high-impact interventions including solar water heaters, compact fluorescent lamps (CFLs) and demand side management options, such as ripple control of appliances; (ii) increasing generation capacity by adding new short-term, high-cost capacity, re-commissioning old plants that have been taken out of service and financing Eskom's aggressive "New Build" program entailing significant addition to generation capacity; (iii) improving Eskom's operating practices to increase supply-side reliability; (iv) designing a legal and regulatory framework to attract private sector investment in generation, with a focus on renewable and low carbon activities and (v) Immediate development of renewable resources for demonstration of the viability of these technologies and address the technological and institutional barriers to the development of wind and CSP projects. .

**The greatest potential for large renewable projects is for CSP and to a lesser extent wind; new hydropower potential is largely non-existent.** CSP has the potential for substantial scaling-up, and matches most closely with the need for baseload power. However, the technology has not yet reached the gigawatt scale (to meet the large baseload capacity requirements of South Africa), and is currently costly, with significant risks for a country facing a demand-supply imbalance and the incremental costs of meeting the new generation needs, estimated at billions of dollars. Wind energy is a commercially mature renewable energy technology, but remains underexploited in South Africa and because it is intermittent, is not well-suited to meet baseload requirements. Current estimates of wind power potential are in the range of 4,000 MW along the East and West coasts of South Africa.

While pre-2020 generation investments are likely to be along the base case scenario including feasible renewable capacity, it is possible to shift the post-2020 investments to align with alternative case scenario with more hydro and hence further lower CO<sub>2</sub> intensity of SAPP. The picture in 2025 therefore could look different with larger share of hydro in the mix. The SAPP region has one of the largest hydropower potential in the continent in DRC (estimated at 40,000 MW). The region also has solar energy potential. South Africa has the fifth largest reserves of world's uranium. Gas reserves are limited, but Botswana has large estimated reserves of CBM (about 190 TCF). Therefore, it is expected that the share of traditional fossil fuels in the energy mix would decline over time in preference for low carbon and renewable energy.

## **2. Objectives**

The Project Development Objective (PDO) is to facilitate the accelerated development of large scale renewable energy capacity in support of the long-term carbon mitigation strategy of South Africa.

The outcomes of the Project would be measured by the following indicators:

- (a) Increased renewable energy supply;
- (b) CTF Leveraged financial investment in renewable projects; and
- (c) Direct GHG emissions avoided.

## **3. Rationale for Bank Involvement**

The proposed project would strongly support immediate interventions on mitigation of climate change through opening up the renewable sector. The proposed CTF co-financed CSP plant would be a flagship; it would establish cost and performance benchmarks for the broader deployment of CSP technology in the country and potentially in the sub-region. The replication potential is significant. However, currently CSP has a levelized cost of electricity two to three times that of supercritical coal-fired power plants and very limited operational experience at scale. The Eskom plant would help buy down costs and risks for subsequent IPPs, interested in entering the sector thanks to South Africa's attractive renewable energy feed-in tariffs, but constrained by uncertainties related to cost and risks. Similarly, the strong potential for scaling-up to utility-scale wind power faces major barriers such as high costs relative to coal-fired production, inability to provide baseload power due to output intermittency, and incremental transmission costs to connect isolated wind power sites to the grid. In the absence of the MDB and CTF support, the current economic crisis will further delay the implementation of the renewable energy projects.

The project will thus ensure that South Africa’s success to date in leading the sub-regional leadership in support of a low carbon and pro-poor energy sector is not derailed. Further as a leader on the continent, South Africa would help demonstrate the viability of large scale renewable generation, thus driving the renewable industry and the private sector towards future investment on the continent.

The Bank intends to continue a process of constructive engagement with Eskom and South Africa, both as a part of this Project and beyond as a part of the Country Partnership Strategy to support South Africa’s move to low carbon economy.

#### 4. Description

The project comprises two components which will be implemented by Eskom:

(i) **Sere Wind Farm (100 MW):** Wind is a commercially mature renewable energy technology but at present there is no significant energy generated by wind in South Africa. The Western Cape Province Wind Energy Facility located 300 km north of Cape Town near the town of Vredendal, has the technical potential to accommodate up to 200 MW of wind capacity. A priority activity for this subsector is development of Phase I of this wind site – the Sere Wind Power Project, consisting of a 100 MW wind farm comprising forty to fifty 1.5 to 3.0 MW wind turbines sized for moderate to low wind regime. The project is fully scoped and specified. The site has a “moderate” wind resource; based on measurements completed to date at the site, it is expected that the plant will have a load factor of 25 percent. The site is about 40-kms from the 132-kV sub-transmission line.

