Document of
The World Bank

FOR OFFICIAL USE ONLY

Report No: 64634-ZA

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

FROM THE CLEAN TECHNOLOGY FUND

IN THE AMOUNT OF US$250 MILLION

TO

ESKOM HOLDINGS SOC LIMITED

GUARANTEED BY REPUBLIC OF SOUTH AFRICA

FOR THE

ESKOM RENEWABLES SUPPORT PROJECT

October 3, 2011

Energy Group
Sustainable Development Department
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate estimated as of July 1, 2011)

Currency Unit = Rand
Rand 7.00 = US$1

FISCAL YEAR

April 1 – March 31

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
AFD	Agence Française de Développement
AQA	Air Quality Act of 2004
AMEU	Association of Municipal Electricity Undertakings
ASGI	Accelerated Share Growth Initiative
BBEE	Broad Based Black Economic Empowerment
BEE	Black Economic Empowerment
BER	Bureau of Economic Research
BID	Background Information Document
BOP	Balance of Payments
CAGR	Compound Annual Growth Rate
CAS	Country Assistance Strategy
CBM	Coal Bed Methane
CCS	Carbon Capture and Sequestration
CDM	Clean Development Mechanism
CEC	Committee for Environmental Coordination
CED	Capital Expansion Department
CEO	Chief Executive Officer
CFAA	Country Financial Accountability Assessment
CFLs	Compact Fluorescent Lamps
COO	Chief Operating Officer
CPAR	Country Procurement Assessment Review
CPIA	Country Policy and Institutional Assessment
CPI	Consumer Price Index
CPS	Country Partnership Strategy
CPF	Carbon Partnership Facility
CSDP	Competitive Supplier Development Program
CSP	Concentrating Solar Power
CTA	Coal Transport Agreement
CTF	Clean Technology Fund
CTL	Coal-to-Liquid
DA	Disbursement Account
DEAT	Department of Environment and Tourism
DBSA	Development Bank of Southern Africa
DCCSF	Development and Climate Change Strategic Framework
DMEDNA	Department of Minerals and Energy Designated National Authority
DNA	Designated National Authority
DNI	Direct Normal Isolation
DPE	Department of Public Enterprises
DSM	Demand Side Management
DST	Department of Science and Technology
DoE	Department of Energy
DEA	Department of Environmental Affairs
DWAF	Department of Water Affairs
EA	Environmental Assessment
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
ECA	Environmental Conservation Act
ECAs	Export Credit Agencies
EDI	Electricity Distribution Industry Holdings
EDPL	Electricity Sector Development Policy Loan
EE	Energy Efficiency
EGEAS	Electric Generation Expansion Analysis System
EGF	Electrical Generation Facilities
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
EISP	Eskom Investment Support Project
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ENPV	Economic Net Present Value
EPP	Electricity Pricing Policy
ERR	Economic Rate of Return
EU	European Union
FBE	Free Basic Electricity
F&C	Fraud and Corruption
FDI	Foreign Direct Investment
FBE	Free Basic Electricity
FGD	Flue Gas Desulphurization
FIRR	Financial Interest Rate of Return
FM	Financial Management
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GNP	Gross National Product
GNI	Gross National Income
GoSA	Government of South Africa
IBRD	International Bank for Reconstruction and Development (Bank)
ICR	Implementation & Completion Results Report
ICB	International Competitive Bidding
IEP	Integrated Energy Planning
IFC	International Finance Corporation
IFI	International Financing Institutions

IFR	Interim Financial Reports
IMF	International Monetary Fund
IP	Investment Plan
IPFA	Institute for Public Finance and Auditing
IPP	Independent Power Producer
IRP	Integrated Resource Planning
ISEP	Integrated Strategic Electricity Plan
KfW	Kreditanstalt für Wiederaufbau
JSAN	Joint Staff Advisory Note
LDP	Letter of Development Policy
LNG	Liquid Natural Gas
LRMC	Long Run Marginal Cost
LTMS	Long Term Mitigation Strategy/Scenario
MDGs	Millennium Development Goals
MEU	Municipal Electric Utilities
MFMA	Municipal Finance Management Act of 2004
MIC	Middle Income Countries
MoE	Ministry of Education
MoF	Ministry of Finance
MoH	Ministry of Health
MPC	Monetary Policy Commission (SARB)
MTEF	Medium-Term Expenditure Framework
MTPPP	Medium Term Power Purchase Program
MYPD	Multi Year Price Determination
NCB	National Competitive Bidding
NEDLAC	National Economic Development and Labor Council
NEEA	National Energy Efficiency Agency
NEMA	National Environment Management Act 1998
NEPAD	New Partnership for Africa's Development
NERSA	National Energy Regulator of South Africa
NERT	National Electricity Response Team
NGL	National Gas Liquids
NIPP	National Industrial Participation Program
NIRP	National Integrated Resource Plan
NPV	Net Present Value
NT	National Treasury
OCGT	Open Cycle Gas Turbine
OHSP	Occupational Health and Safety Management Plan
PDD	Project Development Department
PEFA	Public Financial Management Assessment
PFM	Public Financial Management
PFMA	Public Financial Management Act
PMI	Purchasing Managers Index
PPA	Power Purchase Agreement
PPIAF	Public Private Infrastructure Advisory Facility
RAP	Resettlement Action Plan
RE	Renewable Energy
RED	Regional Energy Distribution/Distributor
REFIT	Renewable Feed-in Tariff
REMT	Renewable Energy Market Transformation Project
RoA	Return on Assets
RoCE	Return on Capital Employed
ROD	Record of Decision
RoE	Return on Equity
ROSC	Report on the Observance of Standards and Codes
RPF	Resettlement Policy Framework
SAAQIS	South African Air Quality Information System
SACU	Southern Africa Customs Union
SADC	Southern Africa Development Community
SANS	South Africa National Standards
SAPP	Southern African Power Pool
SARB	South African Reserve Bank
SARS	South African Revenue Service
SBD	Standard Bidding Document
SDR	Safeguards Diagnostic Review
SEA	Strategic Environmental Assessment
SD&I	Supply, Design & Install
SIL	Specific Investment Loan
SOC	State Owned Company
SME	Small and Medium Enterprise
SSA	Sub-Saharan Africa
TFA	Transnet Freight Rail
UCG	Underground Coal Gasification
UCSP	Upington Concentrating Solar Power plant
UNFCC	United Nations Framework Convention on Climate Change
UMIC	Upper Middle Income Countries
WM	Waste Management
WBG	World Bank Group
WTP	Willingness To Pay
WPP	Wind Power Plant

Vice President:	Obiageli Katryn Ezekwesili
Country Director:	Ruth Kagia
Sector Director:	Jamal Saghir
Sector Manager:	Lucio Monari
Task Team Leader:	Reynold Duncan

SOUTH AFRICA

ESKOM RENEWABLES SUPPORT PROJECT

CONTENTS

Page

SOUTH AFRICA

ESKOM RENEWABLES SUPPORT PROJECT

PROJECT APPRAISAL DOCUMENT

AFRICA

AFTEG

Date: September 22, 2011	Team Leader: Reynold Duncan
Country Director: Ruth Kagia	Sectors: Power (100%)
Sector Manager/Director: Lucio Monari/ Jamal Saghir	Themes: Climate change (100%)
	Environmental category: Full Assessment (A)
Project ID: P122329	Joint IFC: No
Lending Instrument: CTF Loan	Joint Level: N/A

Project Financing Data

[X] Loan [ ] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:

Total CTF financing (US$ million): 250.00

Proposed terms: A US Dollar Loan for a maturity of 40 years, 5-year disbursement period, 10 years Grace with a service charge of 0.25 percent per annum on disbursed amounts and a one-time management fee 0.25 percent of the Loan Amount.

Project Financing Plan (US$m)

Source	Local	Foreign	Total
Borrower	41.78	0.00	41.78
International Bank for Reconstruction and Development	143.00	117.00	260.00
Clean Technology Fund (IBRD)	137.50	112.50	250.00
Clean Technology Fund (AfDB)	55.00	45.00	100.00
Other Bilateral and Commercial Lenders	150.00	750.00	900.00
Total:	**527.28**	**1024.50**	**1,551.78**

Guarantor:	**Borrower:**
The National Treasury and the Department of Public Enterprises, Government of South Africa 1090 Infotech Building, Arcadia Street, Hatfield, Pretoria, South Africa Fax: +27 12 323 3263	Eskom Holdings SOC Limited Megawatt Park, Maxwell Drive, Sunninghill, Sandton, South Africa Email: eskom.funding@eskom.co.za Tel: +27 11 800 2901

Projected Disbursements	**FY12**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**
Annual (US$ million)	05.0	37.0	70.0	105.0	33.0	0.0
Cumulative (US$ million)	5.0	42.0	112.0	217.0	250.0	250.0

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD I.C.***	[ ]Yes [X] No
Does the project require any exceptions from the Bank policies? ***Ref. PAD IV.G.*** Have these been approved by the Bank management? Is approval for any policy exception sought from the Bank Board?	[X]Yes [ ] No [X]Yes [ ] No [X]Yes [ ] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD III.E.***	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD IV.G.***	[X]Yes [ ] No

Project development objective ***Ref. PAD II.C., Technical Annex 3***

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

Project description ***Ref. PAD II.D., Technical Annex 5***

CTF support of US$250 million for financing investments in renewable energy, comprising Sere Wind and Upington Concentrating Solar power plants. The allocations are US$50 million and US$200 million respectively.

As per the request from the Borrower, Eskom Holding, an allocation for US$ 0.625 million has been made to finance the US$ 0.625 million Management Fee associated with the CTF Loan.

Which of the Bank's safeguard policies are triggered, if any? ***Ref. PAD IV.F., Technical Annex 10***

The following safeguard policies are triggered: Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04), Physical Cultural Resources (OP 4.11) and Involuntary Resettlement (OP 4.12). These safeguard policies are being addressed through OP/BP 4.00, Piloting the Use of Borrower Systems to address environmental and social safeguard issues in Bank supported projects. In line with OP 4.00, a Safeguards Diagnostic Review (SDR) has been prepared. The SDR has been disclosed consistent with Bank policies for disclosure for this Category A project. In keeping with best practice, all Environmental Impact Assessments (EIAs) and Environmental Management Plans (EMPs) for the project, which have already been disclosed to meet requirements in-country, have also been disclosed via the Infoshop.

Significant, non-standard conditions, if any, for: ***Ref. PAD III.F.***

Board presentation: October 27, 2011
Loan/credit effectiveness: December 20, 2011
Closing date: December 31, 2016

Conditions for Effectiveness of the Loans:

(a) Standard Conditions;

(b) Execution and delivery of the Guarantee Agreement;

Conditions of Disbursement:

(a) For payments under Category (2), the co-financing agreements for the financing of Part B of the Project have been executed and delivered and all conditions precedent to the effectiveness of each such co-financing agreement or to the right of the Borrower to make withdrawals under it

have been fulfilled.

CTF Loan Covenants:

Anti-Corruption

The Borrower shall ensure that the Project is carried out in accordance with the provisions of the Anti Corruption Guidelines.

Environmental and Social Safeguards

1. The Borrower shall implement the Project in accordance with the provisions of the Environmental Legislation, the Social Legislation, the EIA, the EMP, the RPF, the RAPs, if any RAPs are required in accordance with the RPF, and the provisions of the Loan Agreement.
2. The Borrower shall refrain from carrying out any activity under the Project that would result in the involuntary resettlement of any person or group of persons residing in the selected site for each of the Borrower's UCSP and *Sere* Wind Power projects; provided, however, that if such involuntary resettlement would be unavoidable, then the Borrower shall implement such Project activities in accordance with the provisions of the RPF, including the preparation, adoption and implementation of one or more RAPs as appropriate, all in accordance with the provisions of the Social Legislation as described in the SDR, including without limitation, consultation with potentially Displaced Persons and disclosure of the RAPs.
3. Not later than one year after completion of the implementation of a RAP, the Borrower shall cause an audit to be conducted by an independent qualified resettlement expert to monitor the outcomes of the RAP, including a survey and consultation with Displaced Persons, and which audit shall also define any necessary action to address any shortcomings in the implementation of said RAP.

CTF Guarantee Agreement Covenants

(a) ensure that the Borrower implements the Project in compliance with the requirements of the Environmental Legislation and applicable mitigation measures deemed necessary by the EIA, the RPF and/ or the RAP*;*

(b) provide a copy of the draft final EMF to and afford an opportunity to the Bank to provide a feedback to the Guarantor on the said EMF in connection with the financing of the Project and the environmental and social management of the Project and associated infrastructures *;*

(c) adopt the EMF and cause all concerned parties to implement on a timely basis the environmental management and mitigation measures adopted through the said EMF; and

(d) inform the Bank of, and consult with the Bank on, any proposal to modify the Environmental Legislation and/or the Social Legislation; and if in the opinion of the Bank, the application of any aspects of such proposal would result in adverse environmental or social impacts under the Project, to cause the Borrower to carry out the Project in accordance with the provisions of the SDR or such other environmental and social guidelines as shall have been determined by the Borrower and agreed to in writing by the Bank.

I. STRATEGIC CONTEXT AND RATIONALE

A. Country and sector issues

Country Context

1. South Africa's smooth and peaceful political transition to constitutional democracy along a negotiated path of reconciliation has been one of the most remarkable political achievements of our time. Efforts to build a free, diverse, non-racial, and economically stronger nation have produced impressive results although many challenges still remain. A sustained record of macroeconomic prudence and a supportive global environment enabled South Africa's GDP to grow at a reasonable pace in the 10 years up to 2008. The country has also made notable strides in expanding access to basic services such as education, health, electricity, housing, water and sanitation. South Africa has now become the regional economic powerhouse, and its progress has led to similar gains in many of its neighboring countries. The country's economic dominance has provided it a natural leadership role on the African continent, a mantle it has worn with responsibility.[1] Notably, South Africa is a leader in Africa's dialogue and participated in the formulation of the Copenhagen Accord, and has listed its intended mitigation measures in the developing countries actions schedule.

2. At the same time, the benefits of growth have bypassed major segments of the population largely because of a disappointing record on job creation, perpetuating South Africa's record on inequality and exclusion. These challenges are central to the GoSA priorities. An important reason has been that the legacy and social structures of apartheid have proven troublingly long-lasting, even though their legal foundations are no longer in place. Many are now finding it difficult to break through the segmented structure of the economy because of very limited opportunities under the old regime to accumulate capital in any form (land, financial, skills, education, or social networks) so necessary for enterprise. Post apartheid governments have significantly expanded access to basic services, but the quality and reliability of that access has proven very uneven. Despite noticeable gains in poverty reduction,[2] pockets of poverty remain deeply entrenched mostly among the black population, whose median income is just 8 percent of the median white South African. As a result, South Africa is a dual economy with one of the highest inequality rates in the world, where the impoverished living conditions of a large proportion of the black population coexist with the "first-world" lifestyle of a segment of the multi-racial population.

3. **Economic performance has significantly improved since the mid-1990s.** In the period leading up to 1994, the economy, crippled by external sanctions and policy distortions, was characterized by low growth, high inflation, and ballooning public debt. Economic performance has since improved markedly, underpinned by macroeconomic stabilization, firmer control of inflation through the monetary policy of inflation-targeting, and impressive fiscal consolidation, thus ensuring sustainability of public sector finances. GDP growth improved from an annual average of 1 percent in the decade preceding 1994 to 2.8 percent during 1994-98 and 4 percent during 1999-08, resulting in a 45 percent increase in GDP (in constant local currency units) in the latter period. This took South Africa's per-capita gross national income (GNI) to just under US$6,000 in 2009, further consolidating its position in the ranks of Upper Middle-Income Countries (UMIC).

4. Macroeconomic stabilization contributed to the impressive turnaround in economic performance. Improvements in the quality of public budget management played an especially important role. Fiscal balances consistently improved, eventually turning into a small budget surplus

[1] South Africa is one of the driving forces behind the New Partnership for African Development (NEPAD) and the African Peer Review Mechanism, and an anchor of other key regional partnerships (African Union, SADC, and SACU). Internationally, it is a leading developing country participant in most multilateral fora, and was the chair of the G-20 in 2007.

[2] The poverty rate fell from 58 percent to 48 percent between 2000 and 2005, as per the "Towards an Anti-Poverty Strategy for South Africa," by the Office of the President, South Africa, October 2008.

for the first time in FY2006/2007 and FY2007/08, causing central government gross debt to fall from 48.3 percent of GDP in FY1994/95 to 27.1 percent in FY2008/09[3]. At the heart of the fiscal achievements were dramatic improvements in revenue collection resulting from a more efficient South African Revenue Service (SARS).[4] Exemplary expenditure management also proved important. The 2010 Open Budget Index prepared by the International Budget Partnership ranked South Africa first among 94 countries surveyed, ahead of New Zealand, the United Kingdom, France, and the United States.[5,6] Acknowledgement of this record by global investors has enabled the country to tap into international bond markets with reasonable sovereign risk spreads. The high level of development of South Africa's own financial markets has further ensured ready access to domestic capital at competitive rates[7].

5. **Notwithstanding these achievements, several critical challenges remain**. **Employment creation, in particular, has been a major disappointment**, preventing more meaningful poverty and social gains during periods of reasonable growth. The unemployment rate stands at 24 percent, or 32.4 percent counting the category of "discouraged" workers—which is among the highest in the world.[8] The capital and energy intensive nature of industrial production, unequal land distribution, and vast spatial barriers erected by the so-called "geography of apartheid," have made progress on job creation vastly insufficient.[9] Human development challenges continue to loom large, with discouraging reversals in the mortality indicators. The massive increases in social and capital expenditures have clearly benefited large numbers of previously disadvantaged people. However, the economic and social impact of these expenditures has not been commensurate. To address this issue, the Government has implemented Medium Term Strategic Framework, an outcomes-based approach to planning, focused on achieving 12 identified outcomes arising from priorities in education, health, crime, rural development and job creation.

6. **South Africa is vulnerable to climate change.** It already negatively impacts human health, agricultural production, plant and animal biodiversity, water resources, rangelands, human settlements, infrastructure and disaster management capacity in the country**.** South Africa itself contributes over one percent of global CO_2 emission, higher than its share of the global population and economy. This reflects the fact that the emissions intensity (tonnes of CO_2 per capita per annum) is high compared to major developing and developed countries, higher than China and India, which are also considered coal-based energy economies, and Brazil.[10]

The Government's Response

7. **The Government is fully aware of the critical importance of employment creation, and improving the quality of service delivery.** Long-term development challenges, especially the country's vulnerability to climate change, have also become policy priorities. A relatively fast recovery from the current economic slowdown, followed by a sustained period of GDP growth in the range of at least 5 percent (the average rate during 2004-08), is a prerequisite to meaningful progress in reducing unemployment and continuing social development.

[3] On account of the countercyclical fiscal response to the recent economic downturn, the budget deficit increased to 6.9 percent and 5.4 percent for FY2009/10 and FY2010/11. The debt ratio climbed back up to 33 percent in FY2009/10, increase to 37.1 percent in FY2010/11 and is projected to peak at 43.1 percent in FY2013/14. As the economy recovers, increased revenue collection and a slowdown in fiscal expenditures will assure fiscal and debt sustainability over the medium term.
[4] Revenue collection quadrupled and the number of taxpayers more than doubled between 1996 and 2006.
[5] These five were the only countries in the 2008 Open Budget Survey that provided "extensive budget information."
[6] South Africa was commended by the report for the independence of its supreme audit institution, and also fared well in terms of legislative strength.
[7] According to the Global Competitiveness Report, South Africa ranks 9 in financial market development.
[8] Unemployment is concentrated mostly among the youth (with close to 50 percent of the youth labor force currently unemployed), blacks, and those who are unskilled.
[9] The "geography of apartheid" forced black people during the apartheid years to split up between urban townships far from city centers and the place of work, on the one hand, and barren rural "homelands" with no agricultural potential, on the other.
[10] Higher than Brazil only if emissions from land use changes are excluded.

8. **The GoSA has also 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 to stabilize and then reduce its carbon emission.

9. **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.[11] 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, in the absence of rapid addition of new supply, electricity demand would be expected to exceed supply around 2013; 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.

10. **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; and (b) assigning priority in the near term to increasing generation capacity and reliability of electricity.

11. **The GoSA's response primarily focuses on four areas**: (i) accelerating industrial, as well as residential, energy efficiency programs that include low-cost high-impact interventions such as solar water heaters, use of compact fluorescent lamps (CFLs) and demand side management options; (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 and inclusion of renewable sources to the energy mix; (iii) improving Eskom's operating practices to increase supply-side reliability; and (iv) designing a legal and regulatory framework to attract private sector investment in generation, with a focus on renewable and low carbon activities.

12. For the longer term, GoSA's policy response accounts for coal being dominant in the generation mix, but with its share declining over the next twenty years to approximately 65 percent from the current level of about 87 percent. Coal is abundantly available to South Africa for large-scale power generation, especially considering the country's need to add over 9,250 MW over the next 5 years after taking into account energy conservation measures. South Africa is the world's fifth largest producer of coal with recoverable reserves of 49 billion tons, the sixth largest in the world. The costs generally associated with extraction of this high-quality and reasonably low-sulfur content coals are modest. The country has insignificant deposits of oil or natural gas.

13. **The greatest potential for large grid connected renewable energy projects is limited to Concentrating Solar Power (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. According to the IRP2, South Africa expects to add at least 600MW of

[11] 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.

new solar capacity by 2019. 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 8,400 MW along the East and West coasts of South Africa.

14. **There are no feasible near-term regional renewable energy alternatives to meet the demand in South Africa.** There is a severe shortage of generation capacity in the sub-region. South Africa is part of Southern African Power Pool (SAPP), which includes twelve countries of the sub-region, nine of which are interconnected. All twelve countries in SAPP have been experiencing energy shortages, some more than the others, with shortages in South Africa being a primary cause. While coal-based power continues to be significant due to the region's abundant reserves, the contemplated expansion plan reduces SAPP's CO_2 intensity through a gradual introduction of low carbon initiatives. This is achieved by a combination of increased share of hydropower plants and improved efficiency of coal power plants through infusion of new and better technologies.

15. While pre-2020 generation investments are likely to be along the base case scenario, it is possible to shift the post-2020 investments to align with alternative case scenario with more hydro and hence further lower CO_2 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 on the continent, DRC (estimated at 40,000 MW) having the largest. The region also has significant solar energy potential. South Africa has the fifth largest reserves of world's uranium. Gas reserves are available in Namibia and Angola. Botswana has large estimated reserves of Coal Bed Methane (CBM) of 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. The Integrated Resource Plan 2 (IRP2) approved in March 2011 estimates that close to 45 percent of new capacity over the next 20 years will come from renewable sources and shall constitute about 19 percent of total supply.

16. **The GoSA realizes that continued reliance only on coal-based energy is not a long-term option**. In a significant move, the Long Term Mitigation Scenarios (LTMS) endorsed by the Cabinet envisage a shift away from coal toward renewable energy and nuclear, with a view to ensuring that the carbon emissions from all sources, including electricity generation, peak during 2020-2025, and then begin declining thereafter. The LTMS, one of the first in the developing world, has been a pioneering effort that combines high-quality research-based scenarios with extensive stakeholder consultation. It recommends climate change mitigation options in industrial energy efficiency, renewable energy and nuclear generation.

Box 1: South Africa's Long Term Mitigation Scenarios

The scenarios are based on Marginal Abatement Curves built up from specific projects and programs to reduce GHGs. Energy Efficiency and Demand Side Management Programs are the first steps towards implementing the low carbon strategy. Recognizing the global challenge from climate change impacts, the Government prepared five scenarios designed to decrease GHG emissions.

• a "Growth Without Constraints" scenario, with no GHG constraints, so as to set a baseline representing outcomes from unrestricted emissions ("business as usual" scenario);
• a "Required by Science" scenario, to help the world fully meet the global warming challenges by decreasing GHG emissions in the 60-80 percent range. This scenario assumes that there are no resource constraints and thus establishes what is considered to be the lower bound GHG emission trajectory; **[endorsed by Cabinet in July 2008]**
• a "Start Now" development trajectory, in which the public sector invests in alternatives that have important co-benefits, such as EE/DSM, renewable energy and nuclear power;
• a "Scale-up" scenario, which builds on the "Start Now" scenario through regulatory interventions, extending EE/DSM, renewable energy, and nuclear power interventions into more costly options; and
• a "Use the Market" scenario, which is designed to implement a radical shift in lowering carbon emissions, by implementing a carbon tax.

The detailed implementation plan would, among others, include energy efficiency, more efficient fossil-fueled power plants, electricity demand side management and renewable energy. The GoSA has also established a Designated National Authority (DNA) to support projects under the Clean Development Mechanism (CDM) of the United Nations Kyoto Protocol. The DNA has to date approved 19 projects ranging from energy efficiency and small hydro projects to cogeneration from the sugar and ferrochrome industries.

17. **The LTMS is the basis of the GoSA's mitigation strategy**. This includes: (a) implementing the "Start Now" strategic option focusing on accelerated energy efficiency and conservation across all sectors, especially industrial, commercial, transport and residential; (b) investing in credible carbon-friendly technology research and development, new clean energy resources, and behavioral change; and (c) pursuing regulatory mechanisms contained in the "Scale-Up" scenario together with economic instruments from the "Use the Market" scenario (e.g., taxes and incentives). The Government is now in the process of preparing a Climate Change Policy for the country, for which consultations are underway.

18. **A number of other recent national and international commitments[12] have further signaled the GoSA's fortitude to pursue a low carbon growth path**. The major actions include:

(a) Ratification of the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and accession to the *Kyoto Protocol* in July 2002.

(b) Adoption of a *National Climate Change Response Strategy* (2004), which outlined a broad range of principles and policy measures of mitigation and adaptation to climate change.

(c) Association with the Copenhagen Accord (2009), which has committed South Africa to implement economy-wide mitigation actions designed to achieve 34% emissions reductions from a business as usual trajectory by 2020 and 42% 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.

(d) Issuance of the *Electricity Regulations for Energy Efficiency* in June 2010.

(e) Adoption of a *National Energy Efficiency Strategy* (2006), which set an ambitious national target for energy efficiency improvements of 12 percent by 2015. In April 2006, a National Energy Efficiency Agency (NEEA) was established with the mandate to promote energy conservation.

(f) Adoption of a 2005 *White Paper on Renewable Energy,* and setting a target to supply four percent of electricity demand from renewable sources by 2013 (about 2,000 MW).

(g) Issuance of the National Climate Change Response Green Paper 2010 outlining the response strategy to climate change.

[12] GOSA is hosting the COP 17 in Durban. In November,,2011.

(h) Introduction of the Environmental Levy in 2009.

19. **Implementation of actions for development of renewable energy has already begun.** The following measures illustrate the GoSA's commitment in supporting the global goal of reducing GHG emissions:

(a) The GoSA has established a suitable legal and regulatory framework to incentivize private participation in development and enhanced use of renewable energy;

(b) Regulations for new generation, including renewable-based generation are expected to be promulgated before the end of 2011;

(c) South Africa has begun implementation of its climate change strategy based on agreed principles of accelerated energy efficiency and conservation across all economic sectors, inter alia through more stringent building standards;

(d) Ambitious research and development targets for carbon-friendly technologies will be put in place and be supported by new resources;

(e) Targets will be set for electricity generated from both renewable and nuclear energy sources by the end of the next two decades; and

(f) Regulatory mechanisms will be combined with economic instruments such as taxes and incentives with a view to further developing energy efficiency policies, an escalating CO_2 tax, emissions tax and diversifying the energy mix away from coal whilst shifting to cleaner coal, by for example introducing more stringent thermal efficiency and emissions standards for coal-fired power stations.

20. Integrated Resource Plan 2 (IRP2) has been approved by the South African Government in March and promulgated in May 2011. It sets out long-term electricity demand and details how this demand is to be met. In a long list of planned generation, the IRP includes:

- The 100MW Sere wind and 100MW Upington CSP power stations.
- 3,200 MW of the new wind capacity that is expected to become available by 2019.
- 600MW of CSP capacity by 2019.
- 6,025 MW of renewable energy capacity from other sources (solar PV, biomass, landfill, etc.) by 2027.

<u>Concrete Measures by Eskom and the GoSA to responsibly implement LTMS options</u>

21. **Eskom expects to devote a significant portion of its capital expansion program budget to the diversification of its sources of energy generation especially increased renewable energy sources.** South Africa plans include doubling of its generation capacity to about 80,000 MW by 2027, while also reducing the proportion of electricity generated from coal to approximately 70 percent from current levels of about 90 percent. In order to replace coal with a cleaner fuel source, the GoSA is exploring options to increase nuclear capacity by 9,600 MW and taking steps to add 17,800 MW from renewable supply sources, namely solar and wind power. Successful demonstration of CSP technology that could supply base load, combined with development of large regional hydro, would enable South Africa to reduce reliance on coal.

22. **The investment program also proposes to accelerate new renewable energy technologies.** Studies are underway for adding 500 MWof capacities in the Western and Eastern Cape Provinces and current estimates of wind power potential are about 8,400 MW along the East and West coasts of South Africa. CSP potential is estimated to be 30-38 GW in South Africa. Both CSP and wind technologies are expected to make a significant contribution to the Government's target of 10,000

GWh (about 1,700 MW equivalent) from renewable energy sources by 2013[13]. In addition, the Eskom investment program includes energy efficiency investments; Eskom has been taking discrete steps to increase supply and demand side management. About 3,000 MWs of DSM savings are projected to be achieved by 2013. Going forward, these measures will be complemented by a major effort supported by the private sector especially in areas such as expanded use of solar water heaters. Additional measures also include supply side efficiency improvement investments for upgrading the efficiency of an agreed list of old power plants and shifting from road to railway for coal transportation. All these measures are expected to provide significant reduction in carbon emissions arising out of the energy sector.

23. **Eskom's proposed 100 MW solar capacity addition represents a significant effort in today's nascent solar industry.** The world largest CSP power plant with storage capacity is in implementation stage in California. In September 2010, the California Energy Commission approved certification of the Ivanpah project, 392MW solar thermal power facility that is being constructed by BrightSource Energy. The complex consists of three separate plants that will be built in phases between 2011 and 2013. Besides limited maturity in technology and scale, developing and financing of such projects is also a challenge. Last year, US Government provided US$1.4 billion in loan guarantees to BrightSource Energy to support implementation of the Ivanpah project that is currently the world's largest concentrating solar project to have passed the development stage. Southern Africa is one of a select number of regions around the world that is particularly suited to CSP use. CSP has not been built and operated at large scale to date[14] and this project would be one of the largest commercial operations of the proposed design. First movers such as this project are expected to provide considerable learning for future projects in South Africa and around the world. According to the International Institute for Applied Systems Analysis, every time the total installed capacity for a given technology doubles, the costs fall by about 10-15 percent on account of learning and economies of scale. These initial projects are therefore expected to have critically important impact on lowering costs of follow-on plants. The proposed 100 MW CSP capacity addition is considered a utility scale demonstration project, whose success would facilitate development of other solar power plants by both the public and private sector.

24. **With respect to wind**, **South Africa intends to attract private sector investment into this more mature renewable technology**. South Africa has very little established wind power and the wind project would play an important role in facilitating increased future investment in the sector. In terms of reducing risks, the project will provide greater certainty on equipment and operating-costs in the South African context. If the various cost and risk barriers can be reduced through this project, the consensus view is that there is potential for some 8.4 GW of wind power in South Africa. In addition, certainty around project costs and a track-record of operational wind power in the country will provide comfort to the private sector, thus paving the way for a successful IPPs program for renewable energy in South Africa. The proposed 100MW wind power project is therefore considered as a critical and catalyzing project.

25. **The GoSA and Eskom have begun the development of South Africa's first utility-scale renewable energy projects.** South Africa's CTF Investment Plan, which supports implementation of the mitigation priorities and strategies, was endorsed by the CTF Trust Fund Committee in October 2009. The approved investment plan consists of a **US$2.35 billion program** to scale up CSP and wind (including transmission infrastructure to support private sector developers), and support for development of a private sector-led solar water heater market and energy efficiency investments.

[13] This target includes solar heating as a DSM measure.

[14] The world's largest concentrating solar plant, capable of supporting base load supply, is located near Seville, Spain, with a capacity of 20MW. The plant became operational in May 2009. A number of larger capacity plants are under construction.

26. **Complementary to the proposed CTF financing that South Africa is pursuing, there are programmatic opportunities to benefit from the carbon market for low carbon initiatives.** The Bank's Carbon Partnership Facility (CPF) offers an opportunity for South Africa to attract carbon finance resources for a period of up to ten years (beyond expiration of the Kyoto protocol in 2012) to support programmatic and sector-based efforts to reduce emissions over the medium term, e.g., energy efficiency, solar water heating, and renewable energy. Participation in the CPF will allow South Africa to establish and monetize its climate mitigation assets in anticipation of the creation of any post-2012 global carbon markets.

27. **The GoSA's strategy to move to a low carbon energy sector will be primarily led by the private sector.** Eskom with the proposed renewable projects will play a catalyzing and demonstration role in the initial years, while the GoSA creates an enabling environment that encourages private investment. As mentioned, the GoSA has already adopted a private sector supportive framework for renewable technologies, including wind and CSP. In addition, the private sector, along with commercial financiers, is expected to finance the energy efficiency program related to solar water heaters. The Government and Eskom are also accelerating research and development of coal bed methane and underground coal gasification potential.

B. Rationale for Bank Involvement

28. The Government's main objectives are to return the country to a path of accelerated, more shared growth, to reduce unemployment and poverty within a medium time frame, and to maintain stable, sustainable macroeconomic framework. The country's resolve has been seriously tested by the ongoing global financial and economic crisis. It has done well in containing the damage with timely countercyclical macroeconomic responses. The challenge for South Africa now is to position itself for the recovery. The Government intends to achieve its energy security with due consideration to the environment. It is in the process of preparing its climate policy, which will require, among others, power system planning to factor externalities; in particular the impacts of fossil fuel based generation on GHG emissions.

29. The current Country Partnership Strategy was discussed by the IBRD Board of Executive Directors in January 2008. A Progress Report was discussed in April 2010, in the context of the Eskom Investment Support Project (EISP). The strategic objectives of the CPS were to support South Africa's development programs in partnership with the World Bank Group and to deepen collaboration in the regional integration agenda. However, as the CPS Progress Report noted, the prospective Bank support to the electricity sector would extend the Bank-South Africa partnership to analytical work to help catalyze private sector financing of planned renewable investments and development of low-carbon options and strengthen Bank-South Africa Partnership on matters relating to Climate Change.

Excerpt from a Statement from South African Presidency, December 6, 2009 for COP15 in Copenhagen: "*For South Africa, the major contributor to our emissions of Green House Gases is our energy sector. However, the issue for developing countries like ours is not merely about addressing our Green House Gas emissions but also about energy security and energy access as well. The greatest challenge we face is how to ensure both energy security and access as a developmental imperative and at the same time laying the foundation for moving towards a path of low carbon growth.*

As such, South Africa, being a responsible global citizen and in line with its obligations under article 4.1 of the United Nations Framework Convention on Climate Change acknowledges its responsibility to undertake national action that will contribute to the global effort to reduce greenhouse gas emissions. In accordance with this, South Africa will undertake mitigation actions which will result in a deviation below the current emissions baseline of around 34% by 2020 and by around 42% by 2025. This level of effort enables South Africa's emissions to peak between 2020 and 2025, plateau for approximately a decade and decline in absolute terms thereafter. This undertaking is conditional on firstly, a fair, ambitious and effective agreement in the international climate change negotiations under the Climate Change convention and its Kyoto Protocol and secondly, the provision of support, from the international community, and in particular finance, technology and support for capacity building from developed countries, in line with their commitments under both the Framework Convention on Climate Change and the Bali Action Plan.".

30. 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 activity. 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. With appropriate storage, CSP offers the possibility of dispatchable power generation at scale – a potential long-term replacement for coal. However, currently CSP has a levelized cost of electricity between two and three times that of supercritical coal-fired power plants and there is very limited operational experience at scale. The proposed CSP facility 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 higher up-front costs relative to coal-fired production and incremental transmission costs to connect isolated wind power sites to the grid. Due to these and other reasons, in the absence of the IBRD and CTF support, the current economic crisis will further delay the implementation of the renewable energy projects.

31. The project will thus ensure that South Africa's success to date in leading the sub-regional initiative in support of a low carbon and pro-poor energy sector is kept on track. 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.

32. 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 a low carbon economy.

C. Higher level objectives to which the project contributes

33. The higher level objective consistent with the CPS is to support: (a) the GoSA's strategy for removal of the growing infrastructure bottlenecks on an accelerated basis; and (b) the revival of economic growth in Southern Africa, through adequate and more reliable power supply in the context of GoSA's strategy to transition to a low carbon economy.

II. PROJECT DESCRIPTION

A. Lending instrument

34. CTF Loan: A US Dollar Loan for a maturity of 40 years, 5-year disbursement period, 10 years Grace with a service charge of 0.25 percent per annum on disbursed amounts and a one-time management fee of 0.25 percent of the Loan Amount.

B. Project development objective and key indicators

35. 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.

36. The outcomes of the Project would be measured by the following indicators, as shown in Annex 3:

(a) increased renewable energy supply;
(b) CTF Leveraged financial investment in renewable projects;
(c) direct GHG emissions avoided.

C. The IBRD's strategy for support to Eskom and project components

37. The proposed Eskom Renewables Support Project (ERSP) (described below) will have a total cost of about US$ 1,551 million, of which IBRD CTF Loan will provide US$250 million, IBRD Loan co-financed from the EISP (approved on April 8, 2010 and made effective on May 31, 2010) will contribute US$ 260 million, and other lenders including KfW, EIB, AFD, AfDB and AfDB-managed CTF will provide about US$ 775 million. The IBRD Loan 7862, approved on April 8th, 2010, is being amended to provide the necessary co-financing of US $250 million. The amendment reduces the IBRD loan financing percentages from 100% to 18% for Part B1 of IBRD Loan 7862 which is the same as Part A of the CTF loan - and from 100% to 16% for Part B2 of the IBRD Loan 7862 which is the same as Part B of the CTF loan. The amendment to IBRD Loan 7862 would be countersigned and effective at the same time as the CTF loan. Detailed project cost and financing plan is presented in Table 1 below.

38. As per the request from the Borrower, Eskom Holdings, an allocation for US$ 0.625 million has been made to finance the Management Fee associated with the CTF Loan (0.25% of $250 million), in accordance with CTF Financing Products, Terms and Review Procedures, which state that Management Fee may be paid by the borrower out of its own resources or capitalized from the CTF loan proceeds following effectiveness of the loan.

Table 1: Project Cost and Financing Plan (US$ million)

Name of the Component	Estimated Required Financing	IBRD	AFDB	CTF	CTF	Borrower and other financiers
				through IBRD	*through AFDB*	
Component 1: Wind Plant (100 MW), including development costsetc.	353.5	65.00	45.00	50.00	50.00	143.50
Component 2: CSP Plant (Pilot 100 MW total capacity), including development costs etc.	1197.4	195.00	220.00	199.375	49.750	533.28
Management Fee	0.875			0.625	0.250	
Total	**1,551.78**	**260.00**	**265.00**	**250.00**	**100.00**	**676.78**

Project Components

39. The Project will support the development of South Africa's first large-scale wind and CSP plants, proposed to be implemented by Eskom, and specifically, supporting the design, procurement,

construction, supply, installation and commissioning of a 100MW Sere wind (US$50 million) and 100MW Upington CSP (US$200 million) plants. Both projects are under development by Eskom Holdings and early development works on the sites (survey etc.) are ongoing. The Project is proposed to be co-funded by the CTF Loan and/or jointly by AfDB, AFD, Kreditanstalt für Wiederaufbau (KfW) and the European Investment Bank (EIB). Eskom's own funds and on-balance sheet financing will also assist in financing this Project.

(i) Component 1: 100 MW Sere Wind Power Plant and associated infrastructure for the connection of wind and renewable IPPs to the grid (CTF: US$50 million). Wind is a commercially mature renewable energy technology, but at present there is no significant energy generated by wind in South Africa. The Sere wind project site is located 300 km north of Cape Town near the town of Koekenaap, and has the potential to accommodate up to 200 MW of wind capacity. A priority activity for this subsector is development of Phase I of this site – the Sere wind project comprising turbine units ranging between 1.5 to 3.0 MW with gross total output of about 100 MW. The project is fully scoped and specified. Prequalification of contractors and preparation of bid documents for the wind-turbine generators and other associated facilities are at advanced stages. The wind resource in South Africa as a whole is moderate to low, with the estimated highest capacity factor about 26 percent. Taking this into account, as well as the availability and preparedness of the site, including closeness to transmission, availability of long term wind measurement data, safeguards aspects, etc, it was concluded that Sere is the most suitable location for the plant. Based on measurements completed to date at the site, it is expected that the plant will have a load factor of 26 percent. The site is about 40 km from the 132-kV line.

The Sere Wind component in Western Cape, together with new capacity to evacuate its power, would be a flagship in the sector. In addition, investments in transmission capacity expansion to the key regions of potential wind power development would catalyze substantial private sector investment under the renewable energy development program. CTF funds are proposed to be used to: partially finance the Sere Wind project, thus reducing the production cost differential compared to coal; provide contingent financing (financing towards increase in cost estimates upon completion of final design work); and finance transmission additions dedicated to serving wind power development. Cumulative emissions savings from the Sere Wind Power Project based on annual output of 219 GWh would be 5 million tons of CO_2 over a twenty-year life of the plant (the 0.25 million tons avoided annually could potentially increase to 1 million tons based on other sites already identified in the vicinity).

(ii) Component 2: 100 MW Upington Concentrating Solar Plant (CTF: US$200 million). CSP is the renewable energy source with the largest potential in South Africa. Grid-connected solar thermal power can potentially provide generation capacity, comparable to that provided by coal-fired power plants. At the same time, in addition to being more costly, the initial CSP plants will have higher risk than a coal-fired power plant. The components of the CSP plant comprise proven technology. However, because of the scale up, the composite plant may require some adjustments and modifications in order to operate at its optimal efficiency. The technology selected by Eskom has not yet been built at the proposed scale, so all participants must be prepared to anticipate changes/adjustments during the construction and initial operation phase of the project.

The conceptual design of the plant is based on the development work that Eskom has been carrying out over the past decade with the support of National Renewable Energy Laboratories, Sandia National Laboratories and other institutions involved with the development of the CSP technology. However, implementation was delayed due to lack of financing. In December 2010, Fichtner Consulting, carried out a review of CSP technologies, based on the global availability and experience, in order to recommend the most appropriate technological option for South Africa. The consultants also took into account the design work already carried out by Eskom based on the central receiver technology. The review confirmed

that the central receiver technology promises lower capital and life time costs due to the lowest specific thermal energy storage costs, high capacity factors and firm output and dispatching capabilities, which also supports the grid stability. Molten salt storage based central receiver technology is expected to be the leading technology for utility scale solar power plants with high capacity factors.

A successful CSP project will demonstrate South Africa's role as leading the low carbon energy agenda for the sub region, with scale-up potential in SAPP countries, including Botswana and Namibia (with an estimated solar potential of over 20 GW). As such, CSP in the long term could play a major role in the SAPP. The proposed project would support this development by co-financing the first project in South Africa. CTF financing would reduce the financing costs thus making the CSP project financially viable for Eskom. Cumulative emissions savings from Phase 1 of the Upington CSP based on annual output of approximately 516 GWh would be 9 million tons of CO_2 over an assumed twenty year life of the plant.

D. Lessons learned and reflected in the project design

40. The Eskom Investment Support Project, the first Bank energy operation in South Africa in recent times, was approved by the Bank's board in April 2010. Although good progress has been made in processing procurement following the Bank's Guidelines (two contracts have been awarded and several are being processed), there is still limited Borrower experience with Bank procedures and a desire by the Borrower to include in the procurement process some domestic requirements which are inconsistent with the Bank's Guidelines. Some generic lessons learned from IBRD's experience with MICs have been considered to ensure sound project design and implementation.

41. *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, 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 overall enabling environment being created by the government in parallel with the proposed investment operation.

42. *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 stipulates, as one of its objectives, transition to cost reflective tariffs over a five-year horizon and provides the overarching framework for NERSA. In addition, in 2009, Government has finalized power procurement arrangements that would enable implementation of first phase private renewable energy projects and provide comfort to commercial lenders.

43. *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 has taken leadership in developing long-term mitigation scenarios which are guiding its low-carbon strategy, and is currently preparing a Climate Change policy, of which energy planning will form a major part. The Project is part of the recently approved Integrated Resource Plan for power development and supports specific investment in new renewable technologies.

E. Alternatives considered and reasons for rejection

44. **Energy Planning Process:** The planning function for public investments in the energy sector of South Africa is robust. The Department of Energy prepares an Integrated Energy Plan (IEP) to identify future energy demand and supply requirements. Similarly, Eskom continually assesses the

projected electricity demand and supply. This was previously done through a process called the Integrated Strategic Electricity Plan (ISEP)[15], which was superseded in mid-2009 by the Integrated Resource Plan (IRP). Through these assessments and planning processes, the most likely future electricity demand based on long-term Southern African economic scenarios is forecast, which provides the framework for Eskom and South Africa to investigate a wide range of supply- and demand side scenarios and technological options to meet the needs of the sector. NERSA's licensing authority and regulatory framework provides for checks and balances to ensure against any excess capacity by balancing supply and demand (tariff requests associated with any increase in capacity is assessed by the regulator to meet expected demand). The Bank has reviewed the various planning alternatives.

45. The proposed Solar and Wind projects make important contributions to the objectives of the LTMS, even though that are not the least cost alternatives. They form an integral part of the Power Sector IRP and have been allocated to Eskom for development and financing under IRP1. Implementation of these projects requires concessionary resources such as those provided by CTF. IRP2, which was approved in March and promulgated in May 2011, has determined the next lot of renewable energy projects which are expected to be largely financed in the Private Sector.

46. **Private vs. Public Sector:** Despite the finalization of an attractive framework for soliciting private sector participation in renewable energy development, support of a public sector project was decided appropriate due to: (i) advanced readiness of the project components; (ii) development of the advance infrastructure in the two locations (e.g. transmission) as a part of the public project that would facilitate future private sector investments in renewable energy; and (iii) absorption of the demonstration costs of development of the new technologies in South Africa by the Project.

47. **CSP Technology:** Eskom plans to pursue a technology that includes heat storage as opposed to the more mature technology without storage in their drive to finding a solution that would replace coal fired generation for base load supply over time.

48. **Project Structure and Lending Instrument:** It was originally planned to include the CTF financing for the project components as part of the EISP approved in April, 2010, but agreement was reached between the Bank, CTF, Borrower and Government to have a free-standing SIL for CTF financing, comprising only renewable energy components. The project would be linked to the EISP since the latter includes the IBRD co-financing for the Upington CSP and Sere Wind projects.

III. IMPLEMENTATION

A. Partnership arrangements

49. The CTF financing will be channeled through the IBRD (US$250 million) and the AfDB (US$100 million). Both IBRD and AfDB, will also provide loan financing on their own accounts for the project. The project will have large amounts of joint and parallel co-financing of contracts by other multilaterals and bilaterals.

50. The approved CTF Investment Plan (IP),[16] includes, in addition to the public sector projects, private sector-led initiatives involving IFC, the private sector arm of AfDB and bilateral financiers in line with the Government's strategy of having the private sector take the lead in renewable energy development. As part of the CTF IP, and in addition to the support for this project, US$150 million is allocated for implementation of the GoSA's Solar Water Heater program and private sector-led energy efficiency and renewable energy activities. The CTF Investment Plan, as approved in November 2009,

[15] ISEP is a robust planning tool developed by Eskom that analyzes and prioritizes the base and peak load capacity requirements based on rigorous analyses of alternatives for supply under various demand scenarios. Based on detailed analysis of each of the above aspects, the model compares the various generation capacity options and arrives at the optimal mix for the power system.

[16] The CTF Trust Fund Committee endorsed a US$500 million CTF financing plan for South Africa in October 2009.

is presented in Table 2 below. However, based on the updated cost and financing information the allocation of funds amongst different lenders to components of the project have changed. The total amounts of CTF funds that will be channeled through IBRD and AfDB remain the same.

Table 2: CTF Investment Plan (November 2009)
Proposed Low carbon initiatives to be financed by CTF and other Public Lenders[17]
(Base Costs, excluding contingencies; US$ Millions)

Project	**CTF** (thru)				**IBRD**	**AfDB**	**IFC**	**EIB**	**KfW**	**AFD**	**Priv. Sector**	**Total Proposed Funding**
	IBRD	*ADB*	*IFC*	*ADB (priv)*								
Sere Wind	50	50		-	110	50		-	-	140		400
Upington CSP	200	50		-	150	50		50	100	-		600
Renewable energy/energy efficiency/SWH	-	-	75	75	-	200	200	50	-	210	540	1,350
Total	**250**	**100**	**75**	**75**	**260**	**300**	**200**	**100**	**100**	**350**	**540**	**2,350**

51. On April 8, 2010 IBRD approved a SIL for US$ 3.75 billion for the EISP. One of the components of this project consisted of the Sere Wind Project and the Upington CSP plant, for which US$260 million has been allocated by IBRD to co-finance the CTF loan.

52. In addition, the Global Environment Facility (GEF) and Public Private Infrastructure Advisory Facility (PPIAF), both supported and managed by IBRD, have been active in South Africa. The GEF-financed Renewable Energy Market Transformation (REMT) project is, among others, supporting the design of feed-in tariffs for various renewable energy technologies, update of the 2003 Renewable Energy Strategy, and small to medium energy efficiency and renewable energy investments through the provision of matching grants. Additionally, a PPIAF grant will support the South African Cities Efficiency and Renewable Energy Program, the objective of which is to help increase investment in energy efficiency and renewable energy infrastructure through private sector participation. PPIAF has also recently approved a grant for the GoSA that will assist in identifying gaps in the existing regulatory environment, propose an institutional structure best suited for IPPs (including renewables) in South Africa, and in particular provide advice on how the Government's exposure to contingent liabilities can be limited as it expands private investment in the energy sector.

B. Institutional and implementation arrangements

53. The first part of this section covers the implementation arrangements made by Eskom and the second part explains the arrangements made by the Bank to ensure effective supervision of the operation.

54. 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 Republic of South Africa. See Annex 6 for Eskom's institutional arrangements.

55. Component 1 – The Sere Wind Power Plant: 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 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, who will be assited by

[17] Excludes Eskom's equity financing for the renewable projects.

the Owners Engineer. Operation of the power plant will be undertaken by the "Peaking" department in the Generation Business Unit.

56. Component 2 – The Upington CSP Plant: This sub-component will be implemented in three phases. The first phase has been completed and involved review of available CSP technologies. It concluded that the Central Receiver with molten salt heat storage was the most appropriate for Eskom's intended use. The second phase, that is currently underway, involves the appointment of an Owner's Engineer to review the preparatory work already carried out by Eskom, including the project concept and preliminary design as an input into the third phase, which will consist of procurement, via a two-stage process, as well as construction supervision and management. In this phase, the CED will be responsible for the complete procurement process. The process for every contract will be led by dedicated staff. Upon completion of the procurement phase (signing of a specific construction/supply & install contract), the contract will be handed over to the project manager under CED for construction supervision and management. Operation of the power plant will be undertaken under the new "Peaking" department in the Generation Business Unit responsible for peaking plants.

57. Implementation Support: The IBRD support during implementation takes cognizance of the technical complexities of the project, especially those related to the CSP. While, Eskom is becoming increasingly familiar with IBRD procedures and the arrangements required to support the use of country systems for safeguards, to ensure a smooth transition from preparation to supervision, the majority of members of the IBRD preparation team will continue on the team over the supervision phase. The team will comprise staff from the Africa Region and other Regions of the Bank, as well from Anchor units, especially for Safeguards. Use will also be made of seasoned retired Bank staff. The team will have in-depth experience in all aspects of project implementation. Maximum use will be made of field staff, who will work more closely with the client throughout implementation. The implementation support plan (please refer to Annex 6) has been front-loaded to ensure a good support framework is in place from the outset. In addition, the plan allows for staff exchange between Eskom and the Bank to enable knowledge transfer and strengthening of capacity.

58. From the safeguards perspective, implementation support will be provided on two levels. On the first level, the Bank will help support monitoring the performance of project implementation using country systems. The Bank support will involve evaluating the quality of additional safeguards documents that may be produced, with respect to GoSA requirements and OP 4.00, and reviewing various independent audit reports that Eskom will produce, on resettlement/land acquisition, health and safety, and EMP implementation. On the second level, the Bank team will review results on the ground. Safeguards specialists will join supervision missions at least twice annually and will schedule site visits during those missions so that each generating facility with its transmission line is visited no less frequently than once a year. Facilities at which there are significant social, environmental or health and safety concerns will be visited twice per year.

59. Implementation support will be coordinated with other financiers where possible and maximum utilization will be made of field-based staff. IBRD implementation support is expected to cost US$600,000 over the implementation period of 5 years. At least one mission per year shall be conducted jointly by WB, AfDB and the other financiers.

C. Monitoring and evaluation of outcomes/results

60. Monitoring and impact evaluation of the overall project will be the responsibility of Eskom Holdings, with support from DoE and DPE, as appropriate. The Project Coordinator (from the Finance Directorate of Eskom) will be responsible for coordination and monitoring of progress of the overall project. The Project Coordinator will facilitate coordination between the two project managers and between Eskom, the shareholder (DPE), DoE, DEA and NT.

61. The key indicators to be monitored and used in assessing project progress and evaluation of outcomes are described in Annex 3—Results Framework and Monitoring. Specific data for gathering

and reporting, including responsibilities thereof, have been agreed with Eskom. A mid-term review will be carried around May 2013. There will be an Implementation Completion and Results Report (ICR) at the project close, to be jointly prepared by IBRD and Eskom Holdings.

D. Sustainability

62. The proposed project is critical for developing South Africa's renewable energy program, a key component of the government's low carbon strategy and an important component of Eskom's investment program. The following sections explain the basis for sustainability of the Wind and Solar projects proposed for CTF financing:

(a) 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 projects, 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;

(b) EPP promulgated by GOSA in 2009 mandates a move to cost recovery and provides the overall framework for the fiscal sustainability of the sector. Despite some delays, there has been substantial progress towards cost recovery through tariffs over the medium term. Additionally significant policy changes have been put in place by DoE, such as the 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 continued approval of tariff applications, to reach a cost reflective level as called for in the EPP. As noted earlier, NERSA has a positive track record and has already approved two multi-year tariff increases, thereby moving the tariff trajectory towards cost reflectivity.

(c) The GoSA has provided continuous support for Eskom's investment program. The loan of R60 billion provided in 2008 and already disbursed, and the GoSA guarantee facility of R350 billion in support of the Eskom's borrowings is a strong testament to the GoSA's full support for improving Eskom's financial sustainability.

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

E. Critical risks and possible controversial aspects (Refer to Annex 4)

63. A detailed Risk Identification Worksheet has been prepared. The overall implementation risk of the operation is considered to be Substantial. Details are provided in Annex 4 and the following paragraphs summarize key risks that support this evaluation:

(a) Implementation capacity: Eskom's ability to fully implement its near to medium term capital expansion plan is dependent on approval of additional tariff increases in FY14-FY15 and ability to secure additional financing. Securing of additional tariff increases in FY14-FY15 would be in line with the existing MYPD methodology that allows recovery of capital expenditures through tariff increases. Also, the GoSA and Eskom realize the current funding constraints and have taken a number of steps to address the funding gap including raising funds in the international capital markets. GoSA and Eskom are also aggressively pursuing the option of bringing in private participation, especially in renewable energy to increase overall

investments in the power sector. The CTF supported projects are expected to have commitments for full financing prior to actual construction and the contracting arrangements would be structured to ensure timely completion.

(b) Technical/design and implementation: CSP technology is still in early stages of development, with limited global experience. Eskom has completed a prefeasibility assessment of the proposed CSP project. A comprehensive review of international experience and the current state of CSP technology has also been completed. A technical international advisory panel to support Eskom in the implementation of the Upington CSP is also envisaged. In addition, to ensure that the latest developments of this evolving technology are incorporated in the design, a two stage procurement process will be used, where the first stage will solicit comments on the indicative design from the proposed bidders.

(c) Differences in policy requirements between co-financiers: Several contracts under Components 1 and 2 will be jointly financed by several co-financiers. This poses a challenge due to their different requirements, such as Eligibility Criteria, Fraud & Corruption and debarment provisions. To address this issue, all financiers agreed to the use of Bank's Procurement Guidelines and the Bank's Standard Bidding Documents and the Bank's "Guidelines on Preventing and Combating Fraud and Corruption in Project Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006 and Revised in January, 2011. However, this agreement excludes --the Bank's sanctions/debarment procedures. This poses a risk of a firm debarred by any financier to participate and cause an issue that may not be resolved among financiers. Based on the results of the prequalification for the major contract for the windfarm, which does not include firms debarred by any co-financier, and based on the market analysis for the solar plant, which did not show that any qualified firm that may participate in the bidding under joint financing has been debarred by any co-financier, this risk is considered low. AfDB has obtained a waiver from its Board of Directors to apply IBRD eligibility criteria for procurement of major contracts under this Project. Each of the co-financiers will be reviewing the procurement documents and the Borrower's procurement decisions at each stage of procurement process and provide its own clearances. The procurement process and implementation may be affected if one or more co-financiers is not satisfied with the procurement documents and/or outcome of procurement process and/or makes requests for actions that are not acceptable to the Bank. To address this issue, the Bank is in the process of finalizing a Memorandum of Understanding (MOU) that will be signed by all the co-financiers. It will stipulate the application of Bank's Procurement Guidelines and commitment to use best efforts to resolve any potential disagreements. In the event that any differences may remain unresolved, each Cofinancier may exercise the right to take such actions as it may reasonably considers necessary: (a) to ensure compliance with its policies and procedures and the terms and conditions of its Cofinancing Agreement(s) with the Borrower, and (b) to realize the intended development objectives of the Project. Nevertheless, there are risks of delays in coordination of comments of different financiers and resolution of the issues that may arise. (in the unlikely event of irresolvable inconsistency between the co-financiers requirements during implementation and the agreed approach amongst the co-financiers being not consistent with Bank polices Board approval for such an approach will be sought).

F. Loan/credit conditions and covenants

Conditions for Effectiveness:

(a) Standard Conditions;

(b) For payments under Category (2), the co-financing agreements for the financing of Part B of the Project have been executed and delivered and all conditions precedent to the effectiveness of each such co-financing agreement or to the right of the Borrower to make withdrawals under it have been fulfilled.

Conditions of Disbursement:

(a) Co-financing Agreements have been executed and delivered.

CTF Guarantee Agreement Covenants:

(a) Ensure that the Borrower implements the Proj*ect in compliance with the requirem*ents of the Environmental Legislation and applicable mitigation measures deemed necessary by the EIA, the RPF and/ or the RAP.

(b) Inform the Bank of, and consult with the Bank on, any proposal to modify the Environmental Legislation and/or the Social Legislation; and if in the opinion of the Bank, the application of any aspects of such proposal would result in adverse environmental or social impacts under the Project, to cause the Borrower to carry out the Project in accordance with the provisions of the SDR or such other environmental and social guidelines as shall have been determined by the Borrower and agreed to in writing by the Bank.

CTF Loan Covenants:

Anti-Corruption:

The Borrower shall ensure that the Project is carried out in accordance with the provisions of the Anti Corruption Guidelines.

Environmental and Social Safeguards:

(a) The Borrower shall implement the Project in accordance with the provisions of the Environmental Legislation, the Social Legislation, the EIA, the EMP, the RPF, the RAPs, if any RAPs are required in accordance with the RPF, and the provisions of the Loan Agreement.

(b) The Borrower shall refrain from carrying out any activity under the Project that would result in the involuntary resettlement of any person or group of persons residing in the selected site for each of the Borrower's CSP and Sere Wind projects; provided, however, that if such involuntary resettlement would be unavoidable, then the Borrower shall implement such Project activities in accordance with the provisions of the RPF, including the preparation, adoption and implementation of one or more RAPs as appropriate, all in accordance with the provisions of the Social Legislation as described in the SDR, including without limitation, consultation with potentially Displaced Persons and disclosure of the RAPs

(c) Not later than one year after completion of the implementation of a RAP, the Borrower shall cause an audit to be conducted by an independent qualified resettlement expert to monitor the outcomes of the RAP, including a survey and consultation with Displaced Persons, and which audit shall also define any necessary action to address any shortcomings in the implementation of said RAP.

IV. APPRAISAL SUMMARY

A. Economic and financial analyses

Summary Economic Appraisal

64. Over *the next 20 years, according* to the LTMS, in the absence of any mitigation actions, South Africa's GHG emissions could increase by 500 million tons. In line with South Africa and Eskom's commitment to reduce GHG emissions, this operation supports investments in two renewable energy power plants: (a) Sere Wind Power Project; and (b) Upington CSP which are being developed primarily to help deliver on South Africa's commitment to follow mitigation strategies set out in the LTMS. These projects would help South Africa reduce growth in emissions and are expected to play a catalytic role in the envisaged larger-scale development of these technologies.

65. The economic analysis has been carried out for the two components separately, and for the project as a whole. The economic assessment analyzes whether the renewable energy projects (wind and CSP) are economically viable (using a combination of economic rates of return, economic net present value and other available information).

66. *Calculating economic rates of return (ERR) – consumer willingness to pay (WTP)*: The total economic benefits of the projects are assessed using the value consumers place on consuming incremental power (represented by the area under consumer demand curve). The total WTP is calculated by weighting the WTP by the proportions of power used by each sector. The average consumer WTP for power in South Africa calculates to 17.54 US cents/kWh.[18] The ERR has also been evaluated at a proxy tariff. Assessment of benefits at the tariff level provides an estimate of the lower bound of WTP.[19]

67. *Calculating economic rates of return – rate of discount*: The discount rate used for the assessments is 10 percent which was also used for the LTMS.

68. *Including the social cost of carbon-dioxide emissions*: For each project, the economic assessment is also carried out incorporating the value of CO_2 emissions. For each of the renewable energy projects this value is represented by the *avoided* cost due to displacement of CO_2 emissions (i.e., it is added as an economic benefit). This analysis uses a figure of $29/ton CO_2 which is based on the Stern review.[20]

69. The catalytic role of the proposed Sere Wind and Upington CSP projects in developing future renewable projects is the driving force behind their current development. Assessing these projects as a source of incremental power alone fails to capture the full benefits of these investments. They will help deliver on South Africa's commitment to follow mitigation strategies set out in the LTMS.

70. The two projects – as a first of their kind in sub-Saharan Africa – are seen as a test case and catalyst for larger scale delivery of power using these technologies to displace considerable future CO_2 emissions (and generate economic externality benefits in the process) and are very much a response to

[18] When considering a small project, which supplies only the first few kWh of the total expected increase in demand, in an idealized competitive retail market the energy would be bought by those with the highest willingness to pay (say small commercial enterprises), and hence the relevant yardstick is the marginal WTP. Large industrial consumers could meet their demand by lower cost self generation. But if considering a larger project, accounting for more than half the expected growth in demand say, then in the absence of retail competition, there is no way the incremental energy can be directed just to the consumers with the highest WTP, the energy will go to a mix of customers with a mix of WTP. Therefore, the conservative approach is to use the average WTP.

[19] It is a lower bound because valuation at the tariff ignores any consumer surplus. However, because of the difficulty of empirical verification of WTP and consumer surplus, as a verifiable indicator of WTP an assessment at the tariff is an important yardstick. We base the tariff level on the REFIT level that was originally announced by NERSA in 2009 but which was subsequently replaced by the Renewable Energy Development Program in 2011.

[20] Stern, Nicholas. 2007. *The economics of climate change: The Stern review*. Cambridge: Cambridge University Press.

the need to support the Government in operationalizing its plans under the LTMS. GoSA's strategy on mitigation requires such projects to be developed, and assessment of economic viability of each of these projects should therefore take account of their broader role in making future economically attractive projects take place earlier and in greater numbers.

Sere Wind Power Project

71. South Africa has very little established wind power and the Sere Wind Power Project will play a significant role in facilitating increased future investment in the sector. The project will include investment in transmission lines that will reduce costs for future projects. The project will also provide greater certainty on equipment and operating costs in the South African context. If the various cost and risk barriers can be reduced through this project, the consensus view is that there is potential for some 4 GW of wind power in South Africa, which would make an important contribution to meeting South Africa's commitments to long-term mitigation targets.

72. The ERR using specific data available for the individual project and treating the project as a source of incremental power alone – i.e., based on consumer WTP without avoided carbon benefits – is calculated to be 4.7 percent, assuming a 26 percent load factor. The ENPV has been calculated to be negative at - US$103.2 million. The proposed wind power project results in reduced GHG emissions (when compared to alternatives). Considering a valuation of US$29/ton of CO_2, the ERR increases to 7.3 percent (still assuming a load factor of 26 percent). The ENPV increases to - US$55.3 million. The sensitivity analysis shows that the ERR is strongly dependent upon the achieved load factor. At 32 percent load factor, the ERR increases to 10.3 percent and the ENPV is positive.

Upington CSP Project

73. The ERR using specific data available for the individual project and treating the project as a source of incremental power alone, i.e., based on consumer WTP without avoided carbon benefits – is 0 percent. Even though it is intended to operate at a load factor equivalent to 15 hours per day, because of the limited long-term experience with the technology, the economic analysis is based on a much more conservative load factor equivalent to 12 hours per day. At this load factor, the ENPV is negative US$404.1 million. The proposed CSP project results in reduced GHG emissions (when compared to alternatives). Considering a valuation of US$29/ton of CO_2, the ERR increases to 2.2 percent at a load factor equivalent to 12 hours of operation.[21] The ERR is strongly dependent upon the achieved load factor and rises to 4.8 percent at a load factor equivalent to 15 hours of operation.

74. However, a proper assessment should not ignore the wider (and currently difficult to quantify) indirect benefits of this project. The LTMS finds CSP to be a realistic alternative to coal-fired power plants. Eskom has estimated that there are resources for about 40 GW of solar thermal power in the Northern Cape and North West provinces alone. The combination of scale and potential for replicating coal-fired power generation's dispatch ability in the system (with thermal storage) makes CSP *the* critical renewable energy technology for enabling South Africa to meaningfully reduce absolute emissions by 2030 as per the LTMS and its commitments. What is more, Southern Africa is one of a select number of regions around the world that is particularly suited to CSP use and when commissioned this project will be one of the largest commercial CSP plants in operation. Initial projects such as this one are expected to lead to significantly lower costs of follow-on plants leading to wider and/or earlier adoption of CSP globally. CSP is a technology with significant unrealized economies of scale and there is potential for technical improvements in various components. The IEA finds a learning rate for CSP of 12 percent (i.e., a 12 percent drop in prices every time there is a doubling of installed capacity). Given the scale of the long-term potential for CSP globally and the displacement of CO_2 emission-related costs this would entail, the economic value of this project in unlocking more and cheaper CSP projects in the future is a significant benefit from the project that is almost impossible to quantify.

[21] With storage the Upington CSP is expected to reach a maximum load factor of 65percent.

75. However, there are certain proxies that we can consider for attempting to quantify the additional benefits of this project described in the paragraph above. South Africa does not have green tariffs (i.e. Eskom as a distributor of electricity does not charge a different "green tariff" to consumers) and it is impossible to directly observe consumer WTP for power from CSP. It can be expected, however, that Government policy seeks to reflect longer-term population preferences. On this basis, if the former feed-in tariff for CSP[22] (approximately US cent 30/kWh) were taken as a proxy for higher national willingness-to-pay for power from initial CSP projects (for the reasons linked to South Africa's low carbon growth aspirations), the project ERR (at load factor equivalent to 12 hours of operation and including value of displaced CO_2 emissions) would rise to 7.5 percent and ENPV to negative US$124.1 million. Still proxying additional WTP for CSP, with a load factor equivalent to 15 hours of operation, the ERR would rise to 10.4 percent and ENPV to positive US$23.3 million**.** A clear indication that there is an additional 'global willingness-to-pay' for such initial CSP projects can be observed from the CTF Trust Fund Committee's willingness to provide US$250 million in highly concessional loans towards this transformational CSP project and a further US$750 million specifically towards CSP projects in the Middle East and North Africa regions.

Project Economics as a Whole

76. The benefits of the project are quantified here as the consumer's willingness to pay (WTP) for the **incremental power alone** produced by the project, with an average benefit of 17.5 US cents/kWh. As discussed above, significant benefits of these components relate to impacts beyond simple incremental power. However, these are difficult to quantify and therefore are not incorporated in the tables below. Taking both components together, the baseline aggregate project economic return is quantified as 1.4 percent, with an NPV of US$ -507.3 million (Table 3). This is based on a 26 percent load factor for wind and 12 hour operation for CSP. As we have seen, returns for both projects rise with higher load factors.

Table 3: Project Economics as a Whole

Component	**ERR**	**NPV @ 10%**
	(as a %)	*US$ Millions*
Component 1 – Wind	4.7%	-103.2
Component 2 - CSP	0%	-404.1
Project as a Whole	**1.4%**	**-507.3**

77. As shown in Table 4, when the changes in GHG emissions are taken into account, and based on a carbon valuation of US$29/ton of CO_2, the economic returns of the project increase.

Table 4: Project Economics as a Whole, including CO_2 valued at US$29/ton

	ERR (w/o GHG)	**ERR (w/ GHG)**	**Change in ERR**	**ENPV (w/GHG)**
	(as a %)	*(as a %)*	(as a %)	US$ Millions
Component 1 – Wind	4.7%	7.3%	2.6%	-55.3
Component 2 - CSP	0%	2.2%	2.2%	-336.8
Project as a Whole	**1.4%**	**3.8%**	**2.4%**	**-392.1**

[22] Set by NERSA in 2009 but replaced in 2011 by the Renewable Energy Development Program

Summary Financial Appraisal

78. In the past, Eskom's financial performance was adversely affected by low electricity tariffs, rapidly rising generation costs and increasing debt burden as a result of implementation of a R340 billion capital expansion programme initiated by Eskom in 2005. The 2008 global financial crisis has also negatively affected South African economy and Eskom operations resulting in significant decrease in electricity demand and increase in borrowing costs. All these factors has compelled Eskom to change its financing strategy in the following ways:

- Secure government support to bridge investment needs: in July 2008, the National Treasury approved a R60 billion subordinated loan to Eskom, and in February 2009, the South African government committed its guarantee authority for up to R176 billion over the next five years. Additional government guarantees of R174 billon were provided to Eskom in 2010;
- Seek tariff increases from NERSA, in line with the approved MYPD methodology;
- Continue issuance of local and international bonds;
- Enhance access to ECA-backed and bilateral funding where feasible;
- Approach IFIs, such as AfDB, DBSA, the World Bank and others to fill the financing gap;
- Approach CTF for financing newer clean technologies to implement projects under the low carbon strategy.

79. Implementation of this strategy, combined with major tariff increases approved by NERSA in FY09, FY10 and FY11 (27.5, 31.3 and 24.8 percent respectively) has allowed Eskom to improve its financial performance in FY10 - FY11 and put the company on the path to financial sustainability.. In summary, despite period of weak financial performance in FY08-FY09 due to rapid growth of operating expenditures coupled with an increase in borrowings needed to finance the accelerated Investment Program, Eskom managed to return to profitability in FY10, when the company reported Net Income of R3,6 billion on Sales of R67 billion. In FY11, Net Income reached R8.4 billion on Sales of R92 billion.

80. Financial performance of Eskom is expected to further improve in FY12-FY13, mainly due to increase in generation and additional tariff increases already approved by NERSA for FY12 (25.8 percent) and FY13 (25.9 percent). At the same time, in order to maintain long term financial sustainability Eskom would need to either adjust cash flow requirements by canceling/postponing certain projects or secure additional annual tariff increases of around 25 percent in its MYPD3 (FY14-FY15) application in order to be financially sustainable in the long term.

81. Financial Analysis of Project Components: Financial analysis of each of the project components has also been carried out. As shown in Table 5 below, the Wind and CSP projects have negative NPVs on a standalone basis, but still financially viable for Eskom due to availability of long term debt financing from CTF and other multilateral and bilateral lenders for over 90 percent of the capital costs. Access to long-term, low-cost financing from CTF, IBRD and other financiers is shown to be critical for these projects to achieve positive NPVs for Eskom under the base case. Appropriate sensitivity and scenario analyses have also been conducted on these results, which are presented.

Table 5: Financial Analysis of Components 1 and 2

Component	Project IRR	Project NPV (Rand millions)	Eskom IRR	Eskom NPV (Rand millions)
Component 1 – The Sere Wind Power Plant	12.2%	0	19.0%	303
Component 2 – The Upington CSP	12.2%	0	16.1%	584

B. Technical

82. *Component 1 – Sere Wind Power Project*: Wind measurements are underway at the (Sere) wind farm site. Data for a continuous 12-month period was made available in April 2010 and the procurement process for the plant has commenced. An analysis of the data available so far shows that optimum generation would be achieved from 1.5 MW to 3.0 MW turbine units with an annual gross output of around 219 GWh at 26 percent load factor.

83. The project is fully scoped and specified, except for the transmission links in the Western Cape Province with respect to future IPPs. Cumulative emissions savings from the Sere Wind Power Project, based on an annual output of 219 GWh, would be 5 million tons of CO_2 over the 20-year life of the plant.

84. *Component 2 – Upington Concentrating Solar Power Project*: The Northern Cape Province, where the proposed plant is located, has one of the highest solar irradiation values in the world, with a Direct Normal Insolation (DNI) level of approximately 2,900 kWh/m^2 per year. The proposed Upington CSP demonstration plant is a tower and mirror design, configured to operate at 50 to 60 percent plant factor. The proposed CSP capacity is configured with thermal storage and has a load factor high enough to be considered as a partial baseload resource. Utilizing molten salt as a thermal circulating fluid and storage medium allows this design to achieve a 50 to 60 percent annual load factor with a total capacity of 100 MW.

85. CSP is an evolving technology with a number of innovative developments taking place globally. Eskom has undertaken a detailed technology review of CSP technologies, including the proposed technology, which has concluded that the proposed technology is optimal for heat storage to achieve the high plant factor Eskom requires. The next phase, which is currently underway, involves the appointment of an Owner's Engineer who will support Eskom during project implementation including the following specific activities: (a) validate the proposed design; (b) optimize plant size and design in light of ongoing technological developments; (c) prepare a preliminary design and warranty package for the first stage of the two stage procurement process; and (d) develop the final bidding package for the second stage of the procurement process. Responses from the prospective bidders will be incorporated in the final bidding package, as appropriate.

86. Upington CSP plant is expected to lead to a pipeline of similar projects undertaken by Eskom or as IPPs in South Africa. The estimated cumulative emissions savings resulting from a projected annual energy production of 516 GWh is 9 million tons of CO_2 equivalent over a projected twenty-year plant life.

C. Fiduciary

Procurement

87. Procurement activities will be carried out by Eskom, a State Owned Company with a single shareholder, and the Government of the Republic of South Africa, represented by the Minister of Public Enterprises. Procurement arrangements are explained in Annex 8.