(ii) **Upington CSP (100 MW):** CSP is the renewable energy source with the largest potential in South Africa. Grid-connected solar thermal power can provide large volumes of firm generation capacity, comparable to that provided by coal-fired power plants. However, in addition to being more costly, the initial CSP plants will have higher risk than a coal-fired power plant. The design provided by Eskom for the Upington Concentrating Solar Power (CSP) plant is a tower and mirror design configured to operate as a baseload unit. Utilizing molten salt as a thermal circulating fluid and storage medium would allow the plant to achieve a 60-65 percent annual load factor with a rated capacity of 100 MWe. The capital cost of the project is estimated at about R5 billion; equivalent US\$600 million, excluding contingencies. Given the uncertainties around the technology, and the need to incorporate the latest technological developments based on global experience in the plant design, contingent financing of about US\$150 million has been included in the financing plan.

#### 5. Financing

<u>Source:</u>	<u>(\$m)</u>
Borrower	88.985
International Bank for Reconstruction and Development	260.00
African Development Bank	260.00
Clean Technology Fund - IBRD	250.00
Clean Technology Fund - AfDB	100.00
Other Lenders	270.00
<b>Total</b>	<b>1,228.985</b>

## **6. Implementation**

Eskom, a wholly-owned government entity, will be solely responsible for implementation of all components of the project and the sole beneficiary of the loan, which will be guaranteed by the Government.

Component 1 – The Sere Wind Power Project: The proposed project has been developed by the Project Development Department (PDD) within Eskom Enterprises. The Capital Expansion Department (CED) will be responsible for the complete procurement phase. The process for every contract that needs to be procured will be led by a dedicated staff. Upon completion of the procurement phase (signing of a specific construction/supply & install contract), the contract will be handed over to a project manager under CED for construction supervision and management. Operation of the power plant will be undertaken under a proposed new “Wind” department in the Generation Business Unit responsible for peaking plants.

Component 2 – The Upington CSP Project: This sub-component will be implemented in two phases. The first phase will involve review of preparatory work already carried out by Eskom, including the project concept and preliminary design. This phase will be managed by Corporate Services. The second phase will involve procurement and construction supervision and management. In the second phase, the CED will be responsible for the complete procurement process. The process for every contract that needs to be procured will be led by a dedicated staff. Upon completion of the procurement phase (signing of a specific construction/supply & install contract), the contract will be handed over to a project manager under CED for construction supervision and management. Operation of the power plant will be undertaken under a proposed new “Solar” department in the Generation Business Unit responsible for peaking plants. Eskom may consider procuring the plant through the EPC or DBOT contract using a two-stage procedure.

Eskom has indicated that since Upington CSP is a pilot project to develop the long-term CSP potential in South Africa, Corporate Services will continue to be involved throughout the project’s implementation as well as during operation.

## **7. Sustainability**

The proposed project is critical for developing South Africa’s renewable energy program, a key component of the government’s low carbon strategy. The following sections provide a sound basis for sustainability of the Wind and Solar projects proposed for CTF financing:

(b) The project is consistent with the South African low carbon strategy and its global strategy of supporting climate change mitigation, which defines the path of the energy sector for a low carbon economy. To this extent, the project supports Eskom’s development of the first CSP and the wind project, thereby opening up renewables development in South Africa and the sub-region. Replication of these two projects will be supported by South Africa’s Renewable Energy Feed-In Tariff, which provides IPPs with attractive incentives for investments in CSP and wind; the GoSA’s fiscal measures (such as carbon taxes) and focus on local manufacture of clean energy technologies; and South Africa’s substantial investment in renewable energy R&D, with a view to improving operational performance and reliability;

(c) Even though there have been delays in the implementation of sector reforms, especially those targeted at full cost recovery through tariffs over the medium term, significant new policy changes have been put in place by DoE, such as the EPP and the new regulations providing the enabling framework for private investment in power generation. This continued strong ownership of sector reforms and commitment to Eskom by the GoSA is the foundation for continued sustainability. Eskom’s long-term sustainability is dependent upon the MYPD3 request in 2013. As noted earlier, NERSA has a positive track record and has already approved two multi-year tariff increases, thereby moving the tariff trajectory towards full price recovery.

(d) The GoSA has provided continuous support for Eskom's investment program. The current loan of R60 billion (about 70 percent already disbursed) and the GoSA guarantee facility of R176 billion in support of the Eskom's borrowings is a strong testament to the GoSA's full support for improving Eskom's financial sustainability.