Eskom Procurement Capacity and Controls

88. Eskom has a well-organized procurement system, with qualified and capable personnel. Organization of the procurement function comprises separate arms for policy, strategic sourcing such as bulk procurement of stock items, and capital procurement. Eskom's procurement process is governed by Eskom's policies and procedures and the country's legal framework as regards procurement and fraud and corruption.

89. Eskom's commercial activities are governed by the Public Finance Management Act (PFMA) which stipulates that an organization such as Eskom should have in place "an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost-effective." In addition, a governance structure is in place that allows for a proactive, in-process audit and assurance framework to be implemented with the objective of providing assurance to the governance structures that the transaction under review is in accordance with PFMA.

Procurement Risk Assessment

90. Upington CSP component constitutes approx 77% of the total project cost. The main CSP Package is the largest procurement package with an estimated cost of US$ 696 million. There are only a few bidders that are in possession of this new technology for the project of this size and hence there are risks of high prices and unsuccessful conclusion of bidding and award process. For the Wind Farm component, that is co-financed with AfDB and AFD there is some comfort level based on the experience in ongoing procurement process for the Wind Turbine Generator Package. However, the CSP component will be co financed with AfDB, AFD, KFW and EIB. In view of highly complex procurement for CSP and the number of financiers involved, the overall project risk for procurement is **high** and the residual risk after consideration of the corrective measures, including the MOU between the co-financiers, is **substantial to high**. The Bank will continue to closely monitor implementation of the corrective measures, which will mitigate the identified risks, and the residual risk may be adjusted during project implementation.

Procurement Methodology

91. Procurement will be carried out in accordance with Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004, revised October 2006 and May, 2010; and "Guidelines: Selection and Employment of Consultants by Bank Borrowers" dated May 2004, revised October 2006 and May 2010, and provisions stipulated in the Legal Agreements.

92. ASGI-SA related provisions, as proposed by Eskom and approved by the Bank Board for the EISP and proposed to also apply to this CTF financing, would be used in the procurement of goods, works and supply and installation contract packages.

93. The Bank will co-finance the project in partnership with other development partners. Sere Wind component will be co-financed with AfDB and AFD. CSP component will be co-financed with AfDB, AFD, KFW and EIB. This poses challenges and risks explained in Section III E, and in the Annex 8 "Procurement Arrangements".

Financial Management

94. Eskom is a public company, fully owned by the Government. Its financial affairs and disclosures are governed by its own Act, (read together with the PFMA, the Companies Act), its financial policies and International Financial Reporting Standards – with all of which it fully complies with. A financial management assessment of Eskom shows strong financial management capacity in accordance with applicable legal frameworks and Eskom's policies and procedures.

95. For FM implementation of the CTF project, Eskom will use its existing, acceptable SAP-based FM systems successfully used for the IBRD loan. This is based on the capability of the system to produce reliable and regular unaudited financial reports (IFRs) and other financial reports.

96. The Board of Directors is responsible for the preparation and fair presentation of the financial statements and their explicit legal responsibility includes the design, implementation and maintenance of internal controls relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error. The Board has delegated this function to the Financial Director. The internal controls system is also subject to robust internal audits governed independently by an Audit Committee (five independent non-executive Directors). There is also a Risk Management Committee, comprising four independent non-executive directors and the finance director.

97. Eskom's auditing arrangements are considered acceptable. Eskom's annual audit report together with a management letter and management's response are to be submitted to the Bank within six months of the end of each reporting period, that is, by September 30, of each year.

98. Eskom has opted for reimbursive disbursement method. Expenditures that are eligible for Bank financing will be paid from Eskom's own funds and request for reimbursement will be submitted to the Bank based on IFRs.

99. The FM arrangements meet the Bank's minimum requirements under OP/BP 10.02 Financial Management. (See "Annex 7- Financial Management" for details.). The overall FM risk rating is moderate.

D. Social

100. Land Acquisition and Resettlement. South African legal requirements for resettlement and compensation are broadly consistent with OP 4.12 (Involuntary Resettlement) as well as the Objectives and Operational Principles of OP 4.00 (Use of Borrower Systems to Address Environmental and Social Safeguard Issues in Bank-Supported Projects) Table A1, especially in the context of transparency in consultations with directly affected people, fairness of compensation, the widely-known availability of appeal mechanisms, and, particularly for the poor, a requirement for significant improvement in living quarters and opportunities for betterment of livelihood (economic rehabilitation).

101. South African law goes beyond market-value compensation, to include all costs needed for the affected landowner to re-establish an economic livelihood, including losses incurred during the transition period. South African law also guarantees that all people living on an acquired property, such as tenants, employees, or even squatters, are entitled to resettlement and assistance to improve their economic well-being.

102. One key area in which South African legislation, and Eskom's practice to date, differ from the Bank practices, is the absence of a requirement for preparation and public disclosure of a stand-alone Resettlement Action Plan (or Resettlement Policy Framework) prior to resettlement. It is important to note that the difference is not in the substance of the process, but that in South Africa there is no requirement to systematically document and make public how resettlement will occur, what rights and benefits are available, and what grievance and appeal procedures are available. This gap between the GoSA and the Bank resettlement process has been filled for ERSP through two actions by Eskom. On October 7, 2009, Eskom disclosed two documents that together constitute a Resettlement Policy Framework for the Project: the corporate resettlement policy and procedure, which clearly explains the principles and procedures Eskom follows in acquiring land and other assets,[23] and an overview of the potential land acquisition and resettlement for the components, which gives estimated land requirements and numbers of affected persons and explains the process Eskom will follow in

[23] "Procedure for the Involuntary Resettlement of Legal and Illegal Occupants on or from Eskom-procured Land" (July 2009).

addressing involuntary resettlement, land acquisition, and livelihood restoration (rehabilitation), including preparation and disclosure of RAPs for any future resettlement.[24]

103. Eskom has completed the acquisition of the 16 km^2 needed for the WPP. The land has been purchased from three farm owners on a willing-buyer, willing-seller basis. No resettlement will result from the development of the WPP or acquisition of the right-of-way for its 132-kV transmission line. Eskom has purchased the land for the Upington CSP from a single farm owner. The CSP itself will occupy 2500 ha, and the right-of-way for the 132-kV transmission line to connect to the grid is located on the same farm property. There will be no resettlement, and farming activities (mainly cattle grazing) will not be significantly affected because the amount of land to be acquired by Eskom represents less than 20 percent of the farm.

104. A review of Eskom's land acquisition and resettlement practices indicates that they fully meet the requirements of South African legislation.

105. Corporate Social Responsibility. Eskom endeavors to enhance the social and economic benefits of individual projects and to minimize adverse indirect impacts. At the corporate level, Eskom has established the Eskom Development Foundation, which has as its objectives "*providing support to economic and social projects through the vigorous promotion of support to registered small, medium and micro enterprises (SMMEs), particularly in communities where Eskom implements its capital expansion projects, as well as enhancing the quality of life in communities by supporting social projects.*"

106. HIV/AIDS. Eskom became concerned about the potential impact of HIV/AIDS on its workforce and operations in 1988. It commissioned an HIV/AIDS impact assessment in the mid-1990s and established a cost center for HIV/AIDS awareness and response in 1996. The Company has been a member of the Global Business Coalition on HIV/AIDS, Tuberculosis and Malaria since 2001 and, in 2007, received a "Best in Business Action" award from that organization for demonstrating best practices in HIV/AIDS response. Eskom's HIV/AIDS program consists of three key elements:

- Prevention and Awareness, using proven methods including trained peer educators (over 1,200 to date) and theater to reach employees at all sites, covering human rights and HIV/AIDS care as well as HIV prevention. All Eskom staff are required to take awareness training as a requirement in their performance contracts. Condoms are available through dispensers in most Company toilet facilities. The company provides treatment for sexually transmitted infections (STIs) free of charge through its clinics. Sessions run by people living with HIV/AIDS help address stigma associated with the virus.
- Voluntary Counseling and Testing (VCT), with Eskom paying for the first test, which can be done through any agency approved by the company.
- Care and support, including psychological support from counselors, access to antiretroviral therapy (ARVs) under the Company's medical aid insurance scheme (which covers all employees and their immediate families) through approved HIV clinicians, and monitoring of TB treatment at the Company's own clinics.

Eskom also takes its programs to community centers and schools in the vicinity of its facilities.

E. Environment

107. According to a review conducted by the Bank, South Africa's legal, regulatory and institutional framework is nearly fully equivalent to the Bank's corresponding safeguard policies for Environmental Assessment, Natural Habitats and Physical Cultural Resources and is consistent with South Africa's commitments to its international environmental agreements with respect to these

[24] "Status and Process of Land Acquisition and Resettlement for Eskom's Concentrating Solar Plant (CSP), Wind Energy Facility, Majuba Railway and Transmission Projects" (October 2009).

safeguards.[25] Additional review conducted as part of the identification mission confirmed the equivalency as well as the conclusion that Eskom and the environmental regulatory agencies have the institutional capacity, requisite procedures and track record to meet the acceptability criteria of OP 4.00 with respect to all applicable Bank safeguard policies. Accordingly, a Safeguards Diagnostic Review (SDR) was prepared for the Project, as described later in this section. A review of the environmental and social safeguards for the project components showed that the South African processes followed were consistent with Bank requirements.

108. Structure and institutional capacity: Eskom has developed substantial capacity to conduct EA, through independent consultants (as required by the EIA regulations); to prepare and implement EMPs; and to pro-actively engage the affected public and NGOs in informed consultation through transparent public disclosure of projects and alternative siting and mitigation strategies. An Executive Management Subcommittee on Sustainability and Safety guides Eskom's strategy on sustainability and environmental and occupational health and safety. At the technical level, the Subcommittee is supported by the Environmental Liaison Committee, which includes all environmental managers and representatives from the generation, transmission, distribution, audit, legal and research units. Overall, there are approximately 120 environmental and social professionals working at Eskom out of a total of 35,400 employees.

109. The DEA (formerly DEAT) is the lead agency for all issues involving environmental management, including EA; drafting of legislation and issuance of regulations affecting the environment; and monitoring environmental impacts, emissions and effluents from point sources, including electrical generation and transmission facilities. At the end of December 2009, DEA had 1,874 authorized staff positions with an 18 percent vacancy rate. DEA is organized into six integrated departmental programs, each led by a separate organizational unit, or branch, and supported by various public entities and statutory bodies: The Environmental Quality and Protection (EQP) unit is mandated to protect and improve the quality and safety of the environment, including air, water and soils. Within EQP the Chief Directorate of Environmental Impact Management is responsible for all aspects of EIA and is divided into separate Directorates for Environmental Impact Assessment, Environmental Impact Processing and Environmental Impact Management.

110. Environmental Assessment: The Bank has reviewed the EIAs for the Sere WPP and its transmission line and for the Upington CSP. Both include documentation which shows that Eskom fully adhered to the country EA procedures including scoping and public consultation on the scoping reports and the draft EIAs. The Bank safeguards specialists have visited the sites for these facilities.

111. The site selected for the Sere WPP is sparsely populated and, with the exception of one small area at the northwestern corner that the EIA recommends be avoided, does not contain any unique or rare vegetation. It is used for low-density sheep grazing. The single significant impact is the visual presence of up to 100 wind turbines, mounted on 80-m pylons with blades 45 m in length. Between 40 and 50 of them will be installed in the first phase of the development, which the project is supporting. The visual impact cannot be mitigated, but the number of people affected will be small. Ultimately, the WPP is likely to become a tourist attraction, for which the visual impact will be positive. Bird and bat collisions that have been problems at wind generation sites are not expected to be major problems at this one, according to the EIA, because the site is not on a known migratory corridor for either birds or bats, and there are no significant terrestrial or marine bird rookeries or nesting areas in the project area.

112. The Upington CSP site is on a single farm in an area that is also sparsely populated. The EIA notes that the visual impact of the 210-m tower cannot be mitigated and recommends, instead, the installation of a visitors' center to serve tourists who are likely to be attracted to this unusual facility. The other main impact described in the EIA is bird mortality, caused by collisions with the reflecting

[25] South Africa, Safeguard Diagnostic Review for South Africa: Development, Empowerment and Conservation in the iSimangaliso Wetland Park and Surrounding Region (iSimangaliso), Consultation Draft, November 2008 (SDR).

surfaces of the heliostat and burning when birds pass through intermediate points at which the energy from groups of heliostats is focused during the startup of each day's operation. Noting that there is very little experience with bird mortality at solar energy plants, the EIA expects the impact to be moderate and recommends monitoring to measure the actual results.

113. Natural Habitats: Neither the WPP nor the CSP are located in important natural habitat, and both sites have been disturbed to varying extents by livestock grazing. However, field surveys did detect scattered specimens of Red List plants and some birds and animals in vulnerable or near-threatened status particularly at the CSP site. The EIAs recommend detailed surveys in advance of construction and rescue programs to relocate plants or animals that cannot be avoided. The transmission line from the WPP would have passed through one area of unique vegetation, but Eskom has accepted the EIA's recommendation to modify the alignment and avoid that area.

114. Physical Cultural Resources (PCR): Sixteen Late Stone Age middens[26] were found on the WPP site itself and, although small adjustments in turbine footing locations can avoid some, it will not be possible to avoid all of them. The middens are not considered to be particularly rich in artifacts, but they have research value that will be lost once they are disturbed. The EIA recommends that Eskom apply for permits to sample middens that cannot be avoided, under supervision of Heritage Western Cape. Once sampling is complete and the materials have been properly stored, Eskom can apply for permits for destruction of the remaining materials. The chance find procedures Eskom already has in place will be important because there could be Early Stone Age material in deeper strata on the site. PCR is not an issue at the CSP site.

115. Use of Country Safeguards Systems. In line with OP 4.00, an SDR has been prepared. A draft of the SDR was publicly disclosed on November 11, 2009 and was the subject of a stakeholder consultation workshop in Pretoria on December 9 and 10, 2009. The final SDR takes into account the comments received at the workshop and in writing during the comment period, which ended on January 10, 2010. The Executive Summary of the SDR is presented in Annex 10 of this PAD. In keeping with best practice, all EIAs and EMPs for the project, which have already been disclosed to meet DoEA and Eskom requirements in-country, have also been disclosed via the Infoshop. The gap-filling measures described in Annex 10 have been completed as described in Table 6 below.

Table 6: Use of Country Systems – Gap Filling Measures

Identified Gap	Gap-filling Measure
GoSA EIA Regulations do not require costs or capacity-building to be included in alternatives analysis for all types of projects.	Eskom standard procedures already call for consideration of costs in alternatives analysis.
GoSA regulations on physical cultural resources do not specify a chance finds procedure.	DoEA Records of Decision require chance finds procedure. Eskom already has a chance finds protocol that it incorporates in construction contracts.
GoSA regulations on land acquisition do not require preparation and disclosure of stand-alone resettlement action plans or public disclosure of evaluations of resettlement and livelihood restoration outcomes.	Eskom's formal corporate resettlement procedure issued in July 2009 specifies that resettlement action plans are to be prepared and disclosed and that post-resettlement independent audits that are prepared per Eskom practice also will be disclosed.

F. Safeguard policies

[26] A midden, also known as a kitchen midden, or a shell heap, is a dump for domestic waste. The word is used by archaeologists worldwide to describe any kind of historical feature containing accumulated waste products relating to day-to-day human life. They may be convenient, single-use pits created by nomadic groups or long-term, designated dumps used by sedentary communities that accumulate over several generations. The late Stone Age is commonly considered to have begun 50,000 years before the present and to have ended in Africa approximately 3,500 years before the present.

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

G. Policy Exceptions and Readiness

116. The ASGI-SA is an initiative of the GoSA, initiated in 2004, to reduce poverty and inequity by steady improvement in the economy's performance and job-creating capacity. The Constitution of South Africa has affirmative action provisions in the procurement undertaken by the State or its institutions for advancement of previously disadvantaged persons or categories of persons. One of the objectives is to advance Black Economic Empowerment. It is in this context that public agencies including Eskom are required to seek local content and skills development targets as key evaluation criteria in tenders that they award. Such practice does not align with the Bank's procurement policy as it does not fall under the Bank's Domestic Preference provisions where a margin of preference in the bid evaluation is given for goods manufactured in the country of the Borrower or for works when comparing bids from domestic contractors with those from foreign firms.

117. Board approval is being sought for the inclusion in the bidding documents of the ASGI-SA related provisions as proposed by the Borrower. Such inclusion has been approved for the Eskom Investment Support Project which will co-finance this Project.

118. The Project is ready for implementation. The procurement plan for the first 18 months has been prepared for the Project, and procurement of some contracts has already been initiated.

Annex 1: Country and Sector or Program Background

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Country Background

1. South Africa has a population of about 49 million and a GDP of about R2.7 trillion in 2010 (about US$386 billion). It is the largest economy in Africa, accounting for about 35 percent of the region's GDP and about two-thirds of the combined GDP of the Southern African countries. The largest contributors to GDP are finance, real estate and business services (21.2 percent in 2010) and manufacturing (16.1 percent).

Macroeconomic Update

2. The global economic crisis, in particular, has taken a heavy toll on the South African economy, which is only now beginning to emerge from its first recession in 17 years. Following three consecutive quarterly declines during 2008Q4-2009Q2, output registered six consecutive quarters of positive growth. GDP growth was 4.4 percent (quarter on quarter, seasonally adjusted and annualized) in 2010Q4, reaffirming the momentum of the economic recovery. The decline in economic activity, albeit widespread, has been particularly sharp in manufacturing and mining,[1] as the demand for the country's exports plummeted, commodity prices fell sharply,[2] and domestic private sector demand came to a virtual standstill. Construction, buoyed by a massive government spending program on roads, power, and stadiums for the 2010 soccer World Cup, has been one of the only sectors to grow. Reflecting the economic slowdown, over 1 million jobs were lost as a result of the recession, with the unemployment rate increasing from 21.9 percent in 2008Q4 to 25.3 percent in 2010Q3. The unemployment rate fell to 24 percent in 2010Q4.

3. Fortunately, South Africa entered the downturn with a sound macro/fiscal position, enabling aggressive countercyclical fiscal and monetary responses.[3] In particular, fiscal space generated by several years of budgetary discipline and low public debt (net and gross loan debt of the national government were just 22.7 and 27.1 percent of GDP by end-2008/09), together with South Africa's deep and liquid capital markets and continued access to global finance, allowed the government to undertake a substantial fiscal expansion to offset the weak private sector demand. The emphasis has been on significantly scaling up infrastructure spending and protecting and enhancing social sector spending in certain areas, despite a major decline in revenues. Together with sizeable across-the-board salary increases in the public sector in FY2008/09 and FY2009/10, this caused the fiscal balances to worsen from a surplus of 0.9 percent of GDP in FY2007/08 to a deficit of 6.9 percent of GDP in FY2009/10: the ratio of public sector borrowing requirement to GDP meanwhile increased from 1 percent in FY2008/09 to 6.6 percent and 5.3 percent in FY 2009/10 and FY2010/11. The 2011/12 Budget purports to extend the expenditure trends, by proposing a R623.6 billion infrastructure investment plan for the FY2010/11-FY2014/15 period by major state-owned entities, R421.6 billion of which would be incurred by Eskom and R93.2 billion by Transnet with substantial cover in the form of government guarantees.[4] Fiscal balances are projected to improve gradually over the medium term, an outcome predicated upon revenues picking up with economic recovery and moderation of expenditure

[1] While real GDP fell 1.5 percent in 2009, manufacturing and mining and quarrying sector value added experienced larger declines, 10.4 and 4.2 percent respectively.

[2] Despite strong recovery in the past few months, most commodity prices remain below their pre-crisis levels.

[3] The framework for South Africa's response to the crisis was discussed and agreed upon by Government, labor, and community representatives in February 2009. Key elements of the agreed framework included fiscal and monetary expansion, accelerated public sector investment, protection of jobs and investment in people and productive capacity, and supporting vulnerable sectors such as clothing and textiles and automobile manufacturing.

[4] Priority areas in the budget include (1) education; (2) health care; (3) crime prevention; (4) rural development; and, (5) job creation.

growth.[5] The budget deficit and public sector borrowing requirement would fall to 5.3 percent and 5.4 percent, respectively, in FY2011/12 and further to 3.8 percent and 4.2 percent, respectively, by FY2013/14.

4. Longer-term fiscal sustainability remains of concern to the government as it carries out the short-term stimulus. This is especially important in South Africa's case given its reliance on domestic capital markets for financing, for which it is critical that it retains its investment-grade sovereign rating. Thus far, the markets have remained comfortable with the fiscal frameworks, despite the rising government debt levels, and sovereign ratings have been maintained. Clearly, the solid record of fiscal prudence and macroeconomic stability, transparent budgetary institutions, and broad political consensus on sound public finances has worked in the government's favor.

5. Growth is projected in the 2011 Budget to improve gradually, from 2.8 percent in 2010, to 3.4 percent in 2011 and further to 4.4 percent by 2013. Recovery in global demand for South African exports and a pick-up in global commodity prices, based largely on continued strong demand in China and India, will be important for improved growth performance of the South African mining and manufacturing sectors. Sustained large infusions of public sector investments are essential to addressing the significant gaps in infrastructure, especially electricity generation and transport. Together with complementary policy measures to free up product market competition, these investments would lay the basis for enhanced participation by private investors – in large scale infrastructure as well as smaller private enterprise. Continued focus on low and stable inflation and rollback of the countercyclical fiscal measures, as indicated by the 2011 Budget, would maintain macroeconomic stability and sustainability in the country, which for some time have been among the key attributes of the South African economy that have sustained the interest of foreign investors.

Sector Background

A. Energy Resources in South Africa

6. South Africa has very little crude oil or natural gas, but it has the world's sixth largest recoverable coal reserves, estimated at 54 billion short tons (about 5 percent of the world's reserves). Proven oil reserves are estimated at 15 million barrels and natural gas at 318 billion cubic feet (Bcf).[6] Domestic production of oil amounts to approximately 40 percent of total consumption, but a significant percentage of the oil produced is from coal (synthetic oil). Sasol, the biggest local company listed on the South African stock market, produces synthetic fuels from low-grade coal and a small amount from natural gas. It operates the world's only coal-to-liquids synthetic fuels facility, and produces around 36 percent of liquid fuels consumed in South Africa.

7. As estimated in 2006, South Africa produced 102 Bcf of natural gas and consumed 109 Bcf; the remaining 7 Bcf being in the form of imported Natural Gas Liquids (NGL). Most of South Africa's natural gas production is synthetic gas from coal. Exploration for natural gas is continuing in Mossel Bay.

8. Accordingly, coal is the main energy resource available for power generation in South Africa. Coal has traditionally dominated the energy supply sector in South Africa, from as early as 1880 when coal from the Vereeniging area was supplied to the Kimberly diamond fields. The later gold discoveries in the Witwatersrand area and the growing rail infrastructure placed increasing demands on coal. As South Africa evolved into a mining giant, coal was used more and more to generate steam, compressed air and then electricity.

[5] Public expenditure is projected to grow at around 8.7 percent per year over the FY2011/12-2013/14 period, compared with 15 percent growth during FY2008/09-2010/11.
[6] Energy Information Administration, Country Analysis Brief, October 2008.

9. South Africa is the fifth largest coal producing country in the world, producing an average of 224 million tons of marketable coal annually. Twenty five percent of this production is exported internationally, making South Africa the third largest coal exporting country. The remainder of South Africa's coal production feeds the various local industries: Fifty three percent is used for electricity generation, 33 percent for petrochemical industries (Sasol), 12 percent for metallurgical industries (Iscor) and 2 percent for domestic heating and cooking. At current production rates the coal supply should last another 200 years.

10. Environmental concerns pose the main challenge to coal as an energy source. Not only does the burning of coal cause air pollution, mining activities to extract the coal also have a severe impact on the environment. Advances in technology are now starting to guide international and local industries in how they can control the use of fossil fuels, coal in particular.

11. South Africa also has the potential to use coal to generate methane. Coal Bed Methane (CBM) potential is estimated to be at least 3,500 PJ[7] in South Africa but has not been developed yet. Exploration has been initiated at a number of sites (e.g., Bothaville Magisterial District of the Free State Province, and in the Waterberg region. In the Waterberg region the resource is expected to exceed 1 TCF, and a pilot project that includes a pioneering clean energy fuel cell using the gas is underway. Another pilot involving coal gasification for power generation is underway in the Majuba area, where it is not commercially viable to mine the coal. The project is expected to culminate in about 2000 MW equivalent of gas-fired power plants.

12. South Africa also has uranium reserves estimated at 157,853 PJ[8] thus allowing for further development of its nuclear power program. South Africa currently operates one nuclear facility, Koeberg, located near Cape Town. The plant, consisting of two 965 MW reactors (actual total net capacity 1,840 MW), is the only nuclear power plant on the African continent.

13. South Africa has attractive solar resources. Renewable applications are the least cost energy service in many cases from a fuel resource perspective (i.e., the cost of fuel in generating electricity from such technology); more so when social and environmental costs are taken into account. However, the capital-costs are high. South Africa has been endowed with considerable potential for solar energy (estimated at 8,500,000 PJ/yr), and limited wind (220 PJ/yr) resources. Also, small hydro and biomass are available at 20 PJ/yr and 323 PJ/yr, respectively. Solar and wind are the two priority options for potential renewable energy development. Solar development will follow the evolution of new technologies suitable for baseload operation.

14. The government has announced its target to generate 10,000 GWh from renewable sources by 2013. Itis working hard to achieve this target, but there is likelihood of a slippage of one to two years. The proposed project will contribute to this target and DoE is currently finalizing documentation for the procurement of IPPs for additional capacity towards the target.

15. While many regional energy resources are potentially available (hydro from DRC, Mozambique and Zambia, coal-fired power from Botswana and gas-fired power from Namibia and Mozambique), they will not be developed soon enough to address the short-term needs of South Africa. Other than nuclear power, which has been shown to be prohibitively expensive, the country has no other renewable or low carbon source that could substitute for coal for baseload operation. The only other renewable source, hydro, is exhausted; its developed potential is only used for peaking.

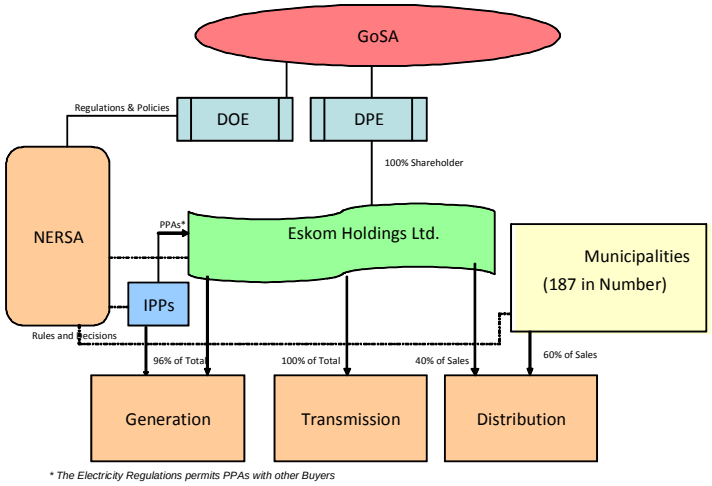
B. Electricity Sector Institutions

16. The principal entities in the South African electricity sector are:

[7] Source: South Africa/Initial National Communication to UNFCCC, October 2000
[8] Source: South Africa/Initial National Communication to UNFCCC, October 2000

a. the Department of Energy (DoE), which is the national government ministry responsible for developing policy for the sector and formerly a part of the Department of Minerals and Energy (DME);
b. the National Energy Regulator of South Africa (NERSA), which has regulatory authority in the sector;
c. Eskom Holdings Ltd. (Eskom), the publicly-owned vertically integrated utility company; and
d. the Municipal Electric Utilities (MEUs), which provide distribution services to about 60 percent of the power customers in South Africa, by number (40 percent of the total amount of power consumed), with the remainder being supplied by the distribution component of Eskom.

Figure 1: Electricity Sector Structure



17. *The Department of Energy*: The DoE is the entity that develops policy measures for the electricity sector, which are expressed in primary or secondary legislation, or by way of policy statements. Legislation, such as the 2008 National Energy Act, is subject to approval by Parliament, and major policy statements, such as the 1998 Energy White paper or the 2008 Electricity Pricing Policy, are considered by the Cabinet. Other policy initiatives, such as the proposed 2009 Electricity Regulation, only require approval by the Minister of Minerals and Energy.[9]

18. In accordance with Section 33 of the Constitution of the Republic of South Africa, and the provisions of the 2000 Promotion of Administrative Justice Act, the DOE undertakes public consultation processes before issuing final versions of policy pronouncements or of secondary legislation. DME also hosts South Africa's Designated National Authority (DNA), which approves projects for the Clean Development Mechanism (CDM).

19. *The National Energy Regulator of South Africa:* NERSA was established as an independent regulatory authority pursuant to the National Energy Regulator Act, 2004. Initially, NERSA was referred to as the National Electricity Regulator and had responsibility for regulating only the electricity sector. In 2006 it also became responsible for the regulation of natural gas and petroleum pipelines.

20. For the electricity sector, NERSA is responsible for:

[9] The Ministry of Minerals and Energy has been recently reorganized and is being led by two separate Ministers, one for Energy and one for Minerals.

a. issuing licenses (with terms and conditions) to entities engaged in the generation, transmission, distribution, import/export and trade of electricity;
b. maintaining a register of entities engaged in the above-noted activities that do not need to be licensed under the Electricity Regulation Act, 2006; such as non-grid supplies of electricity for residential use, and
c. monitoring compliance with license terms and conditions.

21. As part of its licensing function, NERSA is also responsible for the economic regulation of the sector, including:

a. evaluating tariff applications from licensees; and
b. issuing tariff guidelines and methodologies (such as the Multi-Year Price Determination methodology, known as MYPD).

22. *Eskom Holdings Limited*: Eskom Holdings Ltd. (Eskom) is South Africa's national, vertically integrated electricity utility, and is wholly owned by the Government, through the Department of Public Enterprises (DPE). Eskom's current structure is defined by the Eskom Conversion Act of 2001 and its operations regulated[10] by NERSA, and by the National Nuclear Regulator in terms of the National Nuclear Regulatory Act (47) of 1999. The utility employs about 39,222 staff (reduced from about 66,000 over the past two decades). Eskom is responsible for most of South Africa's electricity generation, all transmission, and 40 percent of distribution (by percent of population).[11]

23. Eskom is the 13th largest power utility in the world in terms of generating capacity and the 9th in terms of sales, which is a sign of comparatively better capacity utilization. Eskom's generation assets comprise 26 medium- and large-sized power stations under operation, with a cumulative capacity of about 40,870 MW. Thirteen of these are coal-fired and account for 87 percent of total capacity (92 percent in terms of energy). Hydropower (8), including pump storage, accounts for 6 percent; nuclear (1), for 5 percent; and liquid-fueled gas turbines (4), for 2 percent. Eskom imports 1,700 MW from Mozambique and currently exports to neighboring countries of Swaziland, Lesotho, Mozambique, Botswana, and Namibia.

24. *Municipal Electric Utilities:* There are 187 MEUs providing distribution services in South Africa. There is significant disparity in the size and degree of sophistication of these entities, which range from relatively large, well-organized undertakings in the major urban centers, to extremely small operations with very few employees in more remote locations. These 187 MEUs purchase electricity in bulk from Eskom, which as noted above, also carries on its own distribution business in various parts of the country. It is a highly fragmented structure for the distribution industry, which contributes to the adverse financial state of the distribution sector. This is further aggravated by inefficiencies, disparities in tariffs, unequal treatment of customers, inadequate maintenance of networks and an inability to capitalize on economies of scale.

[10] Eskom is regulated under licenses granted by the National Energy Regulator of South Africa (NERSA), originally under the Electricity Act (41 of 1987), and replaced by licenses under the Electricity Regulation Act (4 of 2006), and by the National Nuclear Regulator in terms of the National Nuclear Regulatory Act (47 of 1999).

[11] Private generators account for about 3 percent of generation (mostly for their own consumption) and municipalities account for the remaining 1 percent. RED authorities (185 in total) manage the balance of electricity distribution by buying power in bulk from Eskom. The DPE as the single shareholder on behalf of the Government oversees the operations of Eskom, which is set up as a Public Company as per the terms of the 2001 Eskom Conversion Act.

C. Electricity Sector in South Africa: Generation, Distribution & Transmission

25. *Electricity generation*: As of January 1, 2009, the total installed capacity of South Africa was 43,257 MW, with Eskom plants representing 42,109 MW and other plant owners having the remaining 1,148 MW.[12] Eskom's installed power generating capacity includes a nuclear plant (1,800 MW), coal-fired power plants (33,036 MW), pumped storage (1,400 MW), open cycle gas turbines (2,414 MW) and the remaining hydropower. The coal-fired plants, along with the Koeberg nuclear power plant, constitute the baseload capacity of South Africa. The Koeberg plant has been in operation for approximately 30 years. Also, electricity is being imported from the Cahora Bassa hydro plant (installed capacity 2,075 MW) in Mozambique.

26. *Electricity Distribution*: A program of progressive rationalization of the distribution business with the objective of improving its overall efficiency has been formulated. In October 2006 the Cabinet approved the proposal to create the six REDs to consolidate the electricity distribution businesses of the municipalities and Eskom. Currently EDI Holdings is responsible for implementing the GoSA's restructuring policy. In parallel the Government initiated establishment of an Independent System Market Operator (ISMO). A bill to this effect has been recently approved by the South African Cabinet and soon will be published for public consultation. The Government also undertook a massive electrification program as part of the post-apartheid efforts, designed to improve the distribution of incomes and quality of life for the poorer segments of the population. Electrification rates have decelerated in the recent past, as financial issues have limited the sector's implementation capacity.

27. Transmission System: The transmission system of South Africa consists of approximately 28,000 km of high voltage lines above 132kV and is owned and operated by Eskom. Expansion of the transmission system is planned to accommodate the increased demand and planned generation capacity. Eskom's planning process identifies three distinct planning periods:

- 5 Year Supply Plan: Commitment of expenditures has already been made;
- 10 Year Transmission Development Plan: Projects in advanced planning with pending commitments; and
- 20 – 25 year Horizon View: Evaluation of alternative scenarios of future grid requirements and identification of robust strategy or least regret projects.

D. Policy Making and Integrated Resource Planning for the Electricity Subsector

28. As the country's economy continues to grow, energy is increasingly becoming a key focus. The Department of Energy is responsible for ensuring development, processing, utilization and management of South Africa's energy resources.

29. *Energy Expansion Planning*: The planning function for public investments in the energy sector of South Africa is very robust. The DOE performs Integrated Energy Planning (IEP) to identify future energy demand and supply requirements. In the past the National Electricity Regulator performed the National Integrated Resource Planning (NIRP) to identify the future electricity demand and supply requirements. Similarly, Eskom used to continually assesses the projected electricity demand and supply through a process called the Integrated Strategic Electricity Plan (ISEP).[13] In mid 2009, the ISEP was superseded by the Integrated Resource Plan (IRP), a tool formulated by the Department of Energy for the electricity sector. Through these assessment and planning processes, the most likely future electricity demand based on long-term Southern African economic scenarios is forecast, which

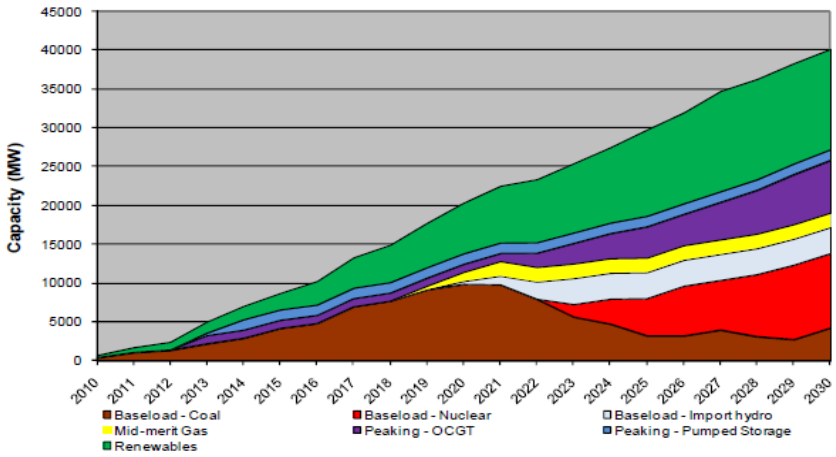
[12] This is installed capacity; available capacity is less than installed capacity and varies from year to year.

[13] ISEP is a robust planning tool developed by Eskom that analyses and prioritizes the base and peak load capacity requirements based on rigorous analyses of alternatives for supply under various demand scenarios. Based on detailed analysis of each of the above aspects, the model compares the various generation capacity options and arrives at the optimal mix for the power system.

provides the framework for Eskom and the Government to investigate a wide range of supply- and demand side scenarios and technological options to meet the needs of the sector.

30. The second IRP (IRP2 or IRP 2010) was approved by Cabinet in March and promulgated in May 2011. Under the IRP, Eskom is expected to continue with the current build program and completion of the return-to-service program (RTS) of the previously mothballed coal-fired power stations. In addition, the renewable energy development program, Medium Term Power Purchase Program (MTPPP) and the open-cycle gas turbine (OCGT) independent power producers (IPPs) are expected to provide additional capacity in the medium term. From the demand side perspective, the IRP2 incorporates known demand side management programs including commercial, industrial and residential, for a total savings of 23TWh by 2019. Figure 3 below provides the new capacity additions technology mix by 2030.

Figure 3: New Capacity Additions Technology Mix (2010-30)



E. Electricity Sector & Climate Change

31. The South African government ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997 and acceded to the Kyoto Protocol (the enabling mechanism for the convention) in August 2002. However, producing and distributing electricity has environmental consequences that must be managed to ensure sustainable development. Eskom has clearly stated that it is determined to play its part and is committed to accelerating efforts to address these challenges.

32. South Africa has been active in the climate change policy arena for over a decade. Progress has been slow, but momentum continues to grow. Eskom actively participates in various national and international initiatives, including the Combat Climate Change (3C) initiative. This business leaders' initiative aims to form a global opinion group consisting of companies that demonstrate leadership by demanding an integration of climate issues into the world of markets and trade. Eskom also actively participates in the World Business Council for Sustainable Development (WBCSD) and the International Emissions Trading Association (IETA). Eskom is the co-chairman of the Electricity Utilities workgroup under the WBCSD, an important platform that allows Eskom to talk to its industry peers. In addition Eskom has partnered with World Wildlife Fund (WWF) of South Africa to stimulate research into the renewable energy industry and joined the partnership to stimulate energy efficiency through the signing of the South African National Business Initiative's energy efficiency accord.

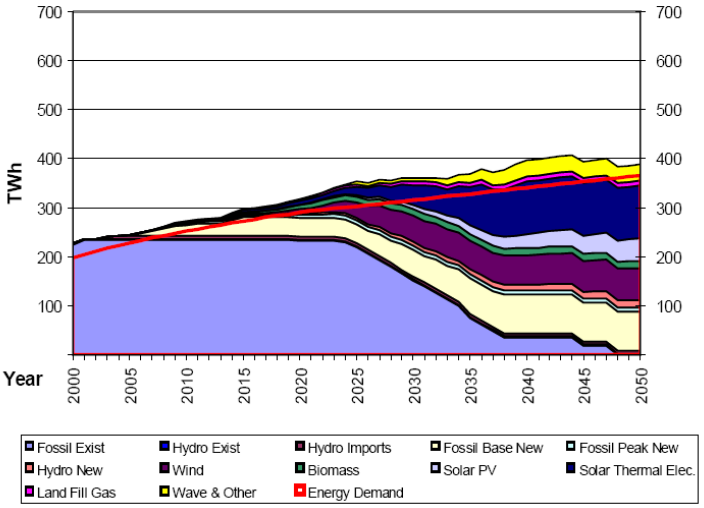
33. Not many countries have adopted supercritical and CCS ready designs in their approach to climate change and the reduction of CO2 emissions. However, South Africa has determined that all of

its new coal-fired-plants will be undertaken using more efficient technologies. This is in line with the GoSA's commitment on climate change and its adoption of CO_2 abatement curves under the South Africa LTMS. In addition, adoption of low-carbon technologies also is in line with the Bank Group's Climate Change Strategy as well as the criteria for securing support from the Clean Technology Fund (CTF).

34. In order to moderate demand growth, Eskom, together with the DoE and NERSA, has embarked on a DSM program aimed to save 3,000 MW of generation capacity by 2013 at a cost of approximately R10 billion (US$1.25 billion). The EE/DSM programs represent the Government's first steps towards implementing its LTMS designed to deal with climate change issues.

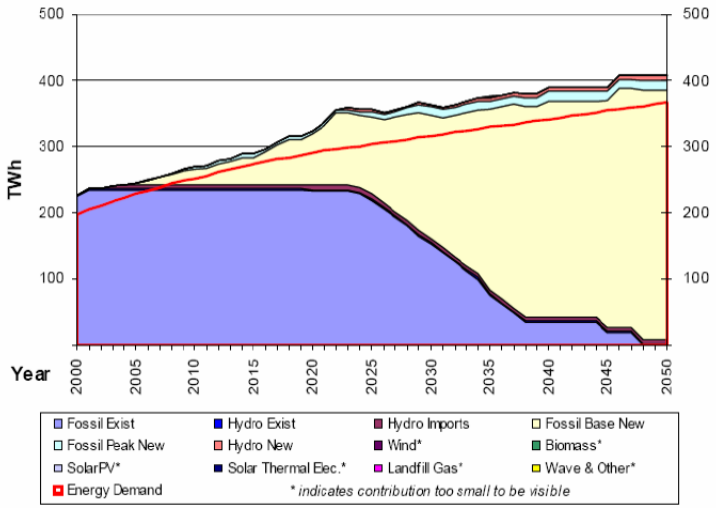
35. Although the Government does not expect RE to relatively contribute much to the energy mix until 2013, it is taking steps to address barriers, such as by introducing feed-in tariffs and establishing a suitable legal and regulatory framework. Whereas the White Paper on Renewable Energy (November 2003) sets a target to supply 4 percent[14] of projected electricity demand for 2013 (below 2000 MW), estimates show that with an enabling legal and regulatory framework and enhanced research and development, local and regional renewable energy sources could contribute significantly to the country's energy mix over time. Figure 2 shows a "Progressive" RE scenario and Figure 3 shows one for "Business as Usual." Some of the SAPP countries such as Mozambique, Zambia and Democratic Republic of Congo, have, with multilateral support (including from the World Bank Group) initiated work on the development of medium- and large-sized hydroelectric power projects. Expeditious development of these projects, and the Bank's proposed support and engagement with Eskom are expected to move South Africa to a progressive RE scenario.

Figure 2: Progressive RE Scenario Installed Capacity



[14] The target is likely to be raised in the revised White Paper in 2010.

Figure 3: Business as Usual RE Scenario Installed Capacity



Source: Banks D. and Schaffler J; 2006

36. Eskom currently tracks and monitors greenhouse gas emissions and continues to improve the accuracy and reporting of its greenhouse gas footprint. Emissions have been increasing over the last decade due to the dominance of coal in South Africa's energy mix and increasing demand for electricity. Although no current restrictions apply to Eskom's greenhouse gas emissions, a comprehensive range of voluntary climate change initiatives has been pro-actively developed.

37. Eskom's climate change strategy, as approved by its Board, proposes immediate and longer term (post-2012) action to reduce these emissions and adapt to the negative impacts of climate change. The strategy ensures that climate change considerations are included in investment decisions; for example, taking into account future carbon prices. The strategy was internationally peer-reviewed in 2006 and was judged to be best practice for addressing climate change, even when compared to utilities in developed countries, given the resource constraints South Africa faces.

38. Eskom's overall future mix of energy solutions is intended to reduce its reliance on fossil fuels while emphasizing the growing contribution of alternatives and demand side measures. Eskom's response to climate change is multifaceted and encompasses strategies to reduce emissions as well as to adapt to the impacts of a changing climate, including:

a. Short- to medium-term initiatives focused on *energy efficiency*. Eskom has led the way with its internal energy efficiency program, together with working with consumers to reduce their demand and thus reduce all emissions, including carbon. This program (which in the future is expected to be led by the Independent System Operator will build on existing successes to significantly reduce future emissions through nationwide deployment. More recently, measures to reduce emissions have included the DSM program. Eskom has begun this process by seeking efficiency improvements in the use of electricity. Savings will grow as the accelerated DSM program is rolled out in the years ahead and the aims of the internal Eskom energy efficiency program are realized. The climate change strategy has mobilized, and will further mobilize, CO_2 reduction mechanisms to combat climate change.

b. *Adaptation* mechanisms are of special importance to Eskom as extreme weather events severely affect the performance of wet-cooled power stations, transmission and distribution infrastructure, line and thermal efficiency and the operation of hydro-electric plants. The effect of changing rainfall patterns poses a particular threat to water availability for power station operation. Some adaptation measures considered include the

consideration and adoption of dry cooling for new power stations (and retrofitting some existing facilities), thus reducing plant water consumption by approximately 90 percent.

c. The *diversification* of South Africa's energy mix is a medium- to long-term initiative, which will result in significant cuts in emissions. The extensive deployment of renewable energy resources will form the basis for long-term cuts in greenhouse gas emissions. Diversification entails a long-term effort to harness a variety of new and existing technologies. To remain alert to future opportunities, Eskom is developing technology roadmaps that identify new technologies and predict when they will be ready for implementation. The coal technology roadmap was the first of the roadmaps to be initiated.

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Sector Issue	Project	Ratings (Bank-financed projects only)		
		IEG Ratings		
Completed Projects		***Outcome***	***Risk to Development Outcome***	***Borrower Performance***
None in South Africa	None in South Africa			
		OED Ratings		
		Outcome	***Sustain-ability***	***ID Impact***
None in South Africa	None in South Africa			
		Latest Supervision (ISR) Ratings		
Ongoing Projects		***Implementation Progress (IP)***	***Development Objective (DO)***	
Enhancement of power supply and energy security in an efficient and sustainable manner so as to support economic growth objectives abd South Africa's lomg term carbon mitigation strategy	Eskom Investment Support Project	S	S	
Removing barriers to, and reduce the implementation costs of, renewable energy technologies to help mitigate greenhouse gas emissions from grid based projects.	Renewable Energy Markets Transformation Project (GEF only)	U	MS	
Improvement of ecosystem functioning of the Lake St Lucia and Umfolozi River System.	Development, Empowerment and Conservation in the Greater St Lucia Wetland Park and Surrounding Region - Isimangaliso Wetland Park (GEF only; first use of UCS for Safeguards)	NA	NA	
Other Development Agencies				
European Investment Bank	Loan Facility to finance 765 kV transmission lines (2009)			

Japan Investment Cooperation Agency	Loan Facility to finance energy efficiency (proposed 2010)
African Development Bank	Loan Facility to finance the 4800 MW Medupi Power Plant (2009)
Agence Française de Développement	Loan Facility to finance the Sere Wind Power Plant (as a restructuring of an earlier loan facility) (proposed 2010) & a credit facility through commercial banks in South Africa to finance renewable energy and energy efficiency projects.
Euler Hermes Kreditversicherungs-AG	Loan Facility Coverage to the Boiler Contract of the 4800 MW Medupi Power Plant (2009)
KfW Bankengruppe	Loan Facility Export Risk Cover for the Turbine Contract of the 4800 MW Medupi Power Plant (2009)

Annex 3: Results Framework and Monitoring

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Results Framework

PDO outcomes	Project Outcome Indicators	Use of Project Outcome Information
(a) Direct GHG emissions avoided (b) Leveraged new and additional resources for clean technology projects (c) Energy supply from renewable sources	• Incremental GWh of renewable energy. • Tons of CO_2-equivalent mitigated • Leverage factor of CTF funding, amount of financing from other sources	• Assess contribution towards reducing carbon emissions • Gauge ability of the CTF support to attract financing from other sources.
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
(a) Implementation of Sere wind farm (b) Implementation of Upington CSP (b) Employment generated	• % progress of Sere wind farm • % progress of Upington CSP. • Number of jobs created by the project.	• Gauge implementation progress • Assess development impact generated by the project through new employment
CTF Catalytic Replication Outcomes	**Indicators**	**Use of CTF Catalytic Replication Outcome Information**
(c) More energy supply transformed to low carbon development pathways (d) Increased investment in clean energy generation technologies	• Total investment in clean energy generation (public and private) • Investments in clean energy generation as a share of all investments in electricity generation • Change in overall energy supply from renewable sources	• Gauge increase of clean energy sources in the energy mix • Gauge increase in private and public financing for renewable projects

Arrangements for Results Monitoring (Refer to Annex 11)

Project Development Objective (PDO): facilitate accelerated development of large scale renewable energy capacity in support of the long-term carbon mitigation strategy of South Africa.											
PDO Level Results Indicators	**Core**	**UOM**[41]	**Baseline**	**Cumulative Target Values**					**Frequency**	**Data Source/ Methodology**	**Responsibility for Data Collection**
				2012	**2013**	**2014**	**2015**	**Project End 2016**			
Direct GHG emissions avoided under the project		x million tons of CO_2 per year at US$ y per ton	0	0	0.238 MT at US$87/ton of CO_2	0.476 MT at US$87/ton of CO_2	0.714 MT at US$87/ton of CO_2	0.952 MT at US$87/ton of CO_2	Annual	Project report	Eskom
Energy supply from renewable sources		GWh	11	11	150	230	230	520	Annual	Annual report	Eskom, DoE
CTF Leveraged financing under the project		US$ million; % of total project cost	1,200; 77%	1,200; 77%	1,200; 77%	1,200; 77%	1,200; 77%	1,200; 77%	Annual	Project report	Eskom
Intermediate Results and Indicators											
Component 1: Sere Wind Power Project commissioned		Cumulative implementation progress (%)	0	5	60	100	100	100	Annual	Progress report	Eskom
Component 2: Upington Concentrating Solar Power (CSP) commissioned		Cumulative implementation progress (%)	0	1	10	20	60	100	Annual	Progress report	Eskom
Number of jobs created under the project		Number of jobs	0	0	400	400	400	800	Annual	Project report	Eskom

[41] **UOM = Unit of Measurement.**

CTF Catalytic Replication Indicators											
Total investments in clean energy generation (public and private)		US$ millions	0	600	750	1,500	1,700	1,900	Annual	Project report	Eskom
Investments in clean energy generation as a share of all investments in electricity generation		%	0	10%	10%	11%	12%	17%	Annual	Project report	Eskom
Percentage of clean energy supply in the overall electricity consumption		%	<1%	<1%	1.2%	1.8%	2.4%	3.0%	Annual	Project report	Eskom

Annex 4: Operational Risk Assessment Framework (ORAF)

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Project Stakeholder Risks	**Rating:**	**Substantial**		
Description : This is the first CTF Loan for South Africa to support renewable energy investments by the Borrower that has limited exposure to Bank's processing and policies.	**Risk Management:** Ongoing implementation of the partnership strategy, knowledge sharing, frank dialogue regarding Bank policies and procedures as well as timely and high-quality response to the needs of the sector.			
	Resp: Bank	**Stage: Board**	**Due Date : Dec 31, 2016**	**Status: In Progress**
Implementing Agency Risks (including fiduciary)				
Capacity	**Rating:**	**Medium-I**		
Description : Eskom's ability to fully implement its near to medium term capital expansion plan is dependent on approval of additional tariff increases in FY14-FY15 and ability to secure additional financing.	**Risk Management :** Securing of additional tariff increases in FY14-FY15 would be in line with the existing Multi-year Pricing Determination (MYPD) methodology that allows recovery of capital expenditures through tariff increases. Also, the GoSA and Eskom realize the current funding constraints and have taken a number of steps to address the funding gap, including raising funds in the international capital markets. The CTF supported projects are expected to have commitments for full financing prior to actual construction and the contracting arrangements would be structured to ensure timely completion.			
	Resp: Client	**Stage: Board**	**Due Date : Dec 31, 2012**	**Status: In Progress**
Eskom has little experience in carrying out procurement based on the Bank's Procurement Guidelines and Procedures. Use of new team for each component or sub-component introduces new problems and risks for procurement to be carried out following the Bank's Procurement Guidelines and Procedures as the skills acquired in dealing with Bank procurement are not fully and evenly utilized.	Eskom has assigned two senior procurement staff to be responsible for procurement under the Project and its compliance with the Bank's Procurement Guidelines and Procedures. International consultants will assist Eskom throughout the process of basic design, bidding, evaluation, award and implementation of CSP. The Bank's Lead and Senior Procurement Specialists with experience in procurement for high value complex power projects are assigned to the Project to guide Eskom in the procurement processes. The majority of the contracts will be subject to the Bank's prior review due to their large value, which will allow for timely correction whenever necessary.			
	Resp: Client	**Stage: Board**	**Due Date: continuous**	**Status: In Progress**
The new Preferential Procurement Regulations may affect the Borrower's ability to comply with the World Bank Procurement Guidelines.	In case the new Preferential Procurement Regulations would affect the Borrower's ability to comply with the World Bank Procurement Guidelines, Eskom will immediately inform and consult with the Bank and the Guarantor in order to resolve the issue and facilitate the procurement.			
	Resp: Client	**Stage: Board**	**Due Date: When applicable**	**Status: In Progress**
	Regarding PFMA approval, we have been informed that the procurement process will not stop because of the pending approval, and it is expected that approval will be granted ahead of the estimated time for awarding the first contract.			

Eskom has initiated procurement of some contracts for both components. In parallel they have also applied for extension of Prublic Finance management Act (PFMA) approval for both. There is a risk that the approval is outstanding when contracts are due to be signed, which could delay implementation.				
	Resp: Client	**Stage: Board**	**Due Date: November 30, 2011**	**Status: In Progress**
Project Risks				
Design	**Rating:**	**High**		
Description : CSP technology is still in early stages of development, with limited global experience. Limited number of bidders for this scale of CSP could result in high bid prices, limited competition, and hence unsuccessful conclusion of bidding and contract award process.	**Risk Management :** Eskom has completed a prefeasibility assessment of the proposed CSP project. A comprehensive review of international experience and the current state of CSP technology has also been completed. A technical international advisory panel to support Eskom in the implementation of the Upington CSP is also envisaged. In addition, to ensure that the latest developments of this evolving technology are incorporated in the design, a two stage procurement process will be used, where the first stage will solicit comments on the indicative design from the proposed bidders.			
	Resp: Client	**Stage: Board**	**Due Date : Dec 31, 2014**	**Status: In Progress**
Social & Environmental	**Rating:**	**High**		
Description : There is a substantial sensitivity around the use of country systems.	**Risk Management :** The Project Team conducted a Safeguards Diagnostic Review which established equivalence between the WB and South African policies, procedures and implementation. Regular mission will review implementation progress.			
	Resp: Bank	**Stage: Board**	**Due Date : Dec 31, 2016**	**Status: In Progress**
Program & Donor	**Rating:**	**Substantial**		
Description : To encourage the private sector in the renewable energy, an	**Risk Management** : Implementation of the proposed project would transform the nascent renewable energy sector of			

explicit and comprehensive policy framework is required. Such policies have been put in place in South Africa, which will over the medium term are expected to lead to a substantial increase in private sector participation, especially in the renewable energy generation. At the same time, many potential private sector investors are reluctant to invest at this stage and are waiting for the market to develop.	South Africa by addressing first-mover costs and risks related to the integration of wind and solar power with the overall energy system. Investments in transmission capacity to connect IPPs to the grid would catalyze substantial follow-on investment from the private sector. Also, the prospective Bank support to the electricity sector would extend the Bank-South Africa partnership to analytical work to help catalyze private sector financing of planned renewable investments and development of low-carbon options and strengthen Bank-South Africa Partnership on matters relating to Climate Change.			
	Resp: Client, Bank	**Stage: Board**	**Due Date : Dec 31, 2016**	**Status: In Progress**
Delivery Monitoring & Sustainability	**Rating:**	**Substantial**		
Description : The risk of slippage in implementing South Africa's low carbon strategy: The proposed project is critical for developing South Africa's renewable energy program, a key component of the government's low carbon strategy and an important component of Eskom's investment program. Successful implementation of this strategy depends on the outcomes of the proposed operation, as well as on the overall success of the energy sector reform.	**Risk Management :** 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 projects, 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 provide IPPs with 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. Monitoring and impact evaluation of the overall project will be the responsibility of Eskom Holdings, with support from DoE and DPE, as appropriate. The Project Coordinator will be responsible for coordination and monitoring of progress of the overall project. The Project Coordinator will facilitate coordination between the two project managers and between Eskom, the shareholder (DPE), DoE, DEA and NT.			
	Resp: Client	**Stage: Board**	**Due Date : Dec 31, 2016**	**Status: In Progress**
Differences in policy requirements between co-financiers	**Rating:**	**High**		
Description : Several contracts under Components 1 and 2 will be jointly financed by several co-financiers. This poses a challenge due to their different requirements, such as Eligibility Criteria, Fraud & Corruption and debarment provisions. Each of the co-financiers will be reviewing the procurement documents and the Borrower's procurement decisions at each stage of procurement process and provide its own clearances. The procurement process and implementation may be affected if one or more co-	**Risk Management :** All financiers agreed to the use of Bank's Procurement Guidelines and the Bank's Standard Bidding Documents and the Bank's "Guidelines on Preventing and Combating Fraud and Corruption in Project Financed by IBRD Loans and IDA Credits and Grants". However, this agreement excludes the Bank's sanctions/debarment procedures. The Bank is in the process of finalizing a Memorandum of Understanding (MOU) that will be signed by all the co-financiers. It will stipulate the application of Bank's Procurement Guidelines and commitment to use best efforts to resolve any potential disagreements. In the event that any differences may remain unresolved, each Co-financier may exercise the right to take such actions as it may reasonably			

financiers is not satisfied with the procurement documents and/or outcome of procurement process and/or makes requests for actions that are not acceptable to the Bank.	consider necessary to ensure compliance with its policies and procedures and the terms and conditions of its Co-financing Agreement(s) with the Borrower. In the event of irresolvable inconsistency between the co-financiers' requirements during implementation and the agreed approach amongst the co-financiers being not consistent with Bank polices Board approval for such an approach will be sought.			
	Resp: Bank	**Stage: Board**	**Due Date : Dec 31, 2013**	**Status: In Progress**
Overall Risk Following Reviews	**Substantial**			
Comments	The implementation risk rating is substantial, mainly due to the limited experience in CSP technology and differences in debarment requirement of the joint financiers.			

Annex 5: Detailed Project Description

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

1. The proposed Project consists of investments in renewable energy (100 MW Sere Wind Power Project and 100 MW Upington Concentrating Solar Power project). These investments are estimated to cost US$1.55 billion, of which IBRD managed CTF Loan will provide US$250 million, IBRD Loan co-financed from the EISP (approved on April 8, 2010 and made effective on May 31, 2010) will contribute US$ 260 million, and other lenders including KfW, EIB, AFD, AfDB and AfDB-managed CTF will provide about US$ 1 billion.

2. Component 1 — Sere Wind Power Project: The scope consists of design, procurement, construction and commissioning of a 100 MW wind power project and associated transmission lines and substations at Sere in the Western Cape Province in South Africa. The proposed design is a two phase development of wind turbines in the Province. Phase one (proposed subcomponent) comprises wind turbines with a total generating capacity of 100 MW, and an expected annual generation of about 219 GWh with a load factor of about 26 percent. In addition, transmission lines and substations will be constructed to allow other renewable projects in the area (specifically under the IPP program) to connect to the grid. Along with the second phase of development (not a subject of this loan proposal), the facility is expected to have a total generating capacity of 200 MW. The project is fully scoped and specified, and an environmental impact assessment (EIA) has already been approved. Cumulative emissions savings from Phase 1 of the Western Cape Wind Energy Facility (the Sere Wind Power project), based on an annual output of 219 GWh, would be 5 million tons of CO_2 over the 20-year life of the plant.

3. Wind power has considerable potential for scale-up at an estimated 4 GW of economic wind potential – mostly along the East and West coasts of South Africa. The avoided annual GHG emission reductions in the hypothetical case of replication of the project throughout South Africa could therefore be in the order of 10 million tons of CO_2. Assuming that half of the available economic potential for wind power is developed by 2025, the emission reductions would be about 5 million tCO_2 or 1.4 percent of the overall reductions consistent with the GoSA long-term 40 percent reduction target.

4. Even though wind power technology is well proven and major components are commercially available from multiple suppliers, the lack of proven performance on a large scale in South Africa creates a perception of high risk. Furthermore, performance risk (e.g., annual output) is real and remains despite intensive wind measurement. In addition, Eskom faces significant investments in transmission infrastructure, driven mostly by the need to evacuate wind power and deliver it to load centers and the main grid. Investments in transmission capacity to connect Independent Power Producers (IPP) to the grid would catalyze substantial private sector investment in wind power. The Sere facility, together with new transmission capacity to evacuate its power, would be a flagship investment in the subsector. Investments in transmission capacity would catalyze substantial private sector investment under the program.

5. *Wind Plant Components*: The proposed site is in a remote location but has good access owing to the existing road network to the farming and mining areas. An existing divisional road provides direct access to the site. This road surface will require improvement including surface redesign and resurfacing with a suitable wearing course gravel to ensure an improved driving surface. A number of surveys have been conducted and the following are expected to be carried out before construction:

- Geotechnical survey to provide information regarding subsurface characteristics for founding conditions and road building;
- Wind power plant facility site survey and confirmation (and pegging) of the turbine micro-siting footprints, lay down areas and access road routes;

- Survey of substation site; and
- Survey and profiling of power line servitude to determine specific tower locations.

6. The turbines and associated infrastructure are proposed to be positioned over an area of less than 20 square kilometers. The proposed plant will include:

(i) 40 to 50 wind turbine units with an expected hub height of ~ 80 m (78 m high steel tower plus 2 m high nacelle); 90 m diameter rotor (consisting of 3x45 m blades).

(ii) A concrete foundation (of 15 m x 15 m) to support each turbine tower with underground electrical cabling between each turbine and the substation.

(iii) A substation (with a footprint of 80 m x 80 m) in an appropriate position to receive generated power via underground distribution cabling from each wind turbine.

(iv) Other substations and transmission lines (132 kV) that allow for other renewable projects in the vicinity (as a shared transmission system) to connect to the main grid.

(v) Internal access roads providing access to each wind turbine site (with a permanent travel surface of approximately 6m in width).

(vi) Other associated infrastructure including office/workshop buildings with a footprint of ~400 m^2 under roof.

7. *Wind Resource and Plant Layout*: The site has a "moderate" wind resource, and is expected to have a load factor of about 26 percent. A site layout optimization exercise undertaken by Eskom has been used to identify the best possible positions for the turbines, as well as the substation and other infrastructure from a technical perspective. An east-west optimized layout is proposed to maximize the utilization of the prevailing SSW winds. The site layout includes the 40-50 turbines (with the potential to include additional 40-50 turbines) in four rows which lie parallel and equidistant to one another. The first turbine rows lie approximately 2 km inland from the coastline. This is to minimize wake effects and wind turbulence. The positioning/layout of all the components of this wind energy plant have a 90 percent confidence level, and will be confirmed through the results of the surveys mentioned above.

8. *Associated Transmission Lines*: The site is near a 132 kV sub-transmission line with sufficient capacity to evacuate the power. An overhead 132 kV power line will connect the substation at the wind energy site to the electricity distribution network/grid at the Juno Transmission Substation (outside Vredendaal). The connection point to the Eskom power grid has been confirmed through a network planning exercise. Additional power line servitudes will follow other existing linear infrastructure (including roads and/or other power lines) as closely as possible to consolidate linear infrastructure in the area, and to minimize the need for additional points of access. The power lines will be constructed utilizing a monopole structure/tower with stand-off insulators and will be approximately 25 m in height. The power lines will be double circuit (i.e., two 132 kV circuits carried by a single tower structure), and will require a right of way of approximately 32 m in width.

9. Component 2 — Upington Concentrating Solar Power (CSP). The scope of the proposed project is to design, procure, construct and commission a 100 MW CSP capacity at Upington in the Northern Cape Province on a turnkey basis. When operational, it is expected to be one of the largest concentrating solar power facility with heat storage for grid use, which will operate at partial baseload. The estimated cumulative emissions savings resulting from a projected annual energy production of 516 GWh is 9 million tons of CO2 equivalent over a projected twenty-year plant life.

10. *Solar Resource in South Africa*: The only renewable energy resource that can provide the volumes of firm capacity to partially complement the capacity provided by coal-fired power plants is CSP configured with thermal storage. This configuration has a load factor high enough to be considered at least as a partial baseload resource. Northern Cape Province was identified as the most

feasible locality for the establishment of the CSP plant. It has one of the highest solar potential values in the world, with a Direct Normal Insolation (DNI) level of approximately 2,900 kWh/m^2 per year. The design reflects a synthesis of design elements meant to reduce risk, improve performance, maximize local content, and conform to local requirements.

11. CSP is an evolving technology with a number of innovative developments taking place globally. Prior to undertaking the implementation of the CSP plant, Eskom has conducted a detailed study to review the recent developments internationally on CSP technologies. The review has recommended the central received technology with molten salt for heat storage. Selection of an Owner's Engineer to review the work conducted by Eskom to date and prepare a preliminary design and warranty package for the first stage bidding is underway. Eskom will invite comments on the preliminary design from prospective bidders and thereafter finalize the package and invite bids. . The IBRD loan (co financing to the proposed CTF Loan) will also support the supervision of the CSP plant construction. Considering the vast solar resources in South Africa, analysis is also underway to assess manufacturing capacity for some of the key components of the CSP plant. This work is expected to enable the formulation of a domestic capacity development strategy in South Africa, considering the sub-regional needs, the manufacturing potential and the remote location of the sub-region from the traditional manufacturing establishments for such equipment.

12. The demonstration and replication potential of CSP plants in Southern Africa is vast. In South Africa alone, where the DNI levels range from 1.7 to as much as 2.9 MWh/m^2/year, estimates are that 30 - 38 GW of commercially viable CSP could be developed – mostly in the Northern Cape and North West provinces. Furthermore, potential replication in Namibia and Botswana could double or treble this potential. The avoided annual GHG emission reductions in the hypothetical case of replication of the project throughout Southern Africa could therefore be in the hundreds of millions of tons of CO_2. By the year 2025, assuming successful implementation and replication of the current project, CSP is expected to generate emission reductions of about 40–80 million tCO_2/year or about 10–20 percent of the overall reductions required to achieve a level of emissions 40 percent below the current trend.[1]

13. CTF support will have the transformational effect of promoting CSP deployment, particularly in the private sector, by proving the technology in actual operation and establishing benchmarks for cost and performance at utility scale. A number of private companies are currently engaged in preliminary development work which could involve CSP and other solar technologies. DoE, in its efforts to mainstream solar development including the concept of solar parks, is being supported by various institutions including the Clinton Foundation.

14. Even given the incentives, the deployment of CSP technology in South Africa is currently a tall order for the private sector. Without Eskom's participation, it is highly unlikely that the private sector will go through with a similar investment in the near future or at the scale necessary for rapid diffusion of the technology. The participation of the national power utility in the first commercial-size CSP project will increase the visibility of CSP and renewable energy in general, and signal to the market that the GoSA sees it as a desirable and viable alternative to coal-based electricity. For its part, the Upington project will have an important role in helping Eskom move beyond coal in its operations.

15. *Solar Plant Components*: The proposed Upington Concentrating Solar Power plant is a 540 MWt tower and mirror design, configured to operate as a partial baseload unit. Utilizing molten salt as a thermal circulating fluid and storage medium is expected to allow this design to achieve a 60–65 percent annual load factor with a rated capacity of 100 MWe.

[1] This estimate assumes that 10–20 GW of CSP capacity is installed in the country by 2025, and that the current (business-as-usual) trend would lead to annual emissions of 870 million tCO2 by that year. A reduction by 40 percent from that level is consistent with the goal declared by South Africa in Copenhagen to cut its emissions by 42 percent by 2025. The level of reduction of 40 million tCO2 per year is relatively conservative for the 10 GW level of installed CSP capacity as it assumes a relatively low annual load factor of 0.4.

16. The CSP technology considered for the proposed plant is a molten salt-type, Central Receiver technology. It is based on the concept of thousands of large two axes tracking mirrors (known as heliostats) which track the sun and reflect the beam radiation onto a common focal point. This focal point (the receiver) is located on a tower well above the heliostat[2] field in order to prevent interference between the reflected radiation and the other heliostats. Heliostats are arranged in an elliptical formation around the focal point with the majority of the reflective area weight to the more effective side of the heliostat field (southern side in South Africa). It is estimated that approximately 6,000 heliostats at 120 m^2 each will be required within the heliostat field in order to obtain a power output of approximately 100 MW, while also enabling approximately 8 hours of energy storage. The central tower will be roughly 200 m high for a 100 MW facility, with the central receiver taking up the top part of the structure. This receiver is in essence a heat exchanger consisting of thin walled tubing which absorbs the concentrating beam radiation and transfers the heat to the working fluid (the molten salt circulated through it) which in turn is used to generate steam. Electrical power is then generated through a Rankine cycle (steam turbine process).

17. The working fluid is a salt mix of a 60:40 ratio of Sodium Nitrate ($NaNO_3$) and Potassium Nitrate (KNO_3). The fluid is a very safe and environmentally friendly substance which is a solid at room temperature. The cold salt is pumped up the central tower at approximately 300°C and flows through the central receiver where it is heated to approximately 540°C, after which it can be stored for use in the conventional steam power generation process. One MWh requires approximately 5 m^3 (roughly 10 tons) of stored hot salt.

18. The proposed power plant is envisioned to utilize a dry cooling technology as a result of limited availability of water in the proposed area. . According to current design specifications, the dry-cooled station would still need approximately 200,000 cubic meters of water per year. The water pipelines as well as the overhead power lines will follow other existing linear infrastructure (existing roads) as closely as possible to consolidate linear infrastructure in the area, and to minimize the need for additional points of access.

19. *Associated Transmission Lines:* The proposed Upington site is near a 132 kV sub-transmission line with sufficient capacity to evacuate the power. An overhead 132 kV power line will connect the substation at the facility site to the nearest substation. The overhead power lines will follow other existing linear infrastructure (existing roads) as closely as possible to consolidate linear infrastructure in the area, and to minimize the need for additional points of access. Furthermore, Eskom will carry out technical and environmental studies for the transmission system to facilitate deeper integration of CSP capacity in the national electricity grid.

[2] A heliostat is a mirror mounted on an axis by which the sun is steadily reflected onto one spot.

Annex 6: Implementation Arrangements

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

1. 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. Eskom last implemented a major investment program in the 1980s and had lost some of the skills that it had then. To address this deficit the utility has recruited externally specifically for the project as well as for Eskom operations and maintenance and at present is well staffed to undertake the proposed investment program.

Institutional and Project Construction/Implementation Arrangements

2. The proposed projects are high value and technologically challenging projects that will be implemented by the Capital Expansion Department (CED) of the Enterprises Division Business unit which reports to the Generation Business unit.

Component 1 – The Sere Wind Power Project

3. The proposed project has been developed by the Capital Expansion Department (CED) within Eskom Enterprises. The CED will be responsible for the complete procurement phase. 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 Generation Business responsible for peaking plant.

4. The GoSA has also constituted an inter-departmental Committee (DoE, DoEA, DPE and Eskom) for Strategic Guidance to provide oversight with respect to CTF-funded components, namely B.1. and B.2.

Component 2 – The Upington CSP Project

5. This component will be implemented in two phases. The first phase involves review of preparatory work already carried out by Eskom, including the project concept and preliminary design. This phase is underway and being managed by Corporate Services. The second phase will involve procurement and construction supervision and management (under CED).

6. In the second phase, the CED will be responsible for the complete procurement phase. 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 Generation Business responsible for the peaking plant. 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 operations to monitor and evaluate performance.

Safeguards Monitoring and Management

7. The safeguards unit within Generation Business (assisted by safeguards staff from the Corporate Division) will be responsible for all aspects of environmental and social safeguards for all components of the project, including communication and consultation with stakeholders and project affected people.

8. Eskom has already established a Health, Safety, Environment and Quality (HSEQ) system for the ongoing capital expansion projects, which meets international standards, under the HSEQ Manager. The system will be replicated for these project components.

9. Eskom has also developed a workplace AIDS program, which it extends to family and community members and to Eskom suppliers, including project sites. A review of the program by the USAID-supported Horizon's Program in 2005 highlighted the following:

- Eskom's program successfully addressed gaps in HIV/AIDS knowledge among workers and catalyzed the dissemination of information by workers to family and community members.
- Eskom's training activities increased the capacity of peer educators and supervisors to confront the stigma in the workplace and community, but more work is needed to address workers' lingering concerns about stigma and confidentiality.
- Eskom's investment in the training of family members of employees and community-based NGOs created an important link between the workplace and community HIV/ AIDS services, but better coordination and role clarification is needed.
- Workplace HIV/ AIDS programs need continued attention, and operations research provides direction to address program challenges.

Monitoring and Evaluation of Outcomes

10. The Project Coordinator (From the Finance Directorate) will be responsible for coordination and monitoring of progress of the overall project. The Project Coordinator will facilitate coordination between the two project managers and between Eskom, the shareholder (DPE), DoE and NT.

11. The key indicators to be monitored and used in assessing the project progress and evaluation of outcomes are described in Annex 3—Results Framework and Monitoring. Specific data for gathering and reporting, including responsibilities thereof, have been agreed with Eskom. A mid-term review would be carried out within approximately 30 months (2.5 years) from effectiveness of the CTF Loan.

IBRD Implementation Support

12. An IBRD implementation support strategy has been designed to suitably match the requirements and complex issues to be addressed under the project. The focus will be on anticipating and managing risks that could impact the project as noted in Section III.E of the Main Text. Consequently, the IBRD team will be staffed with the requisite expertise. Missions will include safeguards and fiduciary staff. The Bank will coordinate implementation support with other potential lenders where possible and maximum utilization will be made of field-based staff. In addition, depending upon the activities being undertaken in the project, intensive concentration at certain times during construction and more focused attention at some locations would be undertaken.

13. From the Safeguards perspective, implementation support will be provided at two levels. On the first level, the Bank will help support monitoring performance of project implementation using country systems. The Bank support will involve evaluating the quality of additional safeguards documents that may be produced, with respect to GoSA requirements and OP 4.00, and reviewing various independent audit reports that Eskom will produce, on resettlement/land acquisition, health and safety, and EMP implementation. On the second level, the Bank team will review results on the ground. Safeguards specialists will join supervision missions and will schedule site visits during those missions so that each generating facility is visited no less than once a year. Facilities at which there are significant social, environmental or health and safety concerns will be visited twice annually in the first two years of their implementation.

14. Based on the above Implementation Support plan, the Bank's implementation supports budget (see Table 7 below) from FY12 to FY16 is estimated below for a total cumulative spending of about US$ 600,000. This estimate takes into account savings resulting from combining supervision of the ERSP and the EISP.