(e) The project will be fully financed by CTF, bilateral, multilaterals and Eskom. The long term and low cost financing from these institutions, especially CTF, will bring down the cost of generation to acceptable levels.

## **8. Lessons Learned from Past Operations in the Country/Sector**

The proposed operation is the first CTF investment in South Africa. Eskom Investment Support Project, the first energy operation in South Africa in recent times, was approved by the board in April 2010, and hence there is limited experience on past projects in the country. Some generic lessons learnt from the Bank's experience with MICs have been used to ensure sound project design and concept.

*Comprehensive Policy Framework is necessary for Private Investment:* To encourage the private sector, an explicit and comprehensive policy framework is required. Such policies have been put in place in South Africa, including providing feed-in tariffs for renewable energy sources, which will over the medium term lead to a substantial increase in private sector participation especially in generation and energy efficiency. These policy initiatives are part of the sector enabling environment being created in parallel with the proposed investment operation.

*Effective Enabling Sector Regulatory Environment is essential for Public and Private Investment:* While the sector and especially Eskom have generally performed well until recently, the new challenges of quickly increasing generation capacity in a low tariff environment required a change in the overall sector policy framework. To achieve this objective, the GoSA has issued, along with a number of other policy measures, the EPP, which mandates a move to full cost recovery over a five-year horizon and provides the overarching framework for NERSA. In addition, NERSA has announced generous Feed-in-Tariffs for renewable energy projects and the Department of Energy is developing a model Power Purchase Agreement for enabling private renewable energy projects. These policies are expected to provide comfort to commercial lenders for large investment projects.

*Planning for Low carbon Growth Trajectory should be undertaken:* Experience has been that a move to lower-carbon growth requires deliberate and tangible actions to ensure the introduction of low carbon technologies. South Africa's leadership in developing long-term mitigation scenarios which are guiding its low-carbon strategy. The project design supports investment in new technologies as well as energy efficiency.

## 9. Safeguard Policies (including public consultation)

WBG Safeguard Policies Triggered by the Project	Yes	No	OP/BP 4.00
<a href="#">Environmental Assessment</a> (OP/BP 4.01)	<input type="checkbox"/>	<input type="checkbox"/>	[X]
Natural Habitats (OP/BP 4.04)	<input type="checkbox"/>	<input type="checkbox"/>	[X]
Pest Management (OP 4.09)	<input type="checkbox"/>	[X]	<input type="checkbox"/>
Physical Cultural Resources (OP/BP 4.11)	<input type="checkbox"/>	<input type="checkbox"/>	[X]
Involuntary Resettlement (OP/BP 4.12)	<input type="checkbox"/>	<input type="checkbox"/>	[X]
Indigenous Peoples (OP/BP 4.10)	<input type="checkbox"/>	[X]	<input type="checkbox"/>
Forests (OP/BP 4.36)	<input type="checkbox"/>	[X]	<input type="checkbox"/>
Safety of Dams (OP/BP 4.37)	<input type="checkbox"/>	[X]	<input type="checkbox"/>
Projects in Disputed Areas (OP/BP 7.60)*	<input type="checkbox"/>	[X]	not eligible for piloting under 4.00
Projects on International Waterways (OP/BP 7.50)	<input type="checkbox"/>	[X]	not eligible for piloting under 4.00

In accordance with the SDR, Environmental Assessment, Natural Habitats, Physical Cultural Resources, and Involuntary Resettlement will be handled under country systems, as provided for in OP 4.00 Piloting the Use of Borrower Systems to Address Environmental and Social Safeguards Issues in Bank-Supported Projects.

\* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas.

## 10. List of Factual Technical Documents

- (a) Assessing the macro-economic impact of Eskom's expenditure on the South African economy, Eskom/BER/CITI, 2008
- (b) CSP Information Document, Eskom 2009
- (c) CTF Investment Plan, November 2009
- (d) Deloitte Report on Eskom Electricity Sector, 2008
- (e) Electricity Pricing Policy, 2008
- (f) Expert Panel Report on Project Consistency with Development and Climate Change Strategic Framework – January 2010
- (g) Long Term Mitigation Scenario, Strategic Options for South Africa – Department of Environmental Affairs – South Africa, October 2007
- (h) Safeguards Diagnostic Review – World Bank – January 2010
- (i) South Africa Electrification Program – Electrification Statistics, 2009

## 11. Contact point

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