Table 7: IBRD Implementation Support

IBRD Fiscal Year	FY12	FY13	FY14	FY15	FY16
Amount of Resources Required (US$,000s)	120	120	120	120	120

Annex 7: Financial Management and Disbursement Arrangements

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

1. The Bank conducted an assessment of the financial management arrangements for the proposed Project as required by the Bank's policy on Financial Management, OP 10.02, and in accordance with the provisions of the Financial Management Manual, dated March 1, 2010. Eskom is the implementing entity for the proposed project. The main objective of the assessment, which included a review of the budgeting, accounting, internal controls, flow of funds, financial reporting, auditing arrangements, and completion of FM assessment questionnaire by some officials of the entity, was to ensure that acceptable financial management arrangements are in place for the implementation of the project.

2. Acceptable FM arrangements require that:

- funds are used for the intended purposes in an efficient and economical way,
- all transactions and balances are correctly recorded to support preparation of regular and reliable financial statements that are subject to auditing arrangements acceptable to the Bank; and
- internal controls are considered capable of safeguarding the entity's assets.

3. Eskom Finance unit will be responsible for the FM aspects of the project implementation. The governance and accountability arrangements in place at Eskom, coupled with the oversight responsibilities provided by DPE, and the interest of the stakeholders and the public at large in the effective management of the Company are acceptable for ensuring efficient and effective utilization of the project funds and reporting of the activities of Eskom. In addition, the internal and external auditors have unrestricted access to the Chairman of the Audit Committee as a measure to ensure efficient and effective corporate governance.

4. Eskom's financial system is capable of managing the project expenditure efficiently and effectively: accounting for utilization of the loan proceeds; ensuring effective internal controls; producing quarterly Interim Financial Reports for the project; and ensuring timely audit of the annual financial statements. The overall FM risk is **Low** based on the proposed use of Eskom's FM system and the oversight arrangements imposed by government on Eskom. The overall conclusion of the assessment is that the proposed FM arrangements meet the Bank's minimum requirements under OP 10.02 Financial Management.

5. Eskom's audited financial statements are acceptable to the Bank without a requirement for a separate audit report for the project.

6. The FM assessment identified the financial management risks that Eskom may face in the implementation of the project, and proposed measures to mitigate the risks, as shown in the risk assessment matrix (see below).

Table 8: FM Risk Assessment and Risk Mitigation Measures

Risk *Risk Rating: H (High), S (Substantial), M (Moderate), L (Low), NA (Non Applicable)*	**Rating**	**Risk Mitigation Measures**	**Residual Risk**	**Negotiation / effectiveness condition (Y/N)**
Country Level Accountability and usage of the project's funds.	L	• Key FM oversight elements of the project are entrusted to the Government's External Audit function being the Office of the Auditor General, which meets all the standards of independence set by International Organization of Supreme Audit Institutions (INTOSAI).	L	N
Entity/Project Level Eskom was not familiar with and has been recently exposed to the Bank's FM and Disbursement policies and procedures under the IBRD loan.	M	• Eskom has the capacity to handle the size and scale of this project. The entity's reputation through its audited financial statements reflects good governance and oversight structure. • The Bank has been conducting comprehensive training on the Bank's FM and Disbursement policies and procedures under the Eskom Investment Support Program.	L	N
Control Risks Budgeting Due to the nature of the project and cost escalations in the power construction industry, there is a risk that budget process may not be based on realistic cost estimates. Procedures for approvals and variations may not be clearly laid out.	M	• When the capital expenditure program is undertaken the projects are subjected to robust due diligence reviews before approval by the board. • Eskom follows a robust monthly management reporting process to monitor deviations on plans. • Eskom has documented policies for approvals of deviations from plans. • In addition Eskom is regulated by PFMA (through materiality significance framework) to seek shareholder approval for variations in excess of R5 million.	L	N
Overall FM Risk Rating	**M**		**L**	

Eskom as the Implementing Agency

7. Eskom is South Africa's national, vertically integrated electricity utility and is wholly owned by the South African government (GoSA). Eskom is responsible for the generation, transmission, distribution and retailing of electricity within South Africa and Africa. Eskom is managed by its Board of Directors which is vested with the power and authority to lead, control, manage and conduct the business. The Board's responsibilities are facilitated by a well developed governance structures through Board committees.

8. On April 8, 2010 IBRD approved a SIL for US$ 3.75 billion for the EISP. This is the first Bank financed project the client has ever implemented. For FM arrangements, the CTF loan will follow the same without any substantive change. So far there are no major FM challenges in the implementation of the IBRD loan; nevertheless, some refinements of the FM arrangmements were to be agreed including (i) the clarification of internal FM responsibilities, (ii) the change of the

disbursement method from advance to reimbursement. This also necessitated a refinement in agreed IFRs' template. To address these minor challenges a workshop was held with finance counterparts. Subsequent to the workshop, three officials were dedicated to the preparation and submission of the IFRs. In addition Eskom is receiving ongoing support to comply with the FM covenants in the loan agreement. To date acceptable IFRs have been submitted to the Bank and the first audit report is due on 30 September 2011.

9. Major Strength. The project FM assessment is strengthened by the adequate external audit arrangements and the noted timely production of the financial statements and audit thereof within a period of five months. External auditors' observations and recommendations are followed-up promptly by the Audit Committee.

10. Weaknesses. Eskom has been recently involved in the implementation of Bank financed projects and thus may not fully understand the Bank procedures as they are still at learning curve. To this extent, the Bank's FM and Disbursement specialists have delivered workshops on the Bank's financial management and disbursement, policies and procedures, including reporting requirements under the Eskom Investment Support Program.

11. Budgeting. Eskom's Corporate division is responsible for the coordination of the Eskom Holdings' overall budget. Budgeting process starts in September each year with a budget circular from the office of the CEO. Each business unit prepares strategic agenda—a five year business plan with mandates and planned achievements, risks, and steps to be taken to achieve the budget. The final draft budget is approved by the management executive committee and the revised budget submitted by the CEO to the Board for approval, through the Executive management committee (Exco). The budget is then submitted through the Annual Corporate Plans to the Department of Public Enterprise for Approval and submission to the National Treasury. The Annual Corporate Plans are submitted by the 28 February of each year for the coming fiscal year and this process is regulated by the Public Financial Management Act (PFMA). The budget execution is monitored through monthly and quarterly reporting.

12. Accounting. Eskom Holdings finance group is headed by the Finance Director, who is a qualified chartered accountant. He is supported by other qualified accountants in key positions in the Department. Staff compliment in the department is excess of 2000. Eskom uses the SAP accounting software and the financial statements are prepared in accordance with the International Financial Reporting Standards (IFRS). This is to comply with Accounting Standards Board (ASB), which has determined that schedule 2 entities of the Government, like Eskom, comply with IFRS. The SAP system is capable of recording and accounting for the project funds. All the payments will be based on contracts signed after following due procurement process under the Bank's procurement guidelines. Contract management and approval of payments will be done by Eskom's procurement department. Approved payment request together with supporting documentation will be forwarded to the Creditor's department for payments through electronic banking system. The capturing of transactions in SAP will be done in the accounting department where documentation will be kept.

13. Internal control. Eskom has internal control framework that is developed and maintained on an on ongoing basis to provide reasonableness assurance to the Board regarding the integrity and reliability of the financial statements; the safeguarding of its assets; the economic and efficient use of resources; the verification of the accomplishment of established goals and objectives; the detection and minimization of fraud, potential liability, loss and material misstatement; and compliance with applicable legislation and regulations. The Assurance and Forensic department assumes the internal audit function. It monitors the operation of the internal control systems and report findings and recommends improvement to management and the Audit Committee. The project will use the already existing internal control framework.

14. Internal audit. Eskom has division called Assurance and Forensic Department (AF). The division encompasses internal audit, technical audit, technical investigations as well as forensic and anti-corruption. In line with the requirements of the PFMA and good governance, the AF provides the Audit Committee and management with independent, objective assurance, consulting and forensic services designed to add value and improve Eskom's operations. The department brings a systematic, disciplined approach to the evaluation and improvements of the effectiveness of risk management, control and governance processes. The AF is governed by international standards and best practices, published by recognized professional institutes.

15. A risk based audit approach is followed by AF. The audit plan is based on the risk assessment and other considerations, such as the achievement of the organizational business objectives. The audit plan is updated as required (minimum quarterly) to reflect significant changes in the risk profile resulting from changes in the business operations, changes in customer needs or regulatory requirements. AF is supported by the Board and the Audit Committee and is authorized to have unrestricted access to all functions, records, property and personnel. The AF is headed by the General Manager, a qualified chartered accountant. The General Manger is supported by seven highly qualified senior managers (some are chartered accountants, holders of master degrees). The department has 144 established positions. The project will be covered in the annual audit plan as part of the capital expenditure.

16. Financial reporting**.** Eskom's accounting system is capable of producing the semiannual reports. Three officials in the treasury department have been dedicated to collate documentation relating to the Bank-financed project, prepare the IFRs and withdrawal application forms for reimbursement. The withdrawal applications forms and IFRs will be reviewed and finally signed by the FD before submission to the Bank. The identified officials in the Treasury Department will serve as link between the Bank and Eskom internal stakeholders to manage FM aspects of the project. The format and contents of the unaudited semiannual financial reports have been discussed with Eskom and will be agreed at negotiation.

17. Eskom will produce and submit interim unaudited financial reports (IFRs) to the Bank on a semiannual basis. These reports will include:

(i) A narrative summary of the project implementation highlights;

(ii) Sources and Uses of Funds by disbursement categories;

(iii) Summary of payments made for contracts subject to the Bank's prior review; and

18. The semiannual Sources and Uses of Funds report (ii above) will reflect contributions from all the financiers and utilization of the funds, while the reports listed in (iii) will reflect Bank eligible expenditures only.

Funds Flow and Disbursement Arrangements

19. Flow of funds. Upon the signing of the Loan Agreement, the Bank will open a CTF Loan Account in its books, in the name of Eskom. Funds will flow from the Bank (Loan Accounts) into operational account maintained by Eskom.

20. Disbursement arrangements. Eskom has opted for reimbursive disbursement method, whereby Eskom will be reimbursed for expenditures which it has prefinanced from its own resources. Disbursements by the Bank into this account will be based on the semiannual Interim Unaudited Financial Report (IFR) and withdrawal applications prepared and submitted by Eskom to the Bank. The submission will be made as when the need arise, but preferable within 45 days of the end of each reporting period. All the contracts financed will be subject to Bank prior review. Eskom will also have the option of using: (i) the Direct Payment disbursement method involving direct payment from the Loan Account on behalf of Eskom to suppliers of goods and services; and (ii) the Special Commitment

method whereby the Bank at the request of Eskom, will issue special commitments to suppliers of goods under the Bank financed components.

21. Other financiers' flow of funds and disbursement arrangements. . It is expected that funds from other financiers will flow directly into one of the Eskom's bank accounts in South Africa or as otherwise designated. The flow of funds from these financiers will be described in their respective loan documents.

22. Use of Loan Proceeds. The following tables show the allocation of the proceeds of the CTF Loan. EISP IBRD Loan 7862 will finance the same Parts A and B indicated in the Table 9 below. EISP IBRD Loan 7862 Agreement will be amended in parallel with signing of the CTF Loan agreement to reflect reduction the IBRD loan financing percentages from 100% to 18% for Part B1 of the IBRD Loan 7862 which is the same as Part A of the CTF loan, and from 100% to 16% for Part B2 of the IBRD Loan 7862 which is the same as Part B of the CTF loan. Amendment to IBRD Loan 7862 would be countersigned and effective at the same time as the CTF loan.

Table 9: Allocation of CTF Loan Proceeds

Category	Total Project Costs (expressed in USD) million	Amount of the Loan Allocated (expressed in USD) million	Percentage of Expenditures to be financed (inclusive of Taxes) million
Goods, works (including supply and installation) and non consulting services for Part A of the Project	353.705	50.0	14.01%
Goods, works (including supply and installation) and non consulting services for Part B of the Project	1,197.4	199.325	16.7%
CTF Management Fee	0.675	0.675	100.0%
TOTAL AMOUNT	**1,551.78**	**250.00**	

Auditing arrangements

23. Eskom is listed as a Schedule 2 public entity and is regulated by the PFMA to submit annual report to the Minister of DPE for noting and submission to the Parliament within five months after end of the financial year. The annual financial statements prepared in accordance with IFRS together with the audit reports are included in the annual report.

24. Eskom has an unqualified audit report for year ended March 31, 2010 and is audited by KPMG Inc and Sizwe Ntsaluba vsp. The statutory auditors for the forthcoming year are appointed at the annual general meeting.

25. The annual audit is conducted in accordance with the International Standards on Auditing. Eskom's Audited annual financial statements which will include the project financial activities will be submitted to the Bank within six months of the end of the financial year, that is, by September 30 each year. The submission will include the auditors' report, management letter, and management's response thereto as an attachment to the AFS.

26. Audited financial statements. Eskom's audited annual financial statements will be acceptable to the Bank without a requirement for a separate audit report for the project. The financial statements will be acceptable to the Bank with additional disclosures on the project activities. Such disclosures will include; (i) Note on the CTF lending terms which is a normal disclosure for Eskom as per IFRS requirements and the fact that funds have been used for intended purposes as per loan agreements and

(ii) the break-down of component 1 and component 2 expenditures and a list of withdrawals as part of notes to the financial statements.

27. A consolidated semi-annual IFR reporting on IBRD loan and CTF loan actual expenditures with direct payments and special commitments need not be audited on a semiannual basis, however, the process and controls to produce these IFRs will be reviewed by the auditors.

28. The following table identifies the audit reports that are required to be submitted to the Bank by the Eskom and the due date for submission.

Table 10: Required Audit Reports

Audit Report	Due date
Continuing Entity Financial Statements- April-March	September 30 each year

Loan Processing

*Actions to be taken by Effectiveness***:** None

*Reporting Undertakings***:**

- Maintain the financial management system including records, and accounts in accordance with the terms of the IBRD Loan Agreement;
- Prepare and furnish to the Bank, not later than 45 days after the end of each 6 month period, interim unaudited financial reports for the project on a cash basis covering the period, in form and substance satisfactory to the Bank;
- Have Eskom's financial statements audited (incorporating the project financial activities) in accordance with the provisions of Section 5.09 (b) of the General Conditions. Each audit shall cover the period of one year and shall be submitted to the Bank not later than six months after the end of the Government's fiscal year, that is, by September 30 each year.

Supervision plan

29. Based on the project's "Low" FM risk rating but given the loan amount, the Bank will carry out the onsite FM supervision of the project at least twice a year. In addition, the Bank's FM specialists will carry out desk-based quarterly review of the IFRs and the annual audit reports.

Governance and Accountability

30. Eskom's governance arrangements and the oversight provided by the Board, Government through DPE, and other stakeholders, which include the general public, are considered adequate for the implementation of the project.

31. The assurance and forensic general manager and the external auditors have unrestricted access to the chairman of the committee and the chairman of the board.

Overall Conclusion

32. Based on the proposal to use Eskom's FM system for accounting and reporting the project receipts, expenditures and asset management, including commitments, the overall conclusion of the assessment of the system is that the proposed FM arrangements meet the Bank's minimum requirements for financial management under OP 10.02.

Annex 8: Procurement Arrangements

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Project Components

1. ERSP comprises Component-1 (Sere Wind) and Component-2 (Upignton CSP) which under EISP are component B. These components are co financed by IBRD loan under EISP and by CTF under ERSP. Section II.C of PAD provides further details on Project Components.

Implementing Agency

2. Procurement activities will be carried out by Eskom Holdings SOC Limited (Eskom). Eskom was established under the Companies Act, 1973 and in 2001 was converted to a Public Company based on the 2001 Eskom Conversion Act with no change of ownership. The single shareholder of Eskom is the GoSA, represented by the Minister responsible for Public Enterprises.

Eskom Procurement Capacity and Controls

3. Eskom has a well-organized procurement system, with qualified and capable personnel. Organization of the procurement function comprises separate arms for policy, strategic sourcing such as bulk procurement of stock items, and for capital procurement. Eskom's procurement process is governed by Eskom's policies and procedures and the Country's legal framework to deal with fraud and corruption.

4. The organizational structure of Eskom includes a number of Divisions. The Corporate Regulations, Directives, Good Practices Notes and other documentation, including those pertaining to procurement, are prepared and issued by the Finance Department in the Corporate Division. The contracts under the components of the Bank financed project will be procured and implemented by the Commercial Department of the Enterprises Division. This Department includes teams responsible for specific projects, e.g., Wind Farm, Solar, Refurbishment, etc., as well as the supporting departments such as Strategic Sourcing, Evaluation, Negotiation, etc. The Commercial Department is staffed with 350 officers of whom 190 are dedicated to procurement. Procurement activities are supervised by about a dozen senior Eskom staff.

5. Eskom's commercial activities are governed by the Public Finance Management Act (PFMA) which stipulates that an organisation such as Eskom should have in place "an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost-effective". In addition, a governance structure is in place that allows for a proactive, in-process audit and assurance framework to be implemented with the objective of providing assurance to the governance structures that the transaction under review complies with PFMA. As per Eskom's procurement policies, each contract has been/or is in process of being evaluated by a third-party independent auditor to confirm consistency with the Eskom policies and provisions of their bidding documents. In addition to the PFMA, Eskom is mandated to comply with legislation aimed at preventing fraud and corruption, public disclosure as well as Black Empowerment laws:

- Promotion of Access to Information Act, No. 2 of 2000
- Prevention and Combating of Corrupt Activities Act No. 12 of 2004
- Promotion of Administrative Justice Act No. 3 of 2000
- Broad Based Black Economic Empowerment Act No. 53 of 2003
- The Construction Industry Development Board (CIDB) Act 38 for 2000
- Construction Industry Development Regulations, 2004
- Standard for Uniformity in Construction Procurement (Standard), January 2009.

6. The Government published the Preferential Procurement Regulations (PP Regulations) in pursuant to the Preferential Procurement Policy Framework Act, 2000. The PP Regulations shall come

into effect on December 7, 2011. Pursuant to the PP Regulations, the public entities, including the Borrower will be required to consider in the bidding process: (a) planning and stipulation of preference point system and Broad-Based Black Economic Empowerment (B-BBEE) status; and (b) local production and content. Eskom confirmed their understanding that some provisions of PP Regulations are not consistent with the Bank's Guidelines. In case that the new PP Regulations would affect the Borrower's ability to comply with the World Bank Procurement Guidelines, Eskom will immediately inform and consult with the Bank and the Guarantor in order to resolve the issue and facilitate the procurement.

7. Consistent with the above legislation, Eskom is guided by several of its own policies and procedures among which Eskom Procurement & Supply Chain Management Policy and Procurement & Supply Chain Management Procedure are the most important. An anti-corruption cell is managed by Eskom which refers any wrongdoing cases to GoSA agencies in charge of ensuring fraud-free procurements by public agencies.

8. Eskom has a clearly defined delegation of authority which covers procurement decisions. This delegation is updated at least every three years.

Procurement Arrangements

9. The Bank will co-finance the project in partnership with other development partners (AFD, AfDB, KFW and EIB). Component 1 (Sere wind) will be co-financed with AfDB and AFD and Component 2 (CSP) will be co financed with AfDB, AFD, KFW and EIB. Only Consultancy Contracts for Owner's Engineer under Component 1 & 2 with be financed solely by IBRD (and CTF through IBRD). All other contract packages will be co-financed.

10. The project including contracts jointly co-financed with other development partners (co-financiers) poses a challenge due to different requirements such as Eligibility Criteria (with AfDB), Fraud & Corruption and Debarment provisions. To address this issue, all co-financiers have agreed to the use of Bank's Procurement Guidelines the Bank's Standard Bidding Documents, and the Bank's Anti-Corruption Guidelines. However, this agreement excludes the Bank's sanctions/debarment procedures. This poses a risk of a firm debarred by any financier to participate and cause an issue that may not be resolved among financiers. Based on the market analysis, which did not show that any qualified firm that may participate in the bidding under joint financing has been debarred by any co-financier, this risk is considered low.

11. AfDB obtained a waiver from its Board of Directors to utilize World Bank's eligibility requirements for major contracts under this project.

12. During implementation, each of the financiers will be reviewing procurement documents and the procurement decisions at each stage of procurement process and provide comments. The procurement process may get affected in case one or more financiers do not accept the outcome of procurement process or make requests for actions not acceptable to the Bank.

13. To address this issue, the Bank and all co-financiers agreed to sign a Memorandum of Understanding (MOU) that stipulates the application of Bank's Procurement Guidelines and commitment to use best efforts to resolve any potential disagreements.

14. In the event that any differences may remain unresolved, each Co-financier may exercise the right to take such actions as it may reasonably consider necessary: (a) to ensure compliance with its policies and procedures and the terms and conditions of its Cofinancing Agreement(s) with the Borrower, and (b) to realize the intended development objectives of the Project. in the event that any differences may remain unresolved, each Cofinancier may exercise the right to take such actions as it may reasonably considers necessary: (a) to ensure compliance with its policies and procedures and the terms and conditions of its Cofinancing Agreement(s) with the Borrower, and (b) to realize the intended development objectives of the Project. Cofinaciers, despite accepting the use of Bank's

Procurement Guidelines, have not accepted the Bank's sanctions list and the Bank's role as the single fiduciary oversight authority.

15. Procurement for the Plant Design Supply & Installation, Construction Contracts and Consultancies for the power plants would be carried out in accordance with the Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2010; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006 and May 2010, and the provisions stipulated in the Legal Agreement.

16. Procurement Strategy (Sere Wind): Procurement for Sere Wind is envisaged to be carried out in three procurement packages (1. Wind Turbine Generator; 2. Civil Works; 3. Transmission Lines and Sub-station) and one consultancy for the Owner's Engineer. For procurement of Wind Turbine Generator Package, Eskom carried out Pre Qualification and the Bank's no objection to the pre qualification evaluation was already issued. Five bidders have been pre qualified. Bids will be invited following ICB and using Bank's Standard Bidding Documents for Plant, Design Supply and Installation, April 2008 revised August, 2010. The bidding documents are under finalization and bids are expected to be invited in October, 2011. Procurement for Consultancy Services for Owner's Engineer is underway and proposals were invited and opened by Eskom in March, 2011.

17. Procurement Strategy (CSP): Procurement for CSP is envisaged to be carried out in three procurement packages (1.Main CSP Package; 2.Civil Works; and 3.Transmission Lines and Distribution System) and one consultancy for the Owner's Engineer. For the Main CSP Package two stage bidding process will be followed using the Bank's Standard Bidding Documents for Plant Design Supply and Installation, April 2008 revised August, 2010. As CSP technology is still in early stages of development, with limited global experience, Eskom completed prefeasibility assessment of the proposed CSP project with the assistance of international consultant Fitchner. Eskom has initiated the process of selection of Owner's Engineer who will assist the Company in review of preliminary work, preparation of conceptual design, and preparation of bidding documentation, bid evaluation, review of basic engineering, and execution of the contract. Eskom has already initiated the procurement process for selection of Owner's Engineer. The procurement process for the main CSP Package is likely to start in end 2012.

18. For multiple contracts of similar works Eskom will consider inviting bids under alternative contract options that would attract the interest of both small and large firms, which could be allowed, at their option, to bid for individual contracts (slices) or for a group of similar contracts (package). All bids and combinations of bids shall be received by the same deadline and opened and evaluated simultaneously so as to determine the bid or combination of bids offering the lowest evaluated cost to Eskom.

19. The Construction Industry Development Board (CIDB) Act and the Construction Industry Development Regulations: CIDB is mandated by the CIDB Act and the Construction Industry Development Regulations to register contractors for construction works. Public entities are not allowed to sign contracts with unregistered contractors. The contractors are registered for the grading designation and category of construction works based on their financial capability evidenced by contractor's annual turnover and available capital, and works capability. The works capability is determined based on the performed contracts and the number of registered professionals by professional statutory bodies in accordance with the law relevant to the class of construction works, for example for engineering by Engineering Council of South Africa (ECSA) or for construction works by South African Council for Project and Construction Management Professions (SACPCMP).

20. Under the EISP, the OPRC considered the CIDB registration requirements and advised that the Bank may accept the CIDB registration with CIDB assurance of the expedited registration process that will enable bidders participation and possibility of the contract in due time of the process. The registration should not be a condition of the contract award. The following are the mitigation measures: (a) evidence of having applied for CIDB registration shall be required at the time of bidding; (b) CIDB commitment to register firms within 21 days on a best efforts basis; (c) ECSA and

Eskom will work together to fast track registration of international engineers within a 4 month period based on receiving a complete application for registration; (d) full and complete registration is neither a bid qualification criterion nor part of evaluation criteria for bids; and (e) the lowest evaluated bid shall not be rejected due to delays in registration.

21. As part of EISP, Eskom informed potential bidders about the registration requirement in the General Procurement Notice (GPN) to enable them to undertake registration much in advance of the specific procurement process.

22. Fulfilling the provisions of the CIDB Act, which mandates CIDB to "promote, establish or endorse… uniform standards… to regulate the actions, practices and procedures of parties engaged in construction contracts," CIDB issued the Standard for Uniformity in Construction Procurement. This Standard defines procurement procedures, methods, procurement documents, and evaluation formulae using the scoring evaluation system. These methods, procedures and documents, and formulae are not compliant with the Bank's Procurement Guidelines and procedures. GoSA has agreed that Eskom will not apply the Standard of Uniformity but will apply the Bank's Procurement and Consultant Guidelines.

23. Component 1 – Sere Wind Power Project. While there is adequate procurement capacity in Eskom for this sub-project, the use of new teams for each component or sub-component introduces new problems and risks which have been noticed in the ongoing procurement processes for Sere wind farm under the EISP. The technical team which was earlier disbanded, has been re-established recently. There is some experience in Eskom with regard to procurement of wind farms. Eskom previously advertised the EPC contract for the wind farm and failed to obtain competitive bids. As Eskom lacked financing at that time, the process was cancelled.

24. Component 2 – Upington CSP Project. While there is adequate procurement capacity in Eskom for this sub-project, the use of new teams for each component or sub-component introduces new problems and risks which have been noticed in the ongoing procurement processes under the EISP. The technical team, which was earlier disbanded, has been re-established. Unlike Sere, where the technology is better understood, Eskom has conducted a review of its CSP design in the context of global developments so as to ensure that optimal designs are used. Eskom has now initiated the procurement process for selection of Owner's engineer.

Procurement Risk Assessment

25. Most of the issues/risks concerning the procurement to be carried out for implementation of the project have been identified and include:

(i) Eskom has little experience in carrying out procurement based on the Bank's Procurement Guidelines and Procedures and this may lead to:

a. delays in the procurement process;

b. Eskom's procurement practices, which are different from the Bank's Procurement Guidelines and Procedures, making their way into the procurement of the Bank financed contracts;

(ii) Use of new team for each component or sub-component introduces new problems and risks for procurement to be carried out following the Bank's Procurement Guidelines and Procedures as the skills acquired in dealing with Bank procurement are not fully and evenly utilized.

(iii) Delays or stalemate of the procurement process may occur as a result of different procurement requirements by the financiers who will jointly finance contracts under the two components.

(iv) The procurement process and implementation may get affected in case one or more development partners do not accept the outcome of procurement process or make requests for modification of procurement documents or request for action not acceptable to the Bank.

(v) New CSP technology and limited number of bidders for this scale of CSP could result in high bid prices and hence the risk of unsuccessful conclusion of bidding and award process.

(vi) The new Preferential Procurement Regulations may affect the Borrower's ability to comply with the World Bank Procurement Guidelines.

(vii) Eskom has initiated procurement of some contracts for both components. In parallel they have also applied for extension of PFMA approval for both. There is a risk that the approval is outstanding when contracts are due to be signed, which could delay implementation.

Proposed corrective measures, some of which Eskom has already implemented include:

(i) Eskom has assigned two senior procurement staff to be responsible for procurement under the Project and its compliance with the Bank's Procurement Guidelines and Procedures.

(ii) Bank's Lead and Senior Procurement Specialists with vast experience in procurement for high value complex power projects are assigned for EISP and ERSP to assist Eskom in procurement processes.

(iii) The majority of the contracts will be subject to the Bank's prior review due to their large value, which will allow for timely correction whenever necessary.

(iv) Eskom has developed a complaints handling system which has been reviewed by the Bank.

(v) To the extent possible Eskom will review its approval chain, with the intention of eliminating inefficiencies. In any case, Eskom will factor in the time taken for all approvals in the Procurement Plan to ensure it is realistic.

(vi) The financiers have agreed to use the World Bank Procurement Guidelines and procedures for the jointly financed packages.

(vii) It is being discussed among the financiers that in case of any procurement related disagreements, the final position of the World Bank would prevail. The co-financiers will sign MOU for cooperation, coordination and exchange of information. This MOU, which is being currently discussed, envisages that in any case, to realize the intended development objectives of the Project, in the event that any differences may remain unresolved, each Co-financier may exercise the right to take such actions as it may reasonably consider necessary to ensure compliance with its policies and procedures and the terms and conditions of its Co-financing Agreement(s) with the Borrower.

(viii) International consultants will assist Eskom throughout the process of basic design, bidding, evaluation, award and implementation of CSP.

(ix) In case the new Preferential Procurement Regulations would affect the Borrower's ability to comply with the World Bank Procurement Guidelines, Eskom will immediately inform and consult with the Bank and the Guarantor in order to resolve the issue and facilitate the procurement. Eskom is considering requesting a waiver to application of the Preferential Procurement Regulations.

(x) Regarding PFMA approval, we have been informed that the procurement process will not stop because of the pending approval, and it is expected that approval will be granted ahead of the estimated time for awarding the first contract.

26. Upington CSP component of the project constitutes approx 77% of the total project cost. The main CSP Package is the largest procurement package. There are only a few bidders that are in possession of this new technology for the project of this size and hence there are risks of high prices and successful conclusion of bidding and award process. For the Wind Farm component, that is co-financed with AfDB and AFD there is some comfort level based on the experience in ongoing procurement process for the Wind Turbine Generator Package. However, the CSP component will be co financed with AfDB, AFD, KFW and EIB. In view of highly complex procurement for CSP and the number of financiers involved, the overall project risk for procurement is **High** and the residual risk after consideration of the corrective measures is **Substantial to High**. The residual risk includes differences that may remain unresolved. In such an event, each Co-financier may exercise the right to take such actions as it may reasonably consider necessary: (a) to ensure compliance with its policies and procedures and the terms and conditions of its Cofinancing Agreement(s) with the Borrower, and (b) to realize the intended development objectives of the Project. The Bank will continue to closely monitor implementation of the corrective measures, which will mitigate the identified risks, and the residual risk may be adjusted during project implementation.

Procurement Plan

27. The Procurement Plan was approved as part of EISP. For ERSP Eskom has now developed separate Procurement Plan for project implementation which provides the basis for the procurement methods. For each contract to be financed by the CTF loan, the different procurement methods, the need for prequalification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank project team in the Procurement Plan. Eskom have also updated the Procurement Plan for EISP (under finalization) as Component B under EISP is now covered in separate Procurement Plan for ERSP. The packages, procurement methods and timing for ERSP are shown below.

Goods, Works and Non Consulting Services

Ref No.	Description		IBRD (US$m)		AfDB (US$m)		Proc. Method	PQ	Domestic Pref	Post/ Prior Review	Expected Bid Opening
			Loan	CTF	Loan	CTF					
W1	Design, supply and installation of wind turbines/ generators		29	20	40	20	ICB (Single Stage)	Yes (completed)	No	Prior	07/15/2011
W2	Civil works		5	8	0	0	ICB (Single Stage)	Yes	No	Prior	07/01/11
W3	Tranmission and substations, (incl upscalling)		0	10	0	0	ICB (Single Stage)	No	No	Prior	07/08/11
W4	Design, supply and installation of Upington		141	116	141	50	ICB/ Two Stage	No	No	Prior	07/01/13

	CSP plant										
W5	CSP Misc Package (Works)		17	14	0	0	ICB (Single Stage	Yes	No	Prior	01/31/13
W6	Transmission and Distribution Lines		2	2	0	0	ICB (Single Stage	No	No	Prior	01/31/13

Consulting Services

28. The consulting assignments are listed below. For both the selection method will be QCBS.

Ref No.	Description	Estimated Cost (US$)	WB Loan (US$)	WB CTF (US$)	Selection Method	Prior/ Post Review?	Expected Proposal Submission
C1	Owner's Engineer for Sere Wind	20	10	10	QCBS	Prior	03/28/11 (Actual)
C2	Upington Consulting Services	45	0	39	QCBS	Prior	06/30/11

29. The Procurement Plan covers the first 18 months of procurement. This agreed Plan will be available at Eskom's offices during implementation and on the Bank's external website. The Plan will be updated in agreement with the Project Team annually, or as required to reflect the actual project implementation needs and improvements in institutional capacity.

Frequency of Procurement Supervision

30. In addition to the prior review supervision to be carried out from Bank offices, a supervision mission including post review of procurement actions will be conducted at least annually.

Procurement Methods

31. It has been agreed with Eskom that no National Competitive Bidding (NCB) shall be used and all contracts shall be procured through ICB through the following methods:

Contracts for goods, works, and non consulting services

Expenditure Category		Contracts Subject to Prior Review
1	Goods	
a	International Competitive Bidding [ICB]	All
2	Works and Supply & Install	
a	International Competitive Bidding [ICB]	All
3	Non-consulting services	
a	International Competitive Bidding [ICB]	All

Contracts for Consulting services

1	Consulting Services	
a	Quality and Cost Based Selection [QCBS]	All

32. Domestic preference shall be used in the procurement of Goods contracts.

Prior review

33. All contracts above the prior review thresholds noted below will be subject to the Bank's prior review as Appendix 1 of the IBRD's Guidelines.

Prior review thresholds for contracts for goods, works, and non consultants services

1	Goods	Contracts estimated to cost US$0.5 million or more
2	Works and Supply & Install	Contracts estimated to cost US$10 million or more
3	IT systems and non-consultants services	Contracts estimated to cost US$3 million or more
4	Direct Contracting	All

34. The prior review thresholds in the above table are determined by the aggregate value of all contracts (slices) in the package or per contract if bid individually.

35. Contracts which are not subject to prior review shall be subject to post review. The Bank may also decide to carry out an Independent Procurement Audit which may include both post and prior review contracts.

Eskom Implementation Arrangements – Procurement matters

36. Implementation arrangements will be based on the existing organizational structure of Eskom. The normal sequence of preparation and implementation activities to build and commission the Project shall be followed. Eskom has issued an internal memorandum (good practice note) to ensure that any special actions, outside the normal practice for any of Eskom's investments projects, are taken in a timely manner.

Annex 9: Economic Analysis

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Introduction

1. Based on South Africa's Long-Term Mitigation Scenarios (LTMS), the Government has adopted mitigation strategies aimed at allowing emissions to grow in the short term, but at a reduced rate, plateau by 2030, and decline gradually thereafter. Mitigation strategies include accelerated energy efficiency across all sectors, investment in new clean energy resources and energy use behavioral change and the pursuit of regulatory mechanisms and economic instruments. South Africa and Eskom are committed to this long-term strategy and this operation forms part of this strategy.

2. Investment in wind and CSP are planned as part of this project. The economic analysis has been carried out for the two components separately, and for the project as a whole. The economic assessment for the Project covers analysis as to whether the renewable energy projects (wind and CSP) are economically viable (using a combination of economic rates of return, economic net present value and other available information).

3. Calculating economic rates of return (ERR) – consumer willingness to pay (WTP): The total economic benefits of the projects are assessed using the value consumers place on consuming incremental power (represented by the area under consumer demand curve). The ERR has also been evaluated at the proxy tariff level[44]. Assessment of benefits at the tariff provides an estimate of the lower bound of WTP.[45]

4. Based on the household electricity survey of rural South Africa,[46] average monthly household expenditure on electricity substitutes is 44 Rand/month.[47] According to the study, typical consumption of rural households once electrified is 85kWh/HH/month.[48] From this follows a WTP of 6.5 US cents/kWh. If one subtracted the 50kWh/month/HH supplied free of charge by Eskom to poor rural areas, the WTP increases to 15.7 US cents/kWh: given the uncertainties we use the lower value for the baseline calculation. The total WTP is then calculated by weighting the WTP by the proportions of power used by each sector. The average consumer WTP for power in South Africa calculates to 17.5 US cents/kWh.

5. Calculating economic rates of return – discount rate: The discount rate used for the assessments is 10 percent. A variety of discount rates have been used for economic analysis over the past decade in South Africa. DoE used 11 percent in their 2003 integrated energy plan, but in the Long Term Mitigation Studies (LTMS) prepared for DoE, 10 percent was used (with sensitivities at 15 percent, 3 percent and zero). The National Energy Regulator of South Africa used 12 percent for purposes of calculating the feed-in tariff for renewables (though with a footnote that they thought a "more generous discount rate than DoE's 10 percent was appropriate for calculating levelized costs for the FIT").

---

[44] As approved by NERSA in October 2009

[45] It is a lower bound because valuation at the tariff ignores any consumer surplus. However, because of the difficulty of empirical verification of WTP and consumer surplus, as a verifiable indicator of WTP an assessment at the tariff is an important yardstick. We base the tariff level on the REFIT level that was originally announced by NERSA in 2009 but which was subsequently replaced by the Renewable Energy Development Program in 2011.

[46] Scottish Power PLC, Community Electricity in Rural South Africa: Renewable Energy Grid Assessment, 2005.

[47] Total household expenditure is 145-174 Rand/month, but this includes cooking fuels – kerosene, fuelwood and LPG. Some wood may also be used for heating water, but it seems unlikely that electrification would result in significant use of electric water heaters in these areas. Most LPG is used for cooking, with small amounts for ironing, water heating and refrigeration – but only 27 percent of HH sampled used LPG.

[48] This is a high rate of consumption by global standards, with 15-40 kWh/HH/month being the typical range in poor rural areas. However, 50 kWh/month is provided by Eskom free of charge.

6. Including the social cost of carbon dioxide emissions: For each project, the economic assessment is also carried out incorporating the value of CO_2 emissions. For each of the renewable energy projects this value is represented by the *avoided* cost due to displacement of CO_2 emissions (i.e. it is added as an economic benefit).

7. The economic value of CO_2 emissions: This analysis uses a figure of \$29/ton CO_2 which is based on the Stern review.[49] The research on the social cost of carbon is extensive and growing; with a large range of valuations from a small net benefit to several hundred dollars a ton. Thus, almost any estimate would find some support. Tol's 2007 meta-analysis of the peer-reviewed literature, which updated an earlier 2005 meta analysis, cites 211 studies, with a mean of US\$120/ton of Carbon (US\$33/ton CO_2 for studies published in 1996-2001), and \$88/ton of Carbon (\$24/ton CO_2 for studies published since 2001). The \$29/ton CO_2 used for this analysis comes from the Stern review[50], which states that "the mean value of the estimates of the (2005) study by Tol was about \$29/ton CO_2 though the current social cost of carbon might be around \$85/ton CO_2"[51].

Renewable Energy Projects – Sere Wind Power Project and Upington CSP

8. Economic Rationale: The wind and concentrating solar power (CSP) projects are being developed primarily to help deliver on South Africa's commitment to follow mitigation strategies set out in the Long-Term Mitigation Scenarios (LTMS). Under the LTMS, South Africa will start to reduce growth in emissions immediately and will reduce absolute emissions from 2030 onwards. The catalytic role of the proposed renewable projects in delivering on the LTMS is the driving force behind development of the proposed Sere Wind and Upington CSP projects. Assessing these projects as a source of incremental energy alone would fail to capture the full benefits of these investments.

9. The two projects – as a first of their kind - are seen as a test case and catalyst for larger scale delivery of power using these technologies to displace considerable future CO_2 emissions (and generate economic externality benefits in the process) and are very much in response to the need to support the Government in operationalizing its plans under the LTMS. The Government's strategy on mitigation requires such projects to be developed, and assessment of economic viability of each of these projects should therefore take account of their broader role in making future economically attractive projects take place earlier and in greater numbers. By putting in place a renewable energy development program[52], the Government has acknowledged the importance of each of these technologies to South Africa's future commitments on low carbon growth.

10. South Africa has very little established wind power and the Sere project would play an important role in facilitating increased future investment in the sector. A full assessment of the economic viability of the Sere Wind Power Project would take account of the knock-on benefits of this project for delivering future projects. The project will include investment in transmission network planning which will reduce costs for future projects. In terms of reducing risks, the project will also provide greater certainty on equipment and subsequent maintenance and operating-costs in the South African context. If the various cost and risk barriers can be reduced through this project, the consensus view is that there is technical potential for some 4 GW of wind power in South Africa which would form an important part of South Africa meeting its commitments set out under the LTMS. In addition, certainty around project costs and a track-record of operational wind power in the country will provide comfort to the private sector, thus paving the way for a successful PPP program for renewable energy in South Africa under the GoSA's program.

[49] Stern, Nicholas. 2007. *The economics of climate change: The Stern review.* Cambridge: Cambridge University Press.
[50] Stern, Nicholas. 2007. *The economics of climate change: The Stern review.* Cambridge: Cambridge University Press.
[51] Even the \$29/ton estimate has come under wide criticism, not least from Tol himself, who notes that the \$29/ton figure was cited out of context, for Tol concluded in the 2005 study that "it is unlikely that the marginal damage costs of emissions exceed \$50/ton of Carbon (US\$14 ton CO_2) and are likely to be substantially lower than that".
[52] Under the prior REFIT scheme (replaced by Renewable Energy Development Program in 2011),the wind feed-in tariff, at ZAR 1.25/kWh is set close to the assessment of the overall weighted average consumer WTP for power in South Africa (US cent 17.5/kWh or ZAR 1.31/kWh). The feed-in tariff for CSP is considerably higher at ZAR 2.10/kWh (US cent 28.0/kWh).

11. For CSP, the broader knock-on impacts of this project are critical to South Africa's ability to follow the path set out by the LTMS. The LTMS finds CSP to be a realistic alternative to coal power plants for baseload capacity. CSP with thermal storage (as envisaged for this project) is one of the few renewable supply options that can provide baseload and dispatchable power. Currently, almost all the power requirements for Eskom are provided by large coal-fired power stations. Eskom has estimated that there are resources for about 40 GW of solar thermal power in the Northern Cape and Western Cape provinces alone. The combination of potential scale and potential for replicating coal-fired power generation's dispatch ability in the system makes CSP *the* critical renewable energy technology for enabling South Africa to meaningfully reduce absolute emissions by 2030 as per its commitments. Envisaged installed capacity of CSP by 2050 as set out in the LTMS indicates strong expectation that CSP will be taken up in line with the full estimated resource size.

12. The Upington CSP project also has considerable global significance in terms of its learning effects. Southern Africa is one of a select number of regions around the world that is particularly suited to CSP use. CSP has not been built and operated at large scale to date and this would be one of the largest commercial operations of the proposed design. First movers such as this project are expected to provide considerable learning for future projects in South Africa and around the world. According to the International Institute for Applied Systems Analysis, every time the total installed capacity for a given technology doubles, the costs fall by about 10-15 percent on account of learning and economies of scale. This suggests that to become competitive with fossil fuels, CSP would have to grow to be about half the capacity of what wind is now[53]. The IEA finds a similar learning rate[54] for CSP of 12 percent i.e. a 12 percent drop in prices every time there is a doubling of installed capacity. These initial projects are therefore expected to have critically important impact on lowering costs of follow-on plants. Given the scale of the long-term potential for CSP globally, this is a significant benefit from the project that is impossible to quantify.

13. Project Selection: For each technology, wind and CSP, the sites and configurations were chosen in accordance with pursuing the least cost option for a given size and type of project.

- For wind, the Western Sere Facility is fully scoped and specified. Importantly, as well as being a "moderate" wind resource, the site is near a 132 kV sub-transmission line with sufficient capacity to evacuate the power.
- A number of solar technology alternatives and sites were assessed before a Concentrating Solar Power project using power tower technology was chosen to be sited in Upington in the Northern Cape. This included technical feasibility in choosing the site. The Upington site is found to have one of the highest solar potential values in the world. This site is to be part of a larger solar park being developed to accommodate a fleet of future CSP plants. The variety of technology options was evaluated. Annual simulation models were run. Pilot plant designs were developed and optimized to provide the lowest levelized energy cost for the location. The results of the comprehensive assessment found the most promising option for the near term to be a molten salt-type central receiver technology to be located in Upington. Full details of this assessment can be found in the Eskom Environmental Impact Assessment[55] stored in the Project File.

14. Economic Rate of Return and Sensitivity Analysis: The results of the economic analysis using specific data available for the individual project and treating the project as a source of incremental clean power alone shows that the Sere Wind Power Project has an ERR of 7.3 percent and an NPV of -$55.3m assuming an annual load factor of 26 percent and including the benefits of displaced CO2 emissions. This rises to an ERR of 10.3 percent and an NPV of $6.7m at a load factor of 32 percent.

[53] IIASA Policy Brief: Expanding solar energy in North Africa to achieve climate targets, #7, December 2009.
[54] The speed at which costs fall in response to engineering, construction, and operational experience, improved material procurement, and manufacturing scale is described by the learning rate.
[55] Vol 2. (Proposed Establishment of a Concentrating Solar Power Plant and Related Infrastructure in the Northern Cape Province).

Therefore, even without consideration of catalytic benefits due to this project, it is found to be economically viable at high load factors.

15. In the case of CSP, even though it is intended to design the plant for a load factor of 60-65 percent (using storage), because of the limited long-term experience with the technology, the economic analysis is based on a conservative load factor based on 12 hours of operation per day. Using specific data available for the individual project and treating the project as a source of incremental clean power alone, the CSP project has an ERR of 2.2 percent and an NPV of -$336.8 million assuming an annual load factor based on 12 hours of operation and including the benefits of CO_2 emissions. The proposed design of the CSP is likely to allow the plant to operate with a load factor equivalent to 15 hours of operation per day and at this higher level, the ERR increases to 4.8 percent and the ENPV to -$242.6 million.

16. South Africa does not have "green" tariffs and therefore it is impossible to directly observe consumer willingness-to-pay for power from these technologies. It can be expected, though, that Government policy seeks to reflect longer term population preferences. On this basis, if the former feed-in tariff for CSP (approximately US cents 30.0/kWh)[56] were taken as a proxy for higher national willingness-to-pay for power from initial CSP projects (for the reasons linked to South Africa's low carbon growth aspirations described earlier), then the project ERR at 12 hours of operation would rise to 7.5 percent and ENPV to US$ -124.1 million. For a CSP project with 15 hours of operation, the ERR would rise to 10.4 percent and ENPV to US$ +23.3 million.

17. The table below summarizes the results of the sensitivity analysis. This shows that the economic returns are strongly dependent on the annual load factor achieved by the plant. Also, that returns are much more sensitive to capital-cost overruns during construction than they are to project delays.

Table 11: Renewable projects - sensitivity analysis

Sere Wind Power Project (including benefits due to displacement of CO_2)						
	EIRR	ENPV (in US$ millions)	EIRR	ENPV (in US$ millions)	EIRR	ENPV (in US$ millions)
Load factor	*20%*		*26%*		*32%*	
WTP@17.5USc/kWh	3.9%	-117.3m	7.3%	-55.3m	**10.3%**	**+6.72m**
Capital cost overrun by 10%	3.0%	-145.8m	6.2%	-83.8m	9.1%	-21.8m
Capital cost overrun by 20%	2.1%	-174.3m	5.3%	-112.3m	8.0%	-50.3m
1 year delay in entire project	3.8%	-116.5m	7.0%	-60.2m	9.8%	-3.8m
2 year delay in entire project	3.6%	-115.8m	6.7%	-64.5m	9.4%	-13.3m

[56] set by NERSA in 2009 but replaced by the Renewable Energy Development Program in 2011.

Upington Concentrating Solar Power Project (including benefits due to displacement of CO_2)						
	EIRR	ENPV (in US$ millions)	EIRR	ENPV (in US$ millions)	EIRR	ENPV (in US$ millions)
Load factor	*9 hrs*		*12 hrs*		*15 hrs*	
WTP @28.0USc/kWh	4.0%	-271.4m	7.5%	-124.1m	**10.4%**	**+23.3m**
WTP@17.5USc/kWh	-	-431.0m	2.2%	-336.8m	4.8%	-242.6m
Capital cost overrun by 10%	-	-496.9m	1.3%	-402.7m	3.8%	-308.5m
Capital cost overrun by 20%	-	-562.8m	0.5%	-468.6m	2.9%	-374.4m
1 year delay in entire project	-	-388.2m	2.4%	-302.6m	4.9%	-216.9m
2 year delay in entire project	-	-356.8m	2.4%	-278.6m	4.9%	-201.1m

18. Assumptions: The economic analysis is based on the following assumptions for both projects: (a) cumulative losses between generation and consumption point are estimated at 10 percent; (b) the total cost of transmission and distribution is US cents 2/kWh; (c) overall consumer willingness-to-pay for power in South Africa is assessed at US cents 17.5/kWh (as discussed in more detail in Paragraph 4); and (d) displacement of CO_2 per kWh of energy generated by CSP or wind is 1.03 kgs of CO_2/kWh (based on the Eskom emission grid factor published in the Eskom Annual Report 2009). Specific project related assumptions for the proposed renewable energy projects are as follows:

- *Sere Wind Power Project - Assumptions*: Total cost of project including transmission but excluding IDC, taxes and import duties and contingencies is based on capital-cost of US$ 310 million ; construction period is 3 years 2011-14 inclusive though some capital-costs are incurred in a fourth year; power generation is assumed to begin during 2013; capital-costs are incurred according to the following distribution: 32 percent in year 1, 51 percent in year 2, 12 percent in year 3 and 5 percent in year 4; extra capital-costs relating to transmission is $7 million; energy for own use is assumed at 1 percent of gross generation; operating and maintenance fixed costs are assumed to be 1.26 percent of capital-costs; costs are assumed to increase by 1 percent (real) per year; installed capacity is 100 MW; base case average hours of operation per day are assumed as a 26 percent load factor) for base case (sensitivities are assessed for 20 percent and 32 percent load factors); and plant operating life is assumed to be 20 years.
- *Upington CSP – Assumptions*: Total cost of project including transmission but excluding IDC, taxes and import duties is US$ 872 million (excluding any contingencies as well); construction period is 6 years 2011-16 inclusive although minor amounts of capital-costs are incurred in a first and sixth years; power generation is assumed to begin during 2016; capital-costs are incurred according to the following distribution: 4 percent in year 1, 10 percent in year 2, 15 percent in year 3, 22 percent in year 4, 45 percent in year 5 and 3 percent in year 6; energy for own use is assumed at 10 percent of gross generation; operating and maintenance fixed costs are assumed to be 1 percent of capital-costs and are assumed to increase at a real rate of 1 percent per year; installed capacity is 100 MWe; average hours of operation per day are assumed to be 12 hours in the base case with additional assessment for 9 hours and 15 hours; and plant operating life is assumed to be 20 years.

Project Economics as a Whole

19. The benefits of the project are quantified here as the consumer's willingness to pay (WTP) for the **incremental power alone** produced by the project, with an average benefit of 17.5 US cents/kWh. As discussed above, significant benefits of these components relate to impacts beyond simple

incremental power (by virtue of these projects being instrumental in delivering more and earlier wind and CSP generated power). However, these benefits are difficult to quantify and therefore are not incorporated in the tables below. Taking both components together, the baseline aggregate project economic return is quantified as 1.4 percent, with an NPV of US$ -507.3 million (Table 12). This is based on a 26 percent load factor for wind and 12 hour operation for CSP. As we have seen, returns for both projects rise with higher load factors.

Table 12: Project Economics as a Whole

Component	**ERR**	**NPV @ 10%**
	(as a %)	*US$ Millions*
Component 1 - Wind	4.7%	-103.2
Component 2 - CSP	0%	-404.1
Project as a Whole	**1.4%**	**-507.3**

20. As shown in Table 13, when the reductions in GHG emissions are taken into account, and based on a carbon valuation of US$ 29/ton of CO_2, the economic returns of the project increase.

Table 13: Project Economics as a Whole, including CO_2 valued at US$29/ton

	ERR (w/o GHG)	**ERR (w/ GHG)**	**Change in ERR**	**ENPV**
	(as a %)	*(as a %)*	*(as a %)*	*US$ Millions*
Component 1 - Wind	4.7%	7.3%	2.6%	-55.3
Component 2 – CSP	0%	2.2%	2.2%	-336.8
Project as a Whole	**1.4%**	**3.8%**	**2.4%**	**-392.1**

Annex 10: Safeguard Policy Issues

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Note: A team of senior legal, environmental, and social specialists at the Bank prepared a Safeguards Diagnostic Review of relevant South African legislation and Eskom corporate practices as part of Bank preparation of the Eskom Investment Support Project (EISP) in late 2009. The Safeguards Diagnostic Review (SDR) was disclosed in draft form, subject to public consultation, and then finalized and disclosed by the Bank in early 2010, as described below.57 The EISP was approved by the Board of Directors of the Bank in April 2010. Two of the components of the EISP, consisting of two renewable energy projects, are the subject of additional financing provided by the ERSP. This annex is a modified version of the Executive Summary of the Safeguards Diagnostic Review prepared for the EISP. It has been modified by removing some material irrelevant to the two renewable energy projects, and incorporates some of the findings relevant to the renewable energy projects that can be found in the main text of the SDR.

Relevant Excerpts from Executive Summary of Safeguard Diagnostic Review for Eskom Investment Support Project

1. **Policy Framework.** Under Operational Policy/Bank Procedure 4.00 (OP/BP 4.00), Piloting the Use of Borrower Systems to Address Environmental and Social Safeguard Issues in Bank-Supported Projects, the Bank has had the authority since March 2005 to support pilot projects in which lending operations are prepared using the borrowing country's systems for environmental and social safeguards, rather than the Bank's corresponding operational policies and procedures. The advantages of using country systems (UCS) are to: scale up development impact, increase country ownership, build institutional capacity, facilitate donor harmonization in approaches to environmental and social safeguards, and increase cost effectiveness. These objectives with respect to environmental and social safeguards were broadly endorsed at the Paris High Level Forum on Aid Effectiveness in March 2005, and strongly reiterated in the Accra Agenda for Action in September 2008.

2. During the past three years, the Bank has approved ten pilot projects under the first phase of this program, including recent approval of a pilot project in South Africa. On January 31, 2008, the Executive Directors of the Bank approved a three-year extension of the pilot program accompanied by an incremental scaling up of the pilots from the project to the country-level, including support of activities at the sub-national level. Under the three-year extension, i.e., the second phase of the pilot program, nine pilots have been formally initiated and are being worked on, including a scaled up second project in South Africa for which this document has been prepared.

3. OP/BP 4.00 describes the approach, enumerates the criteria for using country systems, and specifies documentation and disclosure requirements and respective roles of the borrower and the Bank. The Bank considers a borrower's environmental and social safeguard system to be equivalent to the Bank's if the borrower's system is designed to achieve the objectives and adhere to the applicable operational principles set out in Table A1 of OP 4.00. Since equivalence is determined on a policy-by-policy basis in accordance with Table A1, the Bank may conclude that the borrower's system is equivalent to the Bank's with respect to specific environmental or social safeguards in particular pilot projects, and not with respect to others. Before deciding on the use of borrower systems, the Bank also assesses the acceptability of the borrower's institutional

[57] The full SDR for the EISP can be found at http://web.worldbank.org/external/projects/main?menuPK=51447259&pagePK=51351007&piPK=64675967&theSitePK=40941&menuPK=64187510&searchMenuPK=51351213&theSitePK=40941&entityID=000333038_20100311235302&searchMenuPK=51351213&theSitePK=40941

capacity, implementation practices, and past performance in similar projects. Gap-filling measures must be implemented prior to project approval or, if carried out by necessity during project implementation, are subject to a time-bound legal agreement between the Bank and the borrower. The process and product of analyzing equivalence, assessing eligibility, and identifying and agreeing on gap-filling measures is called a Safeguards Diagnostic Review (SDR). Under OP 4.00, a draft SDR is required to be disclosed prior to project appraisal.

4. An SDR was prepared for the Eskom Investment Support Project (EISP). The SDR described the scope, methodology, and findings of the equivalence analysis and acceptability assessment carried out in South Africa by staff from the Bank for the EISP. It also specified agreed gap-filling measures designed to ensure that applicable South African safeguard systems, and Eskom's corporate practices for complying with the relevant South African regulations, would meet the equivalence and acceptability criteria of OP 4.00 throughout the project cycle and are adapted to extend their benefits beyond the scope of the project to the extent possible. The SDR was conducted in collaboration with the borrower, which is Eskom, and officials from the South African Ministry of Water and Environmental Affairs, including the Department of Environmental Affairs (DEA).58 A draft of this SDR was publicly disclosed by the Bank and by Eskom in November 2009, and was the subject of stakeholder consultation workshops held in South Africa in early December 2009. The final SDR was revised to reflect comments received from stakeholders, and was disclosed by the Bank and by Eskom in early 2010, prior to Board approval of the EISP in April 2010.

5. The scope of the EISP SDR included all of the components of the ERSP, including the 100 MW Sere Wind Power Project (Sere WPP) in the Western Cape Province, the Concentrated Solar Power (CSP) plant near Upington in Northern Cape Province (also with an initial a pilot capacity of 100 MW) and the associated infrastructure for the connection of the Sere and CSP generation facilities to grid.

6. **Project Objectives.** The Project Development Objective of the ERSP is to facilitate the accelerated development of large scale renewable energy capacity in support of the long-term carbon mitigation strategy of South Africa.

7. The SDR for the EISP assessed the implementation practices, track record, and institutional capacity of Eskom and the South African regulatory institutions that will be involved in addressing environmental and social safeguard issues in the Bank-supported EISP. In doing so, the 4,800 MW Medupi power plant in Limpopo province and another major Eskom investment that was under construction at the same time, the 4,800 MW Kusile power plant in Mpumalanga Province, were selected by the Bank team for detailed analytical work to assess and verify the robustness of the Environmental Impact Assessment (EIA) process and its outputs under the requirements of OP 4.00. By selecting these two nationally important projects as the primary subjects of SDR analytical work for the EISP, the Bank achieved two important objectives: it allowed the SDR to assess the integrity and robustness of DEA's environmental review and approval process for two major projects that could be considered of national importance; and it provided insights into Eskom's capacity, commitment, and capability to address environmental and social safeguards issues with respect to both the EIA process and project implementation, since construction was well underway for both the Medupi and Kusile power plant projects during preparation of the SDR. This focus was particularly useful to the objectives of the SDR for both the EISP and the proposed ERSP because both the safeguards

[58] From 1994 through May 2009, DEA was known as the Department of Environmental Affairs and Tourism (DEAT) and reported to the Ministry of Environmental Affairs and Tourism, As part of a ministerial reorganization in May 2009, DEA and the Department of Water Affairs (previous part of the Ministry of Water Affairs and Forestry) were both placed under the authority of the newly designated Ministry of Water and Environmental Affairs and the Department of Tourism became a separate Ministry of Tourism. For purposes of this report, the current acronym, DEA, will be used when referring to the Department in the present or future tense; and DEAT will be used when referring to the Departmental actions taken in its previous capacity.

work and the initial stages of construction were carried out in accordance with Eskom's corporate practices prior to the decision by the GoSA to seek Bank support for Eskom's investment program.

8. Although this EISP SDR analytical work focused primarily on the Medupi and Kusile power plants as representative examples to assess the borrower's safeguards systems, it is important to note that the Bank team also reviewed safeguards documents already disclosed on Eskom's website for the Eskom renewable energy investments that are being financed in part by the Bank's EISP and are the subject of additional financing through the ERSP. In preparing the SDR for the EISP, the Bank team also reviewed the scoping reports and final EIRs prepared by Eskom for the proposed Sere WPP as well as the CSP project, and found that the safeguards documents for these proposed Eskom investments demonstrate comparable equivalence and acceptability with respect to Environmental Assessment and treatment of Natural Habitats, and Physical Cultural Resources. Documentation is provided in both EIRs that show that Eskom adhered fully to the South African EIA procedures. The Bank team also will continue reviewing the safeguards documents, such as the Environmental Management Plans (EMPs), or similar documents, prepared by Eskom for the ERSP components as they become available during project preparation, implementation, and supervision.

9. **Basis for Selection of Pilot Country and Project.** South Africa was selected as a pilot country because it has an established legal and regulatory system and a favorable reputation for effective implementation of its systems governing environmental assessment and protection of natural habitats, protected areas, and physical cultural resources. This was previously demonstrated by the SDR completed by the Bank for the recently approved Global Environment Facility (GEF) project in support of the Development, Empowerment, and Conservation of the iSimangaliso Wetland Park and Surrounding Region (iSimangaliso), which examined South Africa's legal framework for the same four safeguards that were triggered by the EISP, but with reference to their application to an internationally protected wetlands area with substantial autonomy from the mainstream of the South African administrative framework.

10. The EISP was selected as a scaled up pilot project because the borrower, Eskom Holdings Ltd., has demonstrated a substantial corporate commitment to fulfilling and going "beyond compliance" with legal and regulatory requirements and embracing a sustainability policy on both a corporate and project level. As described in detail below, Eskom subscribes to the United Nations Global Compact,59 has obtained or is in the process of obtaining ISO 14000 certification for the Environmental Management System (EMS) for each of its operational units, and seeks to align its projects and its practices with the requirements of the Equator Principles (i.e., the International Finance Corporation's Performance Standards) and with the Global Reporting Initiative (GRI). Accordingly, there was reason to expect that Eskom's systems are likely to demonstrate strong equivalence with the Bank safeguards as set forth in OP 4.00 Table A1, and that Eskom's investment projects making up the EISP would be implemented in an acceptable manner with respect to Bank safeguard policies.

11. **SDR Methodology.** The SDR for the EISP built and expanded on the results of the SDR completed in March 2009 for the GEF-funded iSimangaliso project, which received Board approval in December 2009. The SDR for EISP which includes the Sere Wind and the CSP concluded that the South African systems are fundamentally equivalent to the Objectives and Operational Policies of OP 4.00 Table A1 with respect to the three environmental safeguard policies, and partially equivalent with respect to Involuntary Resettlement in the context of their application to the EISP components.

12. The Equivalence Analysis and Acceptability Assessment for the EISP were carried out by a multidisciplinary team from the Bank in collaboration with relevant officials and technical staff members from Eskom, with cooperation from DEA and the Department of Water Affairs. The methodology included: desk review of legislation currently in force, supporting regulations, and

[59] www.unglobalcompact.org.

mandatory guidelines applicable to the electric power generation sector and associated infrastructure; discussion with officials; and site visits to the Medupi and Kusile construction sites, the Sere WPP site, the CSP site, and the 67-km Ermelo-Majuba rail line servitude, by members of the Bank's project team. The Bank team preparing the SDR consisted entirely of senior level staff and included: an environmental lawyer, three environmental specialists, a Senior Technical Advisor, and a social specialist.

13. The Equivalence Analysis included a detailed inventory of South African laws and regulations relating to the four Bank environmental and social safeguard policies triggered by the EISP project, as identified below in the Equivalence Section of this report. These laws and regulations are supported by Constitutional provisions, policies, and international agreements ratified by the GoSA, all of which are included as relevant to the legal framework for the Equivalence Analysis. An extensive literature review was also conducted tracing the development and evolution of South African environmental law in both historical and comparative contexts. The analysis draws careful distinctions between laws and regulations that are mandatory, as valid comparators to the Operational Principles of OP 4.00 Table A1, and other documents having aspirational or guidance value, which may inform the analysis and provide a basis for comparison with the Objectives of OP 4.00 but cannot be considered conclusive evidence of equivalence with the mandatory provisions of Bank safeguards. Based on this analysis each relevant provision of a borrower's system is characterized as having full, partial, or no equivalence to the corresponding Objective or Operational Principle of OP 4.00 Table A1.

14. The Acceptability Assessment applied the four-component methodology that has evolved through the SDR process during the implementation of the UCS pilot program. These four components include: institutional capacity; processes and procedures; outputs; and outcomes. To assess relevant institutional capacity, the assessment drew on primary sources including external and internal reports prepared by Eskom and DEA. These reports provided valuable insights into Eskom's institutional capacity to: (a) conduct environmental assessment; (b) avoid, minimize, mitigate and compensate for adverse environmental and social impacts resulting from the construction and operation of thermal power plants and associated infrastructure, while conserving natural habitat and physical cultural resources; and (c) conduct land acquisition and related resettlement activities in accord with South African legal requirements and international good practice as exemplified by Bank safeguard policies and associated guidance documents. The SDR also examines the capacity of the DEA to apply informed critical judgment to its review of EIRs submitted by Eskom as demonstrated by its processing of the EIRs for the two power plants proposed for support under the EISP, and by Eskom or other parties responsible for associated infrastructure.

15. To assess the effectiveness of implementing processes and procedures, the SDR reviewed official procedural and guidance documents describing the appropriate conduct of the environmental assessment and management process in South Africa. Attention was given to the various stages of the environmental assessment process in South Africa including: the Scoping Phase and EIR Phase, public consultation and disclosure, culminating in the Environmental Authorization (formerly known as Record of Decision [ROD]) on the part of the Minister of Environmental Affairs. Similar review was conducted with respect to the development and approval of EMPs for the construction and operational phases of the two thermal power plant projects. The EIRs and construction-stage EMPs were reviewed in light of the requirements for environmental assessment under South African law and international good practice.

16. With respect to outputs, the SDR critically reviewed: the findings of the EIRs and EMPs for the Medupi and Kusile projects; the EIRs for the Sere WPP, the Upington CSP plant, and the coal transport rail spur; and the RODs and other approvals issued by DEA to date. The Acceptability Assessment also reviewed the land acquisition and compensation process undertaken by Eskom in connection with project development, and the outcomes of that process with respect to compliance with South African law and the objectives and operational principles of Bank policy with respect to Involuntary Resettlement.

17. The methodology included stakeholder consultation workshops on the draft findings of this SDR report as noted above. A summary of the workshops is included as an annex to the SDR prepared for the EISP.

Summary of Equivalence Analysis

18. The first step in the Equivalence Analysis for the EISP was to identify the Bank environmental and social safeguard policies triggered by the project. The four environmental and social safeguards triggered by the EISP project include: Environmental Assessment (EA); Natural Habitats (NH); Physical Cultural Resources (PCR); and Involuntary Resettlement (IR). The renewable energy components, i.e., the Sere WPP and the Upington CSP project, do not involve involuntary resettlement or result in loss of economic livelihoods due to land acquisition.

19. This Equivalence Analysis found that South Africa's regulatory systems for all of the four safeguards applicable to the EISP project demonstrate sufficient equivalence so as to justify proceeding to an Acceptability Assessment to determine if and on what basis the Bank can use South Africa's and Eskom's systems in lieu of Bank safeguards to address the environmental and social safeguard issues raised by the proposed project.

20. The following findings apply to the four safeguards, respectively:

- *Environmental Assessment (EA)*. With respect to EA, the South African system is deemed to be fully equivalent to the Objectives and Operational Principles of OP 4.00 Table A1. However one ambiguity in the language in the regulatory framework required additional clarification during the preparation of the SDR:

    - It is not clear from the regulations that the assessment of alternatives is required to assess their relative feasibility with respect to all of the feasibility criteria cited in OP 4.00 Table A1. It appears from the South African regulations that the proponent has the option to include those alternatives deemed "feasible and reasonable" and compare the advantages and disadvantages of such alternatives for the environment and the community. But it does not explicitly require the EIR to justify alternatives considered on the basis of comparative capital and recurrent costs, and institutional, training and monitoring requirements, which are among the criteria noted in OP 4.00 Table A1 as among the criteria to be uniformly considered. DEA (then-DEAT) published guidance on criteria to be included in alternatives assessment in 2004 (Integrated Environmental Management Information Series, Series 11: Criteria for Determining Alternatives in EAI), which recognizes that the range of criteria must be appropriate to the type of project subject to the EIA process.

      As noted later in this report, Eskom's policy and practice is to address alternatives assessment at both the strategic and project-specific levels. Although South African regulations do not explicitly require consideration of capital and recurrent costs, and institutional training and monitoring requirements, among the key factors for all projects, Eskom does so at both levels of analyses. Thus, any ambiguity is resolved with respect to Eskom's approach to alternatives analyses.

- *Natural Habitats (NH).* With respect to NH, the South African system is deemed to be fully equivalent to the Objectives and Operational Principles of OP 4.00 Table A1. However one ambiguity in the regulatory framework required additional clarification during the preparation of the SDR:

- South African legislation appears to lack a conservation offset provision for non-critical natural habitat. South Africa recognizes that as the development footprint increases, there will be unavoidable net loss of non-critical habitat, but through the Environmental Authorization (formerly ROD) process, biodiversity offsets can be required on a case-by-case basis.

  As noted later in this report, Eskom, through its partnerships with South African conservation organizations, has supported conservation offsets for projects that convert natural habitat, even though South African legislation does not appear to require such practice.

- *Physical Cultural Resources (PCR).* With respect to PCR, the South African system is deemed to be fully equivalent to the Objectives and Operational Principles of OP 4.00 Table A1. However a few ambiguities in the regulatory framework required additional clarification during the preparation of the SDR:

  - The extent of participation and obligations of communities in the process of cultural heritage assessment and conservation remains within the scope of the EIA process, as specified by the National Heritage Resources Act, but are not as explicit as stated in OP 4.00 Table A1.

  - It is not clear how the legislative framework deals with "chance finds." A standard condition is included in all Environmental Authorizations (formerly RODs) stipulating how "chance finds" must be dealt with during the construction and operational phase, but the legal basis for this requirement is not explicit in the regulations.

    Although South African regulations do not require it, Eskom implements its policy of extensive local stakeholder consultation regarding cultural resources, along with its standard protocol requiring that "chance finds" be reported immediately to the South African Heritage Resources Agency (SAHRA) and that construction is halted at the discovery until qualified experts are consulted.

- *Involuntary Resettlement (IR).* With respect to IR, the South African system is found to be fully equivalent to the Objectives and Operational Principles of OP 4.00 Table A1 for all but the following Operational Principles:

  - Rights of access to natural resources and biodiversity of protected areas (however, as there are no protected areas affected by the project, this gap in equivalence is not relevant to the conclusion of this SDR);

  - Disclosure of draft resettlement plans in a timely manner to the public at large is not clearly spelled out in Eskom guidelines, although it is a requirement with respect to directly affected parties under various Acts related to the National Environmental Management Act (NEMA) and Lands.

  It should be mentioned, however, that Eskom has developed a practice to conduct assessment to confirm whether the objectives of resettlement have been achieved upon completion of the project, taking into account the baseline conditions and the results of resettlement monitoring. It also should be noted that the South African legislation regarding resettlement requires extensive consultation and disclosure with directly affected people, i.e., those who are to be resettled, and provides for benefits and livelihood restoration in a manner consistent with the Bank's safeguard policy. Therefore, for the EISP, the key gaps appeared to be the absence of a requirement for

a stand-alone, formal Resettlement Action Plan that is disclosed to a broad audience of interested parties, and a formal mechanism for a completion audit. For the ERSP, however, the SDR work regarding Involuntary Resettlement is of little or no relevance, because the Sere WPP and CSP projects will not require involuntary resettlement. The lands for these two projects, including transmission line rights-of-way, are being acquired by Eskom on a willing buyer-willing seller basis, and they are either parcels or all of very large farms in semi-arid habitat used for livestock grazing.

Summary of Acceptability Assessment

21. The purpose of the Acceptability Assessment is to confirm that the implementation practices, track record, and institutional capacity of Eskom, and the South African regulatory institutions that will be involved in addressing environmental and social safeguard issues in the proposed Bank-supported EISP, fulfill the requirements of OP 4.00 Table A1. The Acceptability Assessment examined four criteria: institutional capacity; processes and procedures; outputs; and outcomes of the borrower's systems for EA, NH, PCR, and IR.

Institutional Capacity

22. The institutions responsible for implementing the four environmental and social safeguards applicable to the EISP project include, in the first instance the borrower, Eskom, as well as DEA (under the authority of the Ministry of Environmental Affairs and Tourism until May 2009, and now under the authority of the Ministry of Water and Environmental Affairs with respect to environmental impact assessment, biodiversity, and air and water quality management); Department of Water Affairs (DWA, formerly the Department of Water Affairs and Forestry), which enforces regulations governing the supply and use of water; the Department of Land Affairs, under the Ministry of Agriculture and Land Affairs with respect to land acquisition; the South African Heritage Resource Agency (SAHRA), which provides the expertise in South Africa to develop and implement policies and practices regarding protection and management of cultural resources; and provincial and municipal authorities with respect to many of these same authorizations.

23. **Eskom.** Eskom is South Africa's national, vertically integrated electricity utility, and is wholly owned by the GoSA through the Department of Public Enterprises. Eskom's current structure is defined by the Eskom Conversion Act of 2001. The utility employs about 35,500 employees (reduced from about 66,000 over the past two decades). Eskom operates its business through a number of divisions and subsidiary companies. Eskom's core business as a utility is carried out by the three divisions under the heading Eskom Core Business and is described below, followed by a brief description of the operations of the key subsidiaries.

24. At the corporate level, environmental and social governance within Eskom begins at the level of the Chief Executive Officer (CEO) and is overseen by the Executive Directors, who are full time employees of Eskom, and by the authority delegated to Board Committees, including the Executive Management Committee and the Sustainability and Safety Subcommittee. The latter is comprised of four independent non-Executive Directors, along with the CEO and two Board Members, and guides corporate strategy on sustainability, occupational health and safety, and environmental matters in line with Eskom's safety, health and environment policy, the NEMA, and the Occupational Health and Safety Act of 1993.

25. Within the management structure of Eskom, each line division (Generation, Transmission, or Distribution) is individually responsible for carrying out the EIA process, producing EIRs as required by South African regulations, and implementing the environmental management and monitoring activities associated with its line of business. To undertake these tasks Eskom has more than 100 environmental and social specialists located in their headquarters office and various field operations.

26. Eskom has a comprehensive "triple bottom line" approach to the management of environmental, health, and safety issues as part of its corporate commitment to sustainability. As one of the charter members of the United Nations Global Compact, Eskom is committed to uphold the ten principles of the Compact, which include inter alia protection of the environment, labor standards, human rights, and anti-corruption. Eskom's sustainability performance in 2006 met the requirement for inclusion in the Johannesburg Stock Exchange Socially Responsible Investment Index. Eskom has a systematic audit process in place to ensure that any non-compliance with South African legal requirements is identified, reported, and investigated, and that corrective and preventive measures are implemented.

27. The one weakness at the Eskom corporate level that was identified in this SDR is the need, publicly acknowledged by Eskom, to pay greater attention to occupational health and safety, as indicated by a recent record, which Eskom itself characterizes as "unsatisfactory," of traffic-related fatalities and injuries and incidents of electrocution resulting from accidental or unauthorized contact with energized lines or electrical equipment. Accordingly Eskom proposed to enhance its "…focus [on] safety training and awareness, skills, competency, supervision and operational discipline…," and has put in place a procedure to investigate all fatalities promptly and share lessons learned from case studies. In addition, Eskom engaged the services of an international specialist to evaluate its electrical safety as well as behavioral safety programs. Changes were made to the Eskom training materials to incorporate some of the recommendations made. With respect to community safety, campaigns to improve public awareness were rolled out in various media and included school visits and the handout of safety materials.

28. **DEA.** Established in 1994, as the Department of Environmental Affairs and Tourism, DEA is an independent Department of the GoSA responsible for protecting, conserving, and improving the environment and natural resources. It now reports to the Minister of Water and Environmental Affairs, who is a member of the Cabinet and is appointed by the President from among members of the National Assembly.

29. DEA management and staff have high levels of specialized training in all key areas of environmental assessment and management. In particular, the Air Quality Directorate at DEA has been fully engaged in developing and implementing ambient air and emissions standards that are aligned with international good practice as defined by the Bank, the European Union, and the United States Environmental Protection Agency.

Processes and Procedure for Environmental Assessment and Management for Power Generation and Transmission Facilities

30. South Africa began undertaking EIA in an ad hoc manner during the 1980s, and a voluntary EIA procedure was integrated into the Environmental Conservation Act of 1989 (ECA), since largely superseded by the National Environmental Management Act (NEMA). Requirements for EIA were introduced on a sectoral basis in the Minerals Act of 1991 (Sections 38 and 39(5)). These requirements were generalized by the EIA Regulations of September 5, 1997, which mandated a process including screening, scoping, public participation, environmental reports, review, and decision. (For purposes of clarity, it should be noted that the current South African regulations refer to an EIA process, which produces an EIR, and this terminology is used in this SDR).

31. Following an extensive process of expert review and public consultation and discussion, substantially revised EIA Regulations were issued in 2006. The new regulations resulted in a more coherent process with respect to application of EIA including: (a) EIA scoping, (b) decision-making procedures, (c) roles, (d) responsibilities and compliance, (e) public participation, and (f) appeal process.

32. In November 2008, DEA (then DEAT) commissioned and issued a draft review of the previous ten years of EIA practice in South Africa. The draft report was conducted by independent consultants. The main findings of the report are that: (a) the overall effectiveness of

EIA process in South Africa in meeting requirements of ECA and then NEMA was deemed moderately effective but with room for improvement; (b) overall there was a significant improvement in effectiveness and efficiency of EIA in moving from the ECA regulations to the NEMA regulations; (c) public participation in EIA is effective; (d) the cumulative (combined) impacts aspect is generally not considered effective and there is significant room for improvement; (e) the EIA process in South Africa is implemented relatively efficiently in terms of the average time it takes to produce and evaluate EIAs; (f) monitoring and enforcement in environmental management is one area where the current EIA system is not effective or efficient; and (g) a more strategic approach to environmental impact management is required and there is a definite need to move away from an "EIA only" system to one based on integrated environmental management.

Processes and Procedures for Management of Social Impacts from Power Generation and Transmission Facilities

33. As indicated earlier, involuntary resettlement or loss of economic livelihood as a result of land acquisition were issues of concern for the EISP, but not for the renewable energy components. Eskom seeks to avoid land expropriation wherever possible and includes the potential need for expropriation, resettlement, compensation and rehabilitation among the criteria used for alternative site assessment. When resettlement is unavoidable, all displaced people are effectively consulted and compensated; support and other benefits are provided in the relocation process, including livelihood restoration ("rehabilitation") as mandated by GoSA law. A detailed discussion of these issues can be found in the main text of the SDR prepared for the EISP.

34. Although Eskom does not prepare formal publicly-disclosed resettlement plans, Eskom does undertake independent social assessment and develops internal plans for resettlement with timelines and commitments. The plan is treated as a living document that is updated as required on an ongoing basis. All negotiated outcomes are documented as formalized agreements and the entire resettlement process is documented and filed by Eskom. The implementation phase of the contractual resettlement plan is monitored and evaluated and is subject to amendment by mutual agreement of the parties.

Public Consultation and Disclosure in the EIA and Land Acquisition and Resettlement Processes

35. In thoroughly examining the EIA process for both the Medupi and Kusile projects for preparing the SDR, the Bank team determined that Interested and Affected Parties (I&APs) were informed about the projects and consulted at various stages of the EIA process. During the Scoping Phase public participation was comprehensive and included advertising in national, regional, and local newspapers, subsequent notifications in regional and local newspapers, and the dissemination of a non-technical Background Information Document (BID) in English, Afrikaans, and local languages where appropriate, which was updated on various occasions to take account of the evolution of the project. Public fora were held at diverse venues in each area, organized and facilitated by an independent consultant. Following the issuance of the Draft EIR reports, both on the internet and in hard copy at local public libraries and municipal offices, a second round of local public consultations took place.

36. The main issues raised by stakeholders for the Medupi and Kusile projects and the responses by Eskom and government authorities to public comments and questions are thoroughly documented in minutes from the public consultations and summarized thematically in two "Issues Trails" documents prepared by the independent consultant. Stakeholders are also encouraged and often comment not only on the substance of the EIR but also on the disclosure and consultation process itself.

Outputs: EIA Process and EIR Content

37. An independent assessment of the EIA process and resulting EIRs for Medupi and Kusile (commissioned by Eskom) concluded that both the EIA process and the content of the EIRs were consistent with the requirements of the Equator Principles, which are based on the International Finance Corporation (IFC) Performance Standards. The Bank's own review of the EIRs for the Sere WPP and the CSP project indicate that both are consistent with international good practice and with the Objectives and Operational Principles of OP 4.00 Table A1 with respect to EA, notwithstanding the minor ambiguity in the South African legal framework as noted in the Equivalence Analysis.

38. The EIA process for the investments under consideration for the ERSP and associated transmission lines has been thoroughly documented, and the project-specific EIRs of projects that Eskom proposes to undertake are disclosed (and remain available) on Eskom's website.[60]

39. To date EMPs have been prepared and approved by DEA for the construction phase of the Medupi and Kusile projects, and a draft EMP has been prepared for the operational phase of Medupi. Based on a review of these documents it may be concluded that the EMPs prepared by Eskom for power generation facilities satisfy South African regulatory requirements and are consistent with Bank-recommended practice for EMP.

40. The EIRs for the Medupi and Kusile plants were approved by DEA in publicly disclosed RODs issued in September 2006 for Medupi and in June 2007 for Kusile. The RODs include a long list of statutory and regulatory requirements reflecting site-specific projected impacts as documented in the EIRs. The RODs require that Eskom implement detailed monitoring and reporting protocols, and that Eskom appoint independent Environmental Control Officers (having dual reporting to Eskom and DEA) and establish Environmental Monitoring Committees including local stakeholder representatives. The RODs demonstrate that DEA has the capacity and commitment to independently assess and identify conditions that should be imposed on projects on a case-by-case basis. RODs (now referred to as Environmental Authorizations) are publicly disclosed and available on DEA's website (http://www.environment.gov.za/).

41. It should be noted that the RODs issued by DEA provide approval based on the satisfactory conclusion of the EIA process and conditions attached to project implementation. As noted in the RODs for the Medupi and Kusile projects, and as will be the case for the Sere WPP and the CSP on receipt of environmental authorization from DEA, Eskom must still obtain various permits for the operational phase of the projects.

Projected Outcomes: Environment

42. For the Sere WPP project, two environmental issues of particular concern were potential effects on migratory birds and bats, and the presence of shell middens in the project area. Qualified wildlife ecologists conducted studies of the project area during the EIA process, and determined that the area is not an area known to be a migration corridor for birds or bats. The shell middens, consisting of piles of discarded shells and other "kitchen" wastes from the activities of prehistoric use of the coastal zone as a foraging area, were studied by qualified experts and their locations were mapped. To the extent possible, facility location, e.g., of specific wind turbines or access roads were modified to avoid disturbance of the middens. The EIA recommends that Eskom apply for permits to sample middens that cannot be avoided, under supervision of Heritage Western Cape. Once sampling is complete and the materials have been properly stored, Eskom can apply for permits for destruction of the remaining materials. The chance find procedures Eskom already has in place will be important because there could be Early Stone Age material in deeper strata on the site. For both the Sere WPP and the CSP plant site, surveys of rare or unique plants identified a few very localized assemblages, which have been avoided through minor rearrangement of facility siting. No significant adverse environmental impacts are expected to arise from construction and operation as a result of incorporation of appropriate design and layout of facilities.

[60] www.eskom.co.za/eia.

Projected Outcomes: Social Impacts

43. There are no significant adverse social impacts associated with the construction and operation of the Sere WPP and CSP plants. Both projects are located in semiarid to arid areas with very low population density, divided into very large landholdings used almost exclusively for livestock grazing, also at low density because of the very poor quality of forage. For both projects, Eskom has or is in the process of negotiating the purchase of part or all of a very large landholding from the owner and operator of the farm.

44. For the transmission lines that will be built as associated facilities for the EISP and the ERSP, Eskom follows its corporate practice of initially identifying, through the EIA process, corridors that avoid or minimize the need for relocation of households or farm structures, and subsequent refinement of the location of the right-of-way and tower locations within the preferred corridor to further reduce the need for physical displacement of people or structures, and avoid or minimize adverse effects on livelihoods or economic activities. Land valuation is required as part of the route selection process to determine appropriate compensation for acquisition of right-of-way for construction and maintenance.

Summary of Gaps and Proposed Gap-Filling Measures

45. OP 4.00 requires that prior to piloting a project under a borrower's environmental or social safeguard system, the Bank and the borrower reach agreement on a time-bound Action Plan to address gaps in Equivalence and Acceptability that have been identified in the SDR. At the draft stage of the SDR the Bank discloses the gaps that have been identified for further discussion with the borrower and other stakeholders including local stakeholders in the proposed project. For the EISP, the borrower is Eskom. The gap analysis began with the South African laws and regulations as the regulatory framework with which Eskom must comply, but the final analysis of required gap-filling measures focused on the consistency of Eskom's policies, procedures, and practices for its projects with respect to OP 4.00 Table A1.

46. **Equivalence.** With respect to the SDR process conducted to date, the Bank has identified a few minor ambiguities or gaps in South Africa's legal framework with respect to the four Bank safeguard policies triggered by the EISP. However, it would appear from the analysis of Eskom's policies and procedures that all of these gaps in the legal framework applicable to environmental safeguards are fully addressed and internalized in Eskom's policies and practices, with the exception of preparation of a stand-alone Resettlement Action Plan and its disclosure to a broad public audience.

47. With respect to EA, Eskom's policy is to address alternatives assessment at both the strategic and project-specific levels, irrespective of any residual ambiguities in South Africa's legal framework for the types of factors to consider in alternative analysis as part of the EIA process. Therefore, although South Africa requires alternatives analysis to include capital and recurrent costs, or institutional training and monitoring requirements as a matter of good practice, rather than as a regulatory requirement, Eskom does so as a standard operating procedure at both strategic and operational levels of analysis.

48. With respect to NH, Eskom, through its partnerships with South African conservation organizations, has supported conservation offsets for projects that convert natural habitat, although South African legislation does not, as matter of policy require such offsets.

49. With respect to PCR, Eskom's existing policy of extensive local stakeholder consultation regarding cultural sites and artifacts along with its standard protocol requiring that "chance finds" be reported to the South African Heritage Resources Agency (SAHRA) obviates a need for gap-filling at the institutional level. A review of project construction to date demonstrates that Eskom's approach to "chance finds" has been effectively implemented by Eskom's construction

contractors, even though South African regulations do not require a formal protocol to address chance finds.

50. It is only with respect to IR that South Africa appears to lack a legal mechanism, and Eskom an administrative mechanism, to require the preparation of publicly-disclosed, stand-alone resettlement plans or frameworks, or to publicly disclose its evaluation of the success of resettlement and rehabilitation activities. Accordingly, the Bank encouraged Eskom to introduce such an administrative mechanism as corporate practice. Eskom has already disclosed on its website its corporate resettlement policy,61 which summarizes its corporate policy and practice with respect to land acquisition, resettlement, and rehabilitation (livelihood restoration) and a Resettlement Policy Framework specific to Components 2 and 3 of EISP.62 Audits will also be required for any resettlement already carried out for EISP components. For any EISP components for which resettlement is needed but has not yet occurred, the Bank will require and Eskom has agreed to disclose its draft resettlement plans for those components.

51. **Acceptability.** A detailed review of Eskom's policies and procedures with respect to the four triggered safeguard policies as implemented on a corporate level, and as demonstrated by the planning and implementation of the Medupi and Kusile projects to date, indicates a high level of consistency with international good practice as exemplified by international standards of corporate environmental and social management, such as the United Nations Global Compact, IFC Performance Standards, and the Equator Principles.

52. With respect to IR, although not relevant to the ERSP, Eskom staff has acknowledged the benefits of conducting independent retrospective monitoring of the social and economic impacts of any involuntary resettlement associated with its projects. For EISP components where resettlement has already occurred, the Bank will require that Eskom conduct and publish an audit of the resettlement based on Terms of Reference to be agreed by the Bank. For any EISP components for which resettlement is needed but has not yet occurred, the Bank will require Eskom to disclose its draft resettlement plans for those components. To begin addressing this identified gap between Bank policy and Eskom's practice, Eskom prepared and disclosed on its website a Resettlement Policy Framework, which explains its corporate approach to resettlement and land acquisition.

[61] "Procedure for the Involuntary Resettlement of Legal and Illegal Occupants on or from Eskom-Procured Land;" (July 2009). http://www.eskom.co.za/content/20091009091904201.pdf

[62] "Status and Process of Land Acquisition and Resettlement for Eskom's Concentrating Solar Plant (CSP), Wind Energy Facility, Majuba Rail and Transmission Projects" (October 2009). http://www.eskom.co.za/content/RelocationResettl_Final.pdf

Annex 11: Clean Technology Fund

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

1. The Clean Technology Fund (CTF), one of two Climate Investment Funds, promotes scaled-up financing for demonstration, deployment and transfer of low-carbon technologies with significant potential for long-term greenhouse gas emissions savings. CTF support for South Africa (see specific project analysis below) will provide positive incentives for the demonstration of low-carbon development and mitigation of GHG emissions, through private and public sector investments. CTF financing will thus support South Africa in scaling-up clean energy development through funding transformational low-carbon programs and projects that are embedded in national plans and strategies. In this way, the diffusion and transfer of clean technologies will be accelerated.

South Africa's Long Term Mitigation Scenarios and Priority Sectors for GHG Abatement

2. South Africa is the largest contributor to GHG emissions in Africa and the eleventh largest emitter of CO2 globally. The energy sector is the single largest source of CO2 emissions, with coal accounting for more than 90 percent of total emissions by fuel source. The transport sector represents about 15 percent of South Africa's greenhouse gas emissions, and its share is expected to grow. *If South Africa continues with a business-as-usual growth path, its emissions will almost quadruple by 2050*.

3. South Africa sees itself as a responsible global citizen who is committed to the global effort to combat the threats posed by GHG emissions. At the same time, the GoSA is cognizant of the serious threats posed by climate change to the South African economy and society, including the threat to livelihoods, investments, and infrastructure. It is clear to the GoSA that the longer it takes for South Africa to introduce policies and programs to lower the emissions from their business-as-usual trajectory, the harder it will be to promote low-carbon developments as an integral element of its growth path. The earlier investments and GHG reduction activities take place, the bigger the impact into the future. It is fundamentally in this context that the CTF investment plan has been developed

4. South Africa has made the determination that it must diversify its energy mix, reduce reliance on coal, and transition to a low-carbon economy over the long term. To identify priority sectors for GHG abatement, South Africa has developed detailed and rigorous Long-Term Mitigation Scenarios (LTMS). The LTMS, combining high-quality research with extensive stakeholder consultation, identified five large climate change mitigation options in South Africa – industrial energy efficiency, renewable energy, nuclear, passenger modal shift, and improved vehicle efficiency.

5. The LTMS identified a large number of interventions that have the potential to reduce South Africa's greenhouse gas emissions. These were then put together so as to generate a set of scenarios that define possible GHG reduction trajectories. These scenarios attempt to develop an understanding of how the country's current emissions trajectory could be altered to one closer to that required by science. This is done through the introduction of numerous low-carbon initiatives. The policy-relevant scenarios include: (a) The Start Now scenario, which reflects immediate implementation of policies already articulated but not yet implemented, such as efficiency in industry and transport, as well as more renewable energy and nuclear sources for electricity. This scenario significantly reduces the growth in CO2 emissions; (b) The Scale-Up scenario can yield a leveling off in CO2 emissions by 2050 through a transition to zero-carbon electricity, with nuclear power and renewable energy expanding to 50 percent of electricity generated; (c) The Use the Market scenario relies on economic instruments (such as carbon taxes), which would achieve almost three-quarters of the reductions needed to achieve the Required by Science scenario; and (d) The Reach for the Goal scenario fills the remaining gap through investments in new low-carbon technologies, changes in consumer behavior, and restructuring of the economy away from coal towards more climate-friendly energy sources.

6. The Cabinet has noted the LTMS and sees its research as feeding into the development of climate change policy, including the setting of mitigation objectives. This is currently in process, and South Africa's Department of Environmental Affairs (DEA) expects to submit the Climate Change White Paper to Parliament by June 2011. It has been agreed that: (a) the Start Now options, focusing on accelerated energy efficiency across all sectors – industrial, commercial, transport, and residential – must be implemented; (b) investment in the Reach for the Goal strategy must be fast-tracked, and this should include ambitious low-carbon technology research and the development of new clean energy resources, as well as behavioral change; and (c) pursue regulatory mechanisms contained in the Scale-Up scenario, together with the economic instruments from the Use the Market scenario.

7. As a result of these strategies, it is expected that South Africa will have an emissions trajectory that will see emissions peak in around 2020 to 2025, plateau for a decade and then decline thereafter. The South African Cabinet has taken note of this LTMS and agreed that a set of policy directions should be developed that would move South Africa towards low-carbon growth. Specific Government policies stemming from the Cabinet presentation include: (a) ambitious, mandatory targets for energy efficiency; (b) adopting levies on CO2, beginning with a levy on coal-fired power production; (c) introducing more stringent thermal efficiency and emissions standards for coal-fired power stations; (d) providing incentives for private sector-led renewable energy development via feed-in tariffs; (e) developing CCS for coal-fired power stations and coal-to-liquid (CTL) plants; and (f) reducing transport emissions through fuel efficiency standards, modal shifts towards public transport, and promotion of hybrid and electric vehicles.

8. In associating itself with the Copenhagen Accord, South Africa has declared its intention to cut its GHG emissions from business-as-usual by 34 percent by 2020 and 42 percent by 2025 on the condition that it is able to access the necessary finance, technology and capacity building resources to support its efforts, and that a legally binding agreement is reached in the UNFCCC negotiations. The CTF is seen as an important source of support by South Africa and the activities it funds are seen as catalytic.

Box 1: The GoSA's Key Policies and Regulations in the Climate Change Area

The Government of South Africa has become a leading voice in the developing world on climate change issues. The Government has committed to doing its part to stabilize global temperature at 2 degrees Celsius above pre-industrial levels, as recommended by scientific consensus, including the burden share as agreed by the IPCC. Recognizing South Africa's development needs, the Government has adopted a strategy that envisages emissions peaking by 2020 to 2025, stabilizing by 2030 to 2035, and declining in absolute terms by mid-century.

South Africa has taken concrete steps towards realizing these long-term goals. In particular, the country has:

- Ratified the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997, and acceded to the Kyoto Protocol in July 2002;
- Developed a National Climate Change Response Strategy in 2004, outlining a broad range of principles and policy measures for mitigation and adaptation to climate change;
- Adopted a White Paper on Renewable Energy in 2005, setting a target to supply 4 percent of its electricity (equivalent to 10,000 GWh) from renewable energy sources by 2013;
- Adopted a National Energy Efficiency Strategy in 2006 (updated in 2009), setting ambitious national targets for energy efficiency improvement (12 percent by the year 2015). A National Energy Efficiency Agency was also established to pursue this target through various energy conservation programs;
- Completed a major analytical study in 2008, identifying the priority sectors for carbon mitigation, as part of a pioneering effort among developing countries to combine high-quality research with extensive stakeholder consultations. Based on this process, South Africa has agreed on a set of Long-Term Mitigation Scenarios (LTMS) that provides a tool to address priority climate change issues;
- Associated with the Copenhagen Accord (2009), where South Africa declared its commitment 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 resources, and that a legally binding climate deal is agreed.

Proposed CTF Co-Financed Project

9. Support from the CTF to the Eskom Renewables Support Project is proposed for the investments in renewable energy under Phase 1 of the CTF Investment Plan endorsed by the CTF Trust Fund Committee in October 2009. This support will contribute substantially to South Africa's goal of generating 4 percent of the country's electricity requirements from renewable energy by 2013. The project will consist of two components:

10. (a) Design, Construction and Operation of Eskom's proposed first 100 MW Concentrating Solar Power (CSP) plant at Upington – the first-ever commercial scale CSP capacity in sub-Saharan Africa. CTF financing would be used to buy down the high capital cost that is currently the main barrier to adoption of this developing technology. CTF support would have the transformational effect of opening up CSP deployment in South Africa by proving the technology in actual operation and establishing benchmarks for cost and performance at utility scale. This facility, when constructed, will likely be the largest CSP facility in the world. This development will be used as an opportunity to enhance the domestic capacity for manufacturing key components and equipment – not only in South Africa but in the whole region – thus putting the deployment of CSP plants for the region on a faster track. The availability of well established domestic capacity which can support the operation of CSP is also expected to address the technology risk associated with CSP technology. The particular promise of CSP in the LTMS is the fact that it may provide a realistic alternative to coal power plants for baseload capacity (see Box 2).

Box 2: The State of Concentrating Solar Power (CSP) Technology Development

Concentrating solar power (CSP) technologies use mirrors to reflect and concentrate sunlight into receivers that collect the solar energy and convert it into heat. This thermal energy can then be used to produce electricity using conventional steam turbines. CSP is an evolving technology with a number of innovative developments taking place globally. The CSP industry is growing rapidly, with different varieties of CSP technology ranging from commercially available to pioneering. The IEA forecasts electricity generation from CSP to increase from less than 1 TWh in 2007 to more than 120 TWh by 2030 (World Energy Outlook 2009). The main advantages of CSP compared to PV are better compatibility with the power grid system's operation at large scale and the possibility of thermal storage. The latter allows to increase the load factor (which otherwise may be only 20-25 percent) – potentially, to as much as 60-65 percent.

- Currently, CSP is experiencing significant growth, with approximately 700 MW of commercial plant capacity already installed worldwide, nearly 2000 MW currently under construction, and more than 6000 MW in the pipeline. The US and Spain are two major leaders in the industry. The majority of plants use parabolic trough technology, which is now commercially available and can be considered technically mature.
- The power tower version of the CSP technology (the one pursued by Eskom) is more experimental, with a total installed capacity around the world not exceeding 50 MW. A review by international consultations has been initiated to identify the optimal technology and configuration. The technology utilizes numerous large, flat, sun-tracking mirrors (heliostats), which focus sunlight onto a receiver at the top of a tower. A heat-transfer fluid heated in the receiver is used to generate steam, which, in turn, is used in a turbine generator to produce electricity. The power tower technology boasts high solar-to-electrical conversion efficiencies and has other potential advantages vis-à-vis the trough version (e.g., it can use fluids other than oil for heat transfer).
- The United States has deployed two large-scale power tower demonstration projects. During its operation from 1982 to 1988, the 10 MW Solar One plant near Barstow, California, demonstrated the viability of power towers, producing more than 38 GWh of electricity.
- The Solar Two plant was a retrofit of Solar One to demonstrate the advantages of molten salt for heat transfer and thermal storage. Using its highly efficient molten-salt energy storage system, Solar Two successfully demonstrated efficient collection of solar energy and dispatch of electricity. It also demonstrated the ability to routinely produce electricity during cloudy weather and at night. In one demonstration, Solar Two delivered power to the grid for 24 hours a day for almost seven consecutive days.
- Spain has several power tower systems operating or under construction. Planta Solar 10 and Planta Solar 20 are water/steam systems with capacities of 11 and 20 MW, respectively. Solar Tres will produce some 15 MW of electricity and have the capacity for molten-salt thermal storage.
- The power tower installations are currently more expensive per kW installed than the parabolic trough ones, but the costs will likely drop as the technology matures. (Source: US Department of Energy (http://www1.eere.energy.gov/solar/power_towers.html).

- In South Africa, the national power utility Eskom is working to develop a fully commercial plant, with a total capacity of about 100 MW, which will be the first of its kind to be constructed in sub-Saharan Africa. The proposed Upington CSP plant is a power tower design configured to operate as a baseload unit. Utilizing molten salt as a thermal circulating fluid and storage medium allows Eskom to target achieving an annual load factor of at least 0.5.

(b) *Design and Construction of Eskom's proposed first 100 MW capacity Sere Wind Power Plant in South Africa* – the first phase of Eskom's Western Cape Province Wind Energy Facility. The site allows accommodating double this capacity, but CTF would support the construction of the first 100 MW. CTF support would transform the nascent wind sector of South Africa by addressing first-mover costs and risks related to the integration of wind power with the overall energy system. Investments in transmission capacity to connect IPPs to the grid would catalyze substantial follow-on investment from the private sector.

11. The Sere Wind Power Project is located in an area with high wind potential. However, this area has very limited infrastructure, which has been a major constraint to the development of the wind potential. The Sere Wind Power Project will develop the infrastructure including the initial transmission system which will enable development of additional projects. In particular, privately owned IPPs will benefit from the transmission and the other infrastructure developed along with the Sere project. Being the first large wind power project, it will also transfer the knowledge of wind technology to South Africa and provide a live opportunity to understand operational issues such as impact of wind projects on system stability. All these factors will reduce the uncertainties associated with wind power development in the Western Cape region and SA in general, immensely benefiting the private sector which is expected to play a key role in the development of wind potential.

12. The summary Financing Plan for the Eskom implemented CSP and Wind components is provided in Table 1.

Table 1: Project Components co-financed by CTF

	Summary Financing Plan (US$ millions)				
Project Component	**IBRD**	**AfDB**	**CTF via IBRD**	**CTF via AfDB**	**Other Lenders and Eskom**
Upington CSP Project	195	220	200	50	532
Sere Wind Power Project	65	45	50	50	143
Total:	**260**	**265**	**250**	**100**	**675**

13. The Sere Wind Power Project and the Upington CSP Project are planned to be largely funded by debt from IBRD, CTF, AfDB, KfW, EIB and AFD. Eskom is committed to financing any costs that remain unfunded upon the completion of this debt raising effort.

Compliance with CTF Investment Criteria

I. Emissions Reduction Potential of the Investments

14. The following paragraphs provide an overview of the emission reduction potential of the CTF CSP and wind projects. In line with CTF investment criteria, these have been considered both for the investments supported by CTF (in this Project) and for a near-term estimate of prospective project envisaged as leveraged by the proposed CTF-supported projects.

15. Based on the projected annual GHG emission reductions (see Table 2 below) and assuming a 20-year plant life, the direct cumulative emission savings from the proposed CSP

plant would be 7.6 – 11.4 million tons of CO2 – depending on the load factor, which in turn depends on the success of the proposed thermal storage facility. These estimates assume that the power supplied by the CSP facility would otherwise come from coal-fired plant with an average thermal efficiency of 35 percent and emission factor of 1.09 tCO2 per MWh of generated power.

16. Assuming that the proposed CTF-supported investment has leveraged 4 new investments of equal combined capacity, the cumulative emission savings from the total number of CSP plants would be 38 – 56 million tons of CO2 – depending on the load factor.

Table 2: Results Indicators for the CSP Subsector

Indicators	Baseline (2009)	Investment Program Results
I. Direct output/impact of Upington CSP Plant		
Installed Grid-Connected Solar Thermal Power Capacity in SA	0	100 MWe of new solar capacity
Estimated annual power output	0	350 - 526 GWh
Estimated annual GHG emission reductions	0	0.380 - 0.570 MT CO_2e/year
Estimated GHG emission reductions over 20 years	0	7.6 - 11.4 MT CO_2e
II. Output/impact from rapid replication towards Gov't goal of 4 percent of renewable power by 2013		
Assumption: 400 MW incremental CSP capacity in four years		
Installed Grid-Connected Solar Thermal Power Capacity in SA	0	500 MWe
Estimated annual power output	0	1750 - 2600 GWh
Estimated annual GHG emission reductions	0	1.9 - 2.8 MT CO_2e/year
Estimated GHG emission reductions over 20 years	0	38 - 56 MT CO_2e

17. Based on the projected annual GHG emission reductions (see Table 3 below), emission savings from the proposed wind power plants over a projected 20-year plant life would be about 4.8 million tons of CO2. These estimates assume that the power supplied by the wind power installations would otherwise come from coal-fired plant with an average thermal efficiency of 35 percent and emission factor of 1.09 tCO2 per MWh of generated power.

Table 3: Results Indicators for the Wind Power Subsector

Indicators	Baseline (2009)	Investment Program Results
I. Direct output/impact of Sere Wind Power Plant		
Installed Grid-Connected Wind Power Capacity in SA	20 MWe	100 MWe of new wind power capacity
Estimated annual power output	44 GWh	219 GWh
Estimated annual GHG emission reductions	0	0.238 MT CO_2e/year
Estimated GHG emission reductions over 20 years	0	4.8 MT CO_2e
II. Output/impact from rapid replication towards the GoSA's goal of 4 percent of renewable power by 2013		
Assumption: another 500 MW of wind power is built (mostly by private sector)		
Installed Grid-Connected Wind Power Capacity in SA	20 MWe	620 MWe
Estimated annual power output	44 GWh	1344 GWh
Estimated annual GHG emission reductions	0	1.4 MT CO_2e/year
Estimated GHG emission reductions over 20 years	0	28.5 MT CO_2e

18. Assuming that the proposed CTF-supported investment has leveraged another 500 MW of Wind energy by 2013, the cumulative emission savings from these leveraged Wind plants would be 28.5 million tons of CO2.

19. The emission reduction potential of replication of the proposed investments on a broader scale is considered separately under the heading of "Demonstration potential and transformational impact from potential replication". The same section discusses the market penetration challenges faced by wind power in South Africa. Despite these challenges, wind power technology should

still be considered commercially available. Its GHG reduction potential, however, is much more modest than that of CSP.

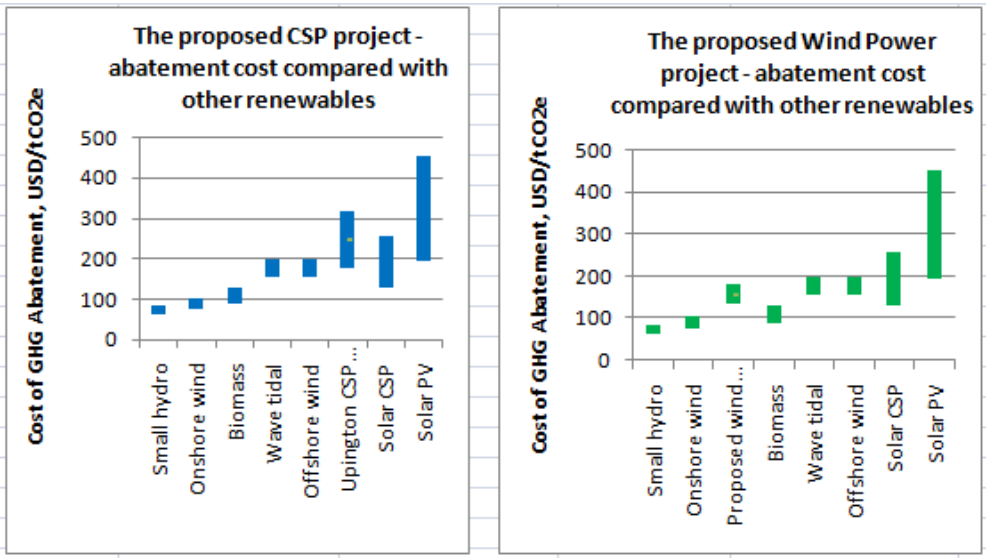
II. Cost Effectiveness of GHG Emissions Reduction

20. As described earlier in Box 2, CSP technology can be considered technically proven, and at least one of its varieties (parabolic trough technology) is commercially available. The power tower technology chosen by Eskom is approaching commercial viability. In the South African context, it has high GHG mitigation potential. High initial capital costs are the most important barrier to the expansion of CSP. As much as 87 percent of the cost of electricity produced by a solar thermal plant is related to the initial capital investment and installation cost, with the remaining 13 percent being the cost of operating and maintaining the plant. Estimates typically range the capital cost between $4,000 and $8,000 per kW, resulting in CSP plants being several times as expensive as combined cycle gas turbine plants. However, there is broad consensus in industry assessments that CSP has high cost reduction potential, due to three factors. First, manufacturers have yet to benefit from economies of scale. Second, technical improvements can be realized in certain components and these can be accelerated when companies' R&D respond to increased global demand. Third, increased demand will result in a more diverse supply chain which will reduce component costs.

21. The estimated costs of CO2-equivalent GHG reductions depend greatly on the methodology employed – particularly on whether or not the avoided costs of alternative energy generation are included, such as fuel costs and the capital costs of new plant capacity. One simple way to gauge the cost-effectiveness of GHG emission reduction projects is to ignore those costs but instead compare the proposed project with other similar projects and technologies on the basis of levelized cost per ton of CO2-equivalent reduced.

22. Using the cost estimates available from a report by McKinsey & Company (see Figure 1), the proposed CSP and Wind projects are found to be comparable to similar renewable energy projects. The power from the proposed wind facility at Sere is found relatively more costly when all the relevant costs of grid integration (transmission lines) are included.

Figure 1: Costs of Greenhouse Gas Abatement



23. In the range of $180 - 320/t CO2, the Upington CSP capacity in South Africa will be producing GHG emission reductions at a cost somewhat higher than generally expected for CSP technology (especially if the energy storage facility is not constructed or fails to operate as expected), significantly lower than the solar PV technology, but substantially higher than the

commercially proven renewable energy technologies such as wind, biomass, and small hydro power. Replication of the project on a broader scale will reduce the unit costs over time.

24. The GHG reduction cost of the proposed wind power project, with a midrange estimate of about $157/t CO2, exceeds the cost generally expected from onshore wind. This is due to a combination of factors, including the relatively high first-mover costs such the transmission integration, as well as the relatively low estimated load factor of 26 percent.

25. The costs of both CSP and wind power technology in South Africa can be expected to be reduced substantially through the economies of scale and experience curve effects once the industrial level of production is reached. Assuming that each doubling of total installed capacity result in cost reductions of 10-15 percent on account of economies of scale and learning effect, the replication potential for CSP and wind in South Africa could result in abatement costs of less than $130/t CO2 within five years.

26. The CTF investment guidelines for public sector operations require that each project/program proposal include a calculation of the CTF investment per ton of CO2-equivalent reduced. In order to ensure the greatest impact of the CTF's limited resources, CTF co-financing will ordinarily not be available for investments in which the marginal cost of reducing a ton of CO2-equivalent exceeds US$200, which according to the International Energy Agency's Energy Technology Perspectives 2008 Report, is the lower-end estimate of the incentive needed to achieve the objectives of the "BLUE Map Scenario". On this basis, given the amounts CTF will allocate in South Africa to CSP and Wind (US$200 million and $50 million), the cost to the CTF per ton of CO2-equivalent reduced is about 18 - 26 US$/t CO2 for CSP and about 11-13 US$/t CO2 for Wind.

III. Demonstration Potential and Transformational Impact from Potential Replication

27. The demonstration and replication potential of CSP plants in southern Africa is vast. In South Africa alone, where the Direct Normal Insolation (DNI) levels range from 1.7 to as much as 2.9 MWh/m2/year (one of the highest in the world), estimates are that 30 - 38 GW of commercially viable CSP may be possible – mostly, in the Northern and Western Cape provinces. This is 300 – 380 times the capacity of the proposed 100 MW facility in Upington. Furthermore, potential replication in Namibia and Botswana could double or treble this potential. The avoided annual GHG emission reductions in the hypothetical case of replication of the project throughout southern Africa could therefore be in the hundreds of millions of tons of CO2. By 2025, assuming successful implementation and replication of the current project, CSP may be expected to generate emission reductions of about 40–80 million t CO2/year or about 10 - 20 percent of the overall reductions required to achieve a level of emissions 40 percent below the current trend.

28. Wind power, too, has considerable potential for scale-up at an estimated 4 GW of economic wind potential – mostly, along the East and West coasts of South Africa. This is 40 times the capacity of the proposed 100 MW facility at Sere. The avoided annual GHG emission reductions in the hypothetical case of replication of the project throughout South Africa could therefore be in the order of 10 million tons of CO2. Assuming that half of the available economic potential for wind power is developed by 2025, the emission reductions would be about 5 million t CO2 or 1.4 percent of the overall reductions consistent with the 40 percent reduction target.

29. Both the solar and wind projects will have a high impact in terms of lasting changes both in the structure and functioning of the energy sector, speeding up and deepening market penetration of low-carbon technology.

30. The CSP component: CTF support would have the transformational effect of promoting CSP deployment by proving the technology in actual operation and establishing benchmarks for cost and performance at utility scale. A number of private companies are currently engaged in preliminary development work which could involve CSP and other solar technologies. DoE in its

efforts to mainstream solar development including the concept of solar parks is being supported by various institutions including the Clinton Foundation.

31. The particular promise of CSP in the LTMS is the fact that it provides a realistic alternative to coal power plants for baseload capacity. The project will stimulate lasting changes in the sector by promoting the application of sound cost recovery principles (including preferential tariffs for renewable energy supporting attractive rates of return) in a project where the national power utility itself produces the renewable power.

Box 3: The GoSA's Strategic Shift Towards Renewable Energy

The Government of South Africa plans to double the power generation capacity to 80,000 MW by 2025, while also reducing the proportion of electricity generated from coal to approximately 70 percent from current levels of about 90%. In order to replace coal with a cleaner fuel source, the Government is exploring options to increase nuclear capacity by 20,000 MW and to add 1,600 MW from renewable supply sources, namely solar and wind power. Eskom expects to devote a significant portion of its capital expansion program budget to the diversification of its sources of energy generation, especially increased renewable energy sources.

Substantial part of the future renewable and other generation capacity is expected to be provided by the private sector. Eskom's climate change strategy, as approved by its board, proposes immediate and longer term (post-2012) action to reduce these emissions and adapt to the negative impacts of climate change. The strategy ensures that climate change considerations are included in investment decisions – for example, taking into account future carbon prices.

32. Even withincentives, the deployment of CSP technology in South Africa is currently a tall order for the private sector. Without Eskom's participation, it is highly unlikely that the private sector will go through with a similar investment in the near future. The participation of the national power utility in the first commercial-size CSP project will increase the visibility of CSP and renewable energy in general, and signal to the market that the GoSA sees it as a desirable and viable alternative to coal-based electricity. For its part, the Upington project will have an important role in helping Eskom move beyond coal in its operations. Its recently approved climate change strategy is an essential starting point in this direction (see Box 3 above).

33. The Wind Power component: Even though wind power technology is well proven and major components are commercially available from multiple suppliers, the lack of proven performance on a large scale in South Africa creates a perception of high risk. Furthermore, performance risk (e.g., annual output) is real and remains despite intensive wind measurement. Finally, Eskom faces significant investments in transmission infrastructure, driven mostly by the need to evacuate wind power and deliver it to load centers and the main grid. Investments in transmission capacity to connect Independent Power Producers to the grid would catalyze substantial private sector investment in wind power. The Sere facility, together with new transmission capacity to export its power, would act as a flagship to the sector. In addition, Eskom investments in transmission capacity expansion to the key regions of potential wind power development would catalyze substantial private sector investment.

IV. Additional Costs and Risk Premiums

34. The first major barrier to scaling-up wind and solar power in South Africa is the high cost relative to coal-fired production. The capital cost of the CSP plant is projected to be several times that of a supercritical coal-fired power plant. Adjusting for fuel and O&M costs, there still remains a viability gap of more than 0.21 US$/kWh, in addition to substantial commercial and performance risks and cost uncertainties. The production cost gap between a typical wind farm and a new supercritical coal-fired power plant is about 0.1 US$/kWh.

Table 4: Costs of Proposed Power Generation based on Wind and Solar (CSP) compared with Coal

	Wind	CSP	Coal (supercritical)
Full Investment costs (including IDC, Development Costs, and Contingencies), US$/kW	3530	10900	2249.3
Annual load factor	0.25	0.5	0.73
Annualized investment cost, US$/ MWh	141	231	30.7
Fuel costs, US$/ MWh	0	0	8.6
O&M costs, US$/ MWh	16	39	14.1
Total annualized cost, US$/ MWh	156	269	53.3

35. Besides the overall cost gap relative to coal, the proposed solar and wind projects face a number of additional costs and risks typical for renewable energy projects: (a) the cost profile of such projects is expressly front-loaded, adding to the initial capital requirement and calling for financial resources of longer maturity; such resources are hard to secure for project proponents; (b) the front-loaded cost profile also puts the projects into a relatively riskier position as the up-front costs need to be recovered in a regulatory environment where the full cost recovery through the end-user tariffs is not guaranteed, although NERSA's promise of preferential feed-in tariffs for renewable energy mitigates this risk; (c) the project proponent has to bear the full cost of the connection of the proposed solar and wind facilities to the power grid as well as the project development and transaction costs; (d) the intermittent (variable) nature of both solar and wind power poses additional challenges to the system operator; and (e) the technological risks involved in the CSP project, particularly with respect to tower technology and thermal storage, are also considerable as the technology has not been tried on a commercial scale before.

36. The concessional financing from CTF will help buy down these extra costs and allow the project proponent to receive the return sufficient to compensate it for the risk involved, thereby providing the positive incentives required for Eskom and its lenders to proceed with the investments. The current agreement with the regulator is that Eskom will be allowed to have a tariff that brings the return on the project to 12.2%. This rate of return is achieved when the tariffs for wind and solar power are set at 1.40 and 2.11 Rand/kWh, respectively, for the year 2011. At this level of tariffs, the leverage of debt resources including the concessional loan from CTF allows Eskom to achieve a 19% return on equity for the wind component and 16.1% for the solar component – assuming availability of concessional funding from the CTF in the amount of US$250 million for CSP and US$100 million for wind.

37. Both preferential tariffs and financial leverage of the IBRD and CTF loans are required to bring the rates of return to the project developer (equity IRRs) to an acceptable level. Industry practice currently in South Africa is to expect a nominal rate of return on equity capital of at least 15% for projects with this level of risk.

V. Development impact

38. The proposed CSP and wind projects are strongly linked to the Government's development agenda. The current Country Partnership Strategy progress report identifies the energy sector, including renewable energy development with CTF support, as an important priority for the country. Renewable energy will contribute to improved generation capacity and make electricity generally more reliable and more resistant to fossil-fuel price fluctuations by virtue of diversification of the energy mix in the country's power system. It is also expected that some of the component value of CSP and wind power plants can be sourced locally at the outset and increase over time. The economic and social benefits of these renewable technologies would include domestic industrial development and employment. The erection of the plants—as well as

operation and maintenance—represent sustainable development through job creation. The development potential of the envisaged renewable energy program was studied under the South African Renewable Energy Initiative (SARI). The country-wide benefits are considered to come from the following:

- Industrial development: Through direct investments in generation and value chains supply to the industry, thus creating employment.
- Export competitiveness: From the fact that future markets are likely to become increasingly carbon sensitive and South Africa could face restrictions and price discounting if carbon intensity in a highly energy-intensive production situation remains high.
- Regional renewable development: Through exploitation of the country's potential to be a regional hub and catalyst for the development of renewable energy in sub-Saharan Africa.
- Medium term energy security: By helping address the medium-term risk of economic and social dislocation of reduced availability and at the same time supporting the country's Universal Access program. Currently, only 80 percent of the South African households have reliable access to electricity.

39. The analysis indicates that a ramp up of renewable energy to 15 percent of the grid-connected MW capacity would create new jobs in the region of 35,000 to 51,000. For the upper limit, 20,000 would be skilled, 22,000 semi-skilled and 9,000 unskilled.

40. The technological expertise built up in the process of the project development, construction, and operation will be a lasting benefit to the country and the beneficiary company. Also, demonstration effect will make CSP more readily acceptable to wider audiences within South Africa and beyond. In particular, the adoption of CSP in neighboring southern African countries could have significant positive development impacts for them, particularly with respect to energy security. Furthermore, beyond the particular technologies of wind and CSP, demonstration effect and local know-how will enable wider choices and increase the probability of other low-carbon technologies being accepted by the stakeholders. Last but not least, all the interventions will have pronounced environmental co-benefits such as reduced NOx, SOx and particulates emissions from avoided coal-fired power generation as well as the avoided environmental, health, and safety impacts associated with coal mining. Both CSP and wind are zero-emission plants.

VI. Implementation Potential

41. Public policies and institutions: The renewable energy program of South Africa is managed by the Department of Energy with NERSA and DoE playing a key role. While the private sector is expected to play major role in the development of renewables, Eskom is developing the first large wind and CSP project with the objective of establishing a replicable implementation framework and addressing infrastructure constraints.

Box 4: Key Elements of the Enabling Policy for Renewable Energy in South Africa

On August 5, 2009, the Department of Energy published the Regulations with the following objectives:

(a) the regulation of entry by a buyer and an IPP into a power purchase agreement;

(b) the facilitation of fair treatment and non-discrimination between IPP and the buyer;

(c) the facilitation of the full recovery by the buyer of all costs incurred by it under or in connection with the PPA and an appropriate return based on the risks assumed by the buyer there under and, for this purpose to ensure the transparency and cost reflectivity in the determination of electricity tariffs;

(d) the establishment of rules and guidelines that are applicable in the undertaking of IPP bid program and the procurement of an IPP for purpose of new generation capacity;

(e) the provision of a framework for the reimbursement by the regulator, of costs incurred by the buyer and the system operator in the PPA; and

(f) the regulation of the framework of approving the IPP bid program, the procurement process, and the relevant agreements to be concluded.

42. The DoE has developed policies and programs in support of renewable energy, including solar and wind power. DoE is committed to building on the foundation laid with NERSA's REFIT tariffs by encouraging private sector development of renewable energy, especially wind. The REFIT tariffs are 2.1 Rand/kWh for solar thermal power with storage capacity, and 1.25 Rand/kWh for wind power[63], compared to Eskom's average tariff of 0.4 Rand/kWh. NERSA is currently developing further tariffs for other forms of grid-tied solar power as well as other renewable energy technologies. The REFIT pricing regime is intended to be complemented by a standard, bankable power purchase agreement (PPA) designed to suit developers of independent solar thermal and wind power plants. NERSA's REFIT pricing regime directly supports the South African Government's goal of producing 4 percent of the country's electricity supply (about 10,000 GWh) from renewable energy sources by 2013.

43. Among the enabling efforts undertaken by DoE is an update of the national wind energy atlas, an outreach program providing information and assistance to small businesses seeking to enter the wind power business, and further development of the grid code and single-buyer model. As part of project preparation, specific areas of cooperation with DoE would be developed and supported with funding from bilateral donors.

44. DoE has established a target for a national SWH program, and is working with the support of the GEF-financed Renewable Energy Market Transformation project to develop a national strategy for SWH market development. Several pro-SWH policies are under active discussion by DoE and other agencies, including: (a) requiring SWH in new residential buildings; (b) demonstration of SWH in government buildings; (c) fees or other restrictions on installing new or replacement electric water heaters; (d) "feebate" programs, which would combine rebates for SWH installation, financed by fees on electric water heater installations, with other financial incentives such as a tax credits; and (e) providing incentives to municipalities that would offset the administrative costs and revenue losses of undertaking SWH programs.

45. The Government agencies responsible for energy efficiency policy and programs include the DoE and the National Energy Efficiency Agency (NEEA) within the South African Energy Research Institute (SANERI). Both entities are under-resourced and understaffed; yet despite these limitations, they have produced several new policy proposals for supporting energy efficiency. DoE is proposing a variant of the Standard Offer mechanism described above, with the total subsidy tied to the amounts available for renewable energy. NEEA and National Treasury's Tax Policy Unit have proposed a tax credit scheme that would provide a one-time credit of up to 90 South African cents per kWh for verified first-year electricity savings, against a metered baseline. The tax rebate would be guaranteed to be available for ten years. Treasury and NEEA are developing the systems and protocols needed to implement the tax credit scheme. Whichever

[63] The REFITs are currently under review in line with the Regulations, which call for regular reviews.

subsidy or tax incentive scheme goes forward should provide an important inducement to energy efficiency project developers.

46. Institutional and implementation arrangements for the Solar and Wind: The implementation arrangements for the CSP and wind components are provided in Annex 6. The two components target the crucial early-commercialization/first adopter phase of an entirely new power generation technology. These first-of-a-kind projects would be a challenge for any utility to implement, and Eskom requires the combined support of IBRD and CTF lending as it develops these transformational investments. However, the country does have the policies in place that will make the transformation easier. The GoSA has also constituted an inter-departmental Committee for Strategic Guidance to provide oversight with respect to CTF-funded investments.

47. *Concentrating Solar Power*: The project will be implemented by a dedicated team in Eskom which is being built around core staff already available. This project has been extensively developed over a five-year period. The EIA has been conducted and necessary provincial environmental approvals received. Development work on the site is underway.

48. *Wind Power*: Phase 1 of the Western Province Wind Energy Facility Project is fully prepared, with an approved EIA and permit for the 100 MW plant at Sere. An Eskom core group is already working on the development of the project. More than two years of wind data are available for the site. Wind turbine suppliers have been identified, and performance data are available from Eskom's Klipheuwel test station. The power will be evacuated at via a double circuit 132kV sub-transmission line. The incremental transmission capacity required is contained in Eskom's recent Multi-Year Price Determination filing with NERSA. Development work on the site is underway.

49. Sustainability and arrangements for long-term operations and maintenance: South Africa's Energy Pricing Policy provides the basis for scaling up and sustainability of the renewable energy and energy efficiency market. The measures highlighted in Box 4 will also help ensure a sustainable RE market. For the two large-scale Wind and CSP pilots, operation and maintenance will fall under Generation Business and separate departments for the two technologies. Sufficient annual budget allocations will be made, and training of personnel during construction and commissioning will be provided to staff, to ensure proper operation and maintenance.

Annex 12: Bank Project Preparation and Processing

SOUTH AFRICA: ESKOM RENWEABLE SUPPORT PROJECT

	Planned	Actual
PCN review (at OC level)	09/21/09	09/21/09
Initial PID to PIC	09/21/09	11/11/09
Initial ISDS to PIC	09/21/09	11/11/09
Appraisal	02/07/11	02/07/11
Negotiations	08/30/11	08/30/11
Board	10/27/11	-
Planned date of effectiveness	12/20/11	-
Planned date of mid-term review	01/02/13	-
Planned closing date	12/31/16	-

Key institutions responsible for preparation of the project include: Eskom Holdings, National Treasury, Department of & Energy, Department of Public Enterprises, and Department of Environment Affairs.

The Bank staff and consultants who worked on the project included:

Name	Title	Unit
Reynold Duncan	Task Team Leader/Program Coordinator	AFTEG
Andrey Gurevich	Co-Task Team Leader /Senior Financial Analyst	AFTEG
Pankaj Gupta	Manager	FEUFS
Suman Babbar	Consultant, Project Finance Advisor	AFTEG
Sandeep Mahajan	Lead Economist	AFTP1
Elzbieta Sieminska	Lead Procurement Specialist	AFTPC
Edith Ruguru Mwenda	Senior Counsel	LEGAF
Harvey van Veldhuizen	Lead Environmental Specialist	OPCQC
Thomas Walton	Consultant, Environmental Specialist	AFTEN
Victor Loksha	Energy Consultant, CTF	SEGES
Mustafa Zakir Hussain	Sr. Infrastructure Finance Specialist	FEUFS
Frederic Edmund Brusberg	Lead Social Development Specialist	SARDE
Jose C. Janeiro	Senior Finance Officer	CTRFC
Andrew Asibey	Sr. Monitoring and Evaluation Specialist	AFTDE
Gert Van Der Linde	Lead Financial Management Specialist	AFTFM
Mudassar Imran	Senior Energy Economist	AFTEG
Sarwat Hussain	Senior Communication Officer	AFRSC
Yash Gupta	Procurement Specialist	AFTPC
Heather Worley	Senior Communications Officer	ENVCI
Tandile Ngetu	Consultant, Financial Management Specialist	AFTFM
Elvira Morella	Young Professional	AFTEG
Jemima Harlley	Program Assistant	AFCS1
Rita Ahiboh	Program Assistant	AFTEG

Bank funds expended to date on project preparation:

1. Bank resources: ~US$150,000
2. Trust funds: None
3. Total: ~US$150,000

Estimated Supervision costs:

Estimated annual supervision cost: US$120,000

Annex 13: Documents in the Project File

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

1. Assessing the macro-economic impact of Eskom's Planned R343 billion capital expenditure on the South African economy, Eskom/BER/CITI, 2008
2. CSP Information Document, Eskom 2009
3. CTF Investment Plan, November 2009
4. Deloitte Report on Eskom Electricity Sector, 2008
5. Electricity Pricing Policy, 2008
6. Expert Panel Report on Project Consistency with Development and Climate Change Strategic Framework – January 2010
7. Independent Review of Compliance with Equator Principles, SE Solutions (Pty) Ltd.
8. Long Term Mitigation Scenario, Strategic Options for South Africa – Department of Environmental Affairs – South Africa, October 2007
9. Multi-Year Tariff Determination 2, Eskom November 2009
10. Safeguards Diagnostic Review – World Bank – January 2010
11. SAPP Regional Generation and Transmission Expansion Plan Study, Nexant of USA.
12. South Africa Electrification Program – Electrification Statistics, 2009
13. South Africa Nuclear Energy Policy, 2008
14. Various Presentation, Energy Efficiency and DSM, 2009

Annex 14: Statement of Loans and Credits

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT

Operations Portfolio (IBRD/IDA and Grants)

As Of Date 7/30/2010

Closed Projects 16

IBRD/IDA *	
Total Disbursed (Active)	9.38
of which has been repaid	0.00
Total Disbursed (Closed)	26.10
of which has been repaid	16.76
Total Disbursed (Active + Closed)	35.48
of which has been repaid	16.76
Total Undisbursed (Active)	3,740.63
Total Undisbursed (Closed)	0.00
Total Undisbursed (Active + Closed)	3,740.63

Active Projects

Project ID	Project Name	Last PSR Supervision Rating: Dev. Obj.	Last PSR Supervision Rating: Implem. Progress	Fiscal Year	Original Amount in US$ Millions: IBRD	IDA	GRANT	Cancel.	Undisb.	Difference Between Expected and Actual Disbursements [a]: Orig.	Frm Rev'd
P064438	ZA-GEF Great Addo SIL (F	S	S	2004			5.5		0.74452	0.744518	
P086528	ZA-GEF Isimangaliso Wetl	S	S	2010			9		9		
P073322	ZA-GEF Rnwbl Enrgy Mkt	S	MS	2007			6		3.4682	1.5915307	
P116410	ZA:Eskom Investment Sup	S	S	2010	3750				3740.63	457.29167	
Overall Result					3750		20.5		3753.84	459.62772	

South Africa
Committed and Disbursed Outstanding Investment Portfolio
As of 6/30/2010
(In USD Millions)

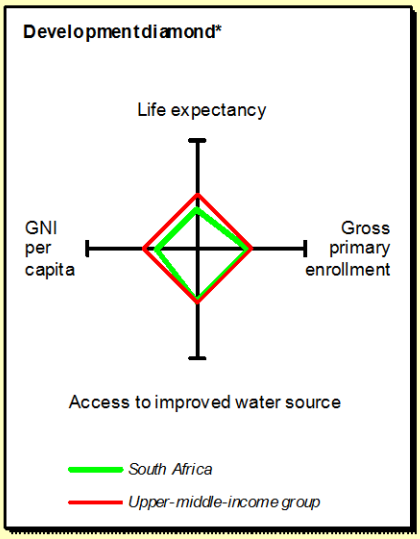
		Committed					Disbursed Outstanding				
FY Approval	Company	Loan	Equity	**Quasi Equity	*GT/RM	Particip ant	Loan	Equity	**Quasi Equity	*GT/RM	Particip ant
2009	African bank	0	0	45.89	0	0	0	0	45.89	0	0
2002	Bioventures	0	0.15	0	0	0	0	0.02	0	0	0
2009	Columbus	52.09	0	0	0	0	52.09	0	0	0	0
2010	Curro holdings	9.53	0	0	0	0	0	0	0	0	0
2006	Ethos v	0	20.14	0	0	0	0	16.57	0	0	0
2005	Firstrand lim...	0	0	0.01	0	0	0	0	0.01	0	0
6/10/2004	Hernic	10.98	4.7	6.47	3.73	0	10.98	4.7	3.54	0	0
2007	Horizon iii	0	8.51	0	0	0	0	1.08	0	0	0
2006	Karsten farms	3.88	0	0	0	0	3.88	0	0	0	0
2010	Life healthcare	0	100	0	0	0	0	92.26	0	0	0
2007/09	Lonmin	0	16.97	0	0	0	0	16.61	0	0	0
2010	Marico	5	0	0	0	0	0	0	0	0	0
2002	Namf	0	0.78	0	0	0	0	0.43	0	0	0
2007	Nedbank	0	0	131.12	0	0	0	0	131.12	0	0
2007	Omnia fertilizer	0	0	0	34.48	0	0	0	0	28.65	0
0	Safal steel	20	0	5	0	0	20	0	5	0	0
1999	Sapef	0	1.71	0	0	0	0	0	0	0	0
2009	Sasfin	0	10	10.81	0	0	0	10	10.81	0	0
2007	Sonae novobord	7.65	0	0	0	0	7.65	0	0	0	0
0	Sphere i	0	3.62	0	0	0	0	2.91	0	0	0
2008	Wizzit	0	0.58	0	0	0	0	0.27	0	0	0
Total Portfolio:		**109.13**	**167.16**	**199.3**	**38.21**	**0**	**94.6**	**144.85**	**196.37**	**28.65**	**0**

* Denotes Guarantee and Risk Management Products.
** Quasi Equity includes both loan and equity types.

Annex 15: Country at a Glance

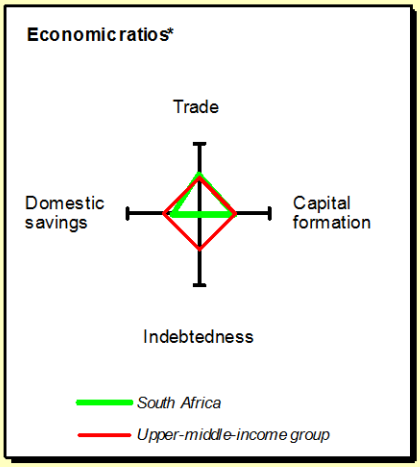
SOUTH AFRICA: ESKOM RENWEABLES SUPPORT PROJECT

POVERTY and SOCIAL	South Africa	Sub-Saharan Africa	Upper-middle-income
2009			
Population, mid-year *(millions)*	49.3	840	1,002
GNI per capita *(Atlas method, US$)*	5,740	1,126	7,495
GNI *(Atlas method, US$ billions)*	282.9	946	7,508
Average annual growth, 2003-09			
Population *(%)*	1.1	2.5	0.9
Labor force *(%)*	2.4	2.9	1.7
Most recent estimate (latest year available, 2003-09)			
Poverty *(% of population below national poverty line)*	22	..	..
Urban population *(% of total population)*	61	37	75
Life expectancy at birth *(years)*	51	52	71
Infant mortality *(per 1,000 live births)*	48	81	19
Child malnutrition *(% of children under 5)*	..	25	..
Access to an improved water source *(% of population)*	93	60	95
Literacy *(% of population age 15+)*	89	62	93
Gross primary enrollment *(% of school-age population)*	105	100	111
Male	106	105	111
Female	103	95	110



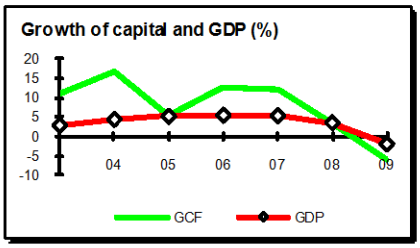
KEY ECONOMIC RATIOS and LONG-TERM TRENDS	1989	1999	2008	2009
GDP *(US$ billions)*	124.9	133.2	275.3	282.8
Gross capital formation/GDP	20.6	16.2	22.1	19.5
Exports of goods and services/GDP	26.7	25.3	35.6	27.4
Gross domestic savings/GDP	25.9	18.8	18.6	18.2
Gross national savings/GDP	22.2	15.7	14.5	15.0
Current account balance/GDP	1.3	-0.5	-7.1	-4.0
Interest payments/GDP	..	1.1	0.6	0.6
Total debt/GDP	..	18.0	29.5	27.5
Total debt service/exports	..	12.1	9.1	11.2
Present value of debt/GDP	..	..	..	..
Present value of debt/exports	..	..	..	..

	1989-99	1999-09	2008	2009	2009-13
(average annual growth)					
GDP	1.7	4.0	3.7	-1.8	3.7
GDP per capita	-0.5	2.7	2.5	-2.8	..
Exports of goods and services	5.3	3.0	2.4	-19.5	6.1

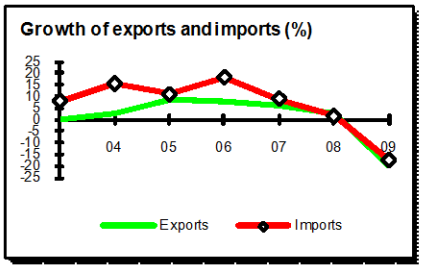


STRUCTURE of the ECONOMY

	1989	1999	2008	2009
(% of GDP)				
Agriculture	5.4	3.5	3.2	3.0
Industry	40.7	31.2	32.6	31.3
Manufacturing	23.5	18.5	16.5	15.2
Services	53.9	65.2	64.2	65.7
Household final consumption expenditure	54.9	62.8	62.2	60.7
General gov't final consumption expenditure	19.2	18.4	19.2	21.1
Imports of goods and services	21.4	22.7	38.6	28.3



	1989-99	1999-09	2008	2009
(average annual growth)				
Agriculture	-0.1	1.6	10.9	-3.2
Industry	0.6	3.0	1.5	-7.2
Manufacturing	0.8	3.3	2.7	-10.7
Services	2.3	4.3	4.7	1.1
Household final consumption expenditure	1.9	4.6	2.9	-2.5
General gov't final consumption expenditure	0.4	4.8	4.9	4.7
Gross capital formation	3.9	8.7	3.4	-5.7
Imports of goods and services	7.1	7.8	1.4	-17.4

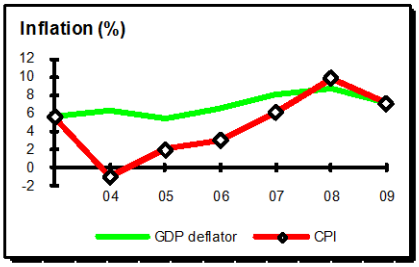


Note: 2009 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

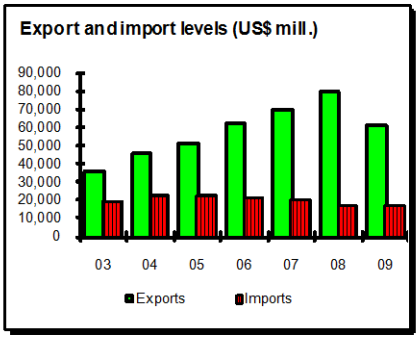
PRICES and GOVERNMENT FINANCE

	1989	1999	2008	2009
Domestic prices				
(% change)				
Consumer prices	14.7	5.2	9.9	7.1
Implicit GDP deflator	17.3	7.1	8.8	7.3
Government finance				
(% of GDP, includes current grants)				
Current revenue	27.0	24.0	26.8	23.8
Current budget balance	0.6	-0.5	-0.8	-7.0
Overall surplus/deficit	-1.2	-2.0	-1.2	-7.4



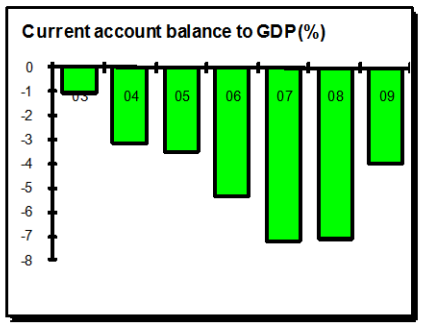
TRADE

	1989	1999	2008	2009
(US$ millions)				
Total exports (fob)	25,621	27,019	79,184	60,376
Gold	7,465	3,930	5,877	6,228
Food, beverages, and tobacco	1,547	1,382	4,712	4,176
Manufactures	9,239	15,800	46,629	33,231
Total imports (cif)	18,442	23,568	17,430	16,993
Food	627	773	2,549	2,304
Fuel and energy	2,134	2,351	18,875	13,124
Capital goods	3,192	20,264	61,350	44,342
Export price index *(2000=100)*	43	87	232	234
Import price index *(2000=100)*	38	85	202	188
Terms of trade *(2000=100)*	114	103	115	125



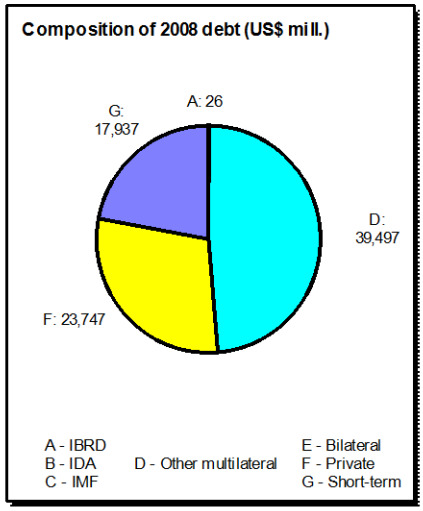
BALANCE of PAYMENTS

	1989	1999	2008	2009
(US$ millions)				
Exports of goods and services	25,129	33,722	98,005	77,548
Imports of goods and services	20,465	30,269	117,131	79,982
Resource balance	4,664	3,453	-8,339	-2,434
Net income	-3,286	-3,206	-8,942	-6,316
Net current transfers	186	-926	-2,289	-2,647
Current account balance	1,564	-680	-19,570	-11,397
Financing items (net)	-1,650	-1,253	16,415	9,386
Changes in net reserves	86	1,933	3,155	2,011
Memo:				
Reserves including gold *(US$ millions)*	2,633	7,373	34,099	39,706
Conversion rate *(DEC, local/US$)*	2.0	6.1	8.3	8.5



EXTERNAL DEBT and RESOURCE FLOWS

	1989	1999	2008	2009
(US$ millions)				
Total debt outstanding and disbursed	..	23,907	81,207	77,757
IBRD	..	1	26	21
IDA	..	..	..	..
Total debt service	..	4,290	9,400	9,100
IBRD	..	0	5	7
IDA	..	..	..	..
Composition of net resource flows				
Official grants	0	246	777	..
Official creditors	..	37	-23	-38
Private creditors	..	-149	-1,503	4,041
Foreign direct investment (net inflows)	-201	1,503	12,140	4,112
Portfolio equity (net inflows)	443	9,001	-16,325	10,913
World Bank program				
Commitments	..	..	..	..
Disbursements	..	..	..	..
Principal repayments	..	..	..	..
Net flows	..	..	..	..
Interest payments	..	..	..	..
Net transfers	..	..	..	..



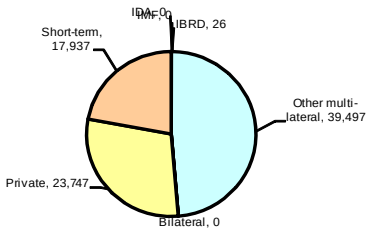
Development Economics 4/4/11

Economic and Social Indicators

South Africa

Balance of Payments and Trade	2000	2009
(US$ millions)		
Total merchandise exports (fob)	30,180	60,376
Total merchandise imports (cif)	20,749	16,993
Net trade in goods and services	3,930	-2,434
Current account balance	-168	-11,397
as a % of GDP	-0.1	-4.0
Workers' remittances and compensation of employees (receipts)	344	902
Reserves, including gold	7,533	39,706
Central Government Finance		
(% of GDP)		
Current revenue (including grants)	22.9	23.8
Tax revenue	22.5	23.5
Current expenditure	23.5	30.9
Overall surplus/deficit	-1.9	-7.4
Highest marginal tax rate (%)		
Individual	*40*	40
Corporate	38	35
External Debt and Resource Flows		
(US$ millions)		
Total debt outstanding and disbursed	24,861	77,757
Total debt service	3,861	9,100
Debt relief (HIPC, MDRI)	–	–
Total debt (% of GDP)	18.7	27.5
Total debt service (% of exports)	9.8	11.2
Foreign direct investment (net inflows)	969	4,112
Portfolio equity (net inflows)	4,169	10,913

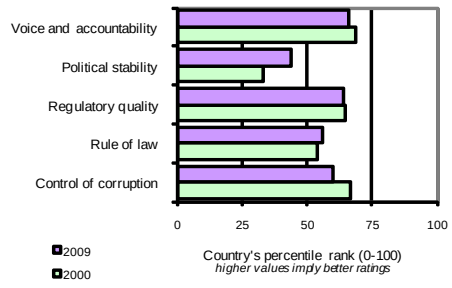
Composition of total external debt, 2008



US$ millions

Private Sector Development	2000	2009
Time required to start a business (days)	–	22
Cost to start a business (% of GNI per capita)	–	5.9
Time required to register property (days)	–	24
Ranked as a major constraint to business (% of managers surveyed who agreed)	2000	2009
Skills and education of workers	..	*35.5*
Labor regulations	..	*32.8*
Stock market capitalization (% of GDP)	154.2	249.3
Bank capital to asset ratio (%)	8.7	*7.9*

Governance indicators, 2000 and 2009



Source: Kaufmann-Kraay-Mastruzzi, World Bank

Technology and Infrastructure	2000	2008
Paved roads (% of total)	20.3	..
Fixed line and mobile phone subscribers (per 100 people)	30	101
High technology exports (% of manufactured exports)	7.0	5.2
Environment		
Agricultural land (% of land area)	82	*82*
Forest area (% of land area)	7.6	*7.6*
Terrestrial protected areas (% of surface area)	..	6.0
Freshwater resources per capita (cu. meters)	*984*	918
Freshwater withdrawal (billion cubic meters)	12.5	..
CO2 emissions per capita (mt)	8.4	*9.0*
GDP per unit of energy use (2005 PPP $ per kg of oil equivalent)	3.0	*3.4*
Energy use per capita (kg of oil equivalent)	2,507	*2,784*

World Bank Group portfolio	2000	2009
(US$ millions)		
IBRD		
Total debt outstanding and disbursed	3	21
Disbursements	3	0
Principal repayments	0	5
Interest payments	0	1
IDA		
Total debt outstanding and disbursed	*0*	*0*
Disbursements	–	–
Total debt service	–	–
IFC *(fiscal year)*		
Total disbursed and outstanding portfolio	55	374
of which IFC own account	55	374
Disbursements for IFC own account	25	82
Portfolio sales, prepayments and repayments for IFC own account	3	48
MIGA		
Gross exposure	12	13
New guarantees	0	0

Note: Figures in italics are for years other than those specified. 2009 data are preliminary. 4/4/11
.. indicates data are not available. – indicates observation is not applicable.

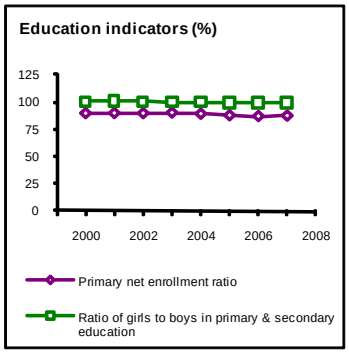
Development Economics, Development Data Group (DECDG).

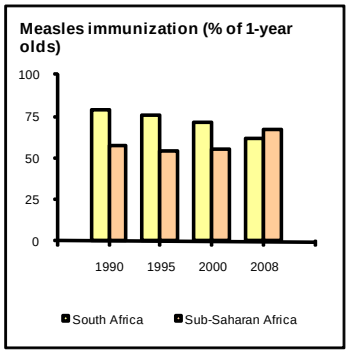
Millennium Development Goals

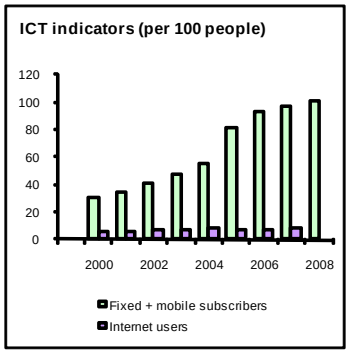
South Africa

With selected targets to achieve between 1990 and 2015
(estimate closest to date shown, +/- 2 years)

	South Africa			
Goal 1: halve the rates for extreme poverty and malnutrition	**1990**	**1995**	**2000**	**2008**
Poverty headcount ratio at $1.25 a day (PPP, % of population)	..	21.4	26.2	..
Poverty headcount ratio at national poverty line (% of population)	..	..	38.0	22.0
Share of income or consumption to the poorest quintile (%)	..	3.6	3.1	..
Prevalence of malnutrition (% of children under 5)	..	..	..	..
Goal 2: ensure that children are able to complete primary schooling				
Primary school enrollment (net, %)	*90*	..	90	*87*
Primary completion rate (% of relevant age group)	*76*	..	87	*86*
Secondary school enrollment (gross, %)	66	*80*	86	*95*
Youth literacy rate (% of people ages 15-24)	..	*94*	..	97
Goal 3: eliminate gender disparity in education and empower women				
Ratio of girls to boys in primary and secondary education (%)	*104*	..	100	*100*
Women employed in the nonagricultural sector (% of nonagricultural employment)	..	..	43	*44*
Proportion of seats held by women in national parliament (%)	3	*25*	30	33
Goal 4: reduce under-5 mortality by two-thirds				
Under-5 mortality rate (per 1,000)	56	57	73	67
Infant mortality rate (per 1,000 live births)	44	43	52	48
Measles immunization (proportion of one-year olds immunized, %)	79	76	72	62
Goal 5: reduce maternal mortality by three-fourths				
Maternal mortality ratio (modeled estimate, per 100,000 live births)	..	..	..	*400*
Births attended by skilled health staff (% of total)	..	82	*84*	*91*
Contraceptive prevalence (% of women ages 15-49)	57	..	*56*	*60*
Goal 6: halt and begin to reverse the spread of HIV/AIDS and other major diseases				
Prevalence of HIV (% of population ages 15-49)	0.8	6.2	15.9	*18.1*
Incidence of tuberculosis (per 100,000 people)	301	317	576	960
Tuberculosis case detection rate (%, all forms)	73	56	59	72
Goal 7: halve the proportion of people without sustainable access to basic needs				
Access to an improved water source (% of population)	81	83	89	*93*
Access to improved sanitation facilities (% of population)	55	56	57	*59*
Forest area (% of total land area)	7.6	7.6	7.6	*7.6*
Terrestrial protected areas (% of surface area)	..	..	..	6.0
CO2 emissions (metric tons per capita)	9.5	9.0	8.4	*9.0*
GDP per unit of energy use (constant 2005 PPP $ per kg of oil equivalent)	3.1	2.8	3.0	*3.4*
Goal 8: develop a global partnership for development				
Telephone mainlines (per 100 people)	9.4	10.2	11.3	9.1
Mobile phone subscribers (per 100 people)	0.0	1.4	19.0	92.2
Internet users (per 100 people)	0.0	0.7	5.5	8.6
Personal computers (per 100 people)	0.7	2.8	6.6	*8.4*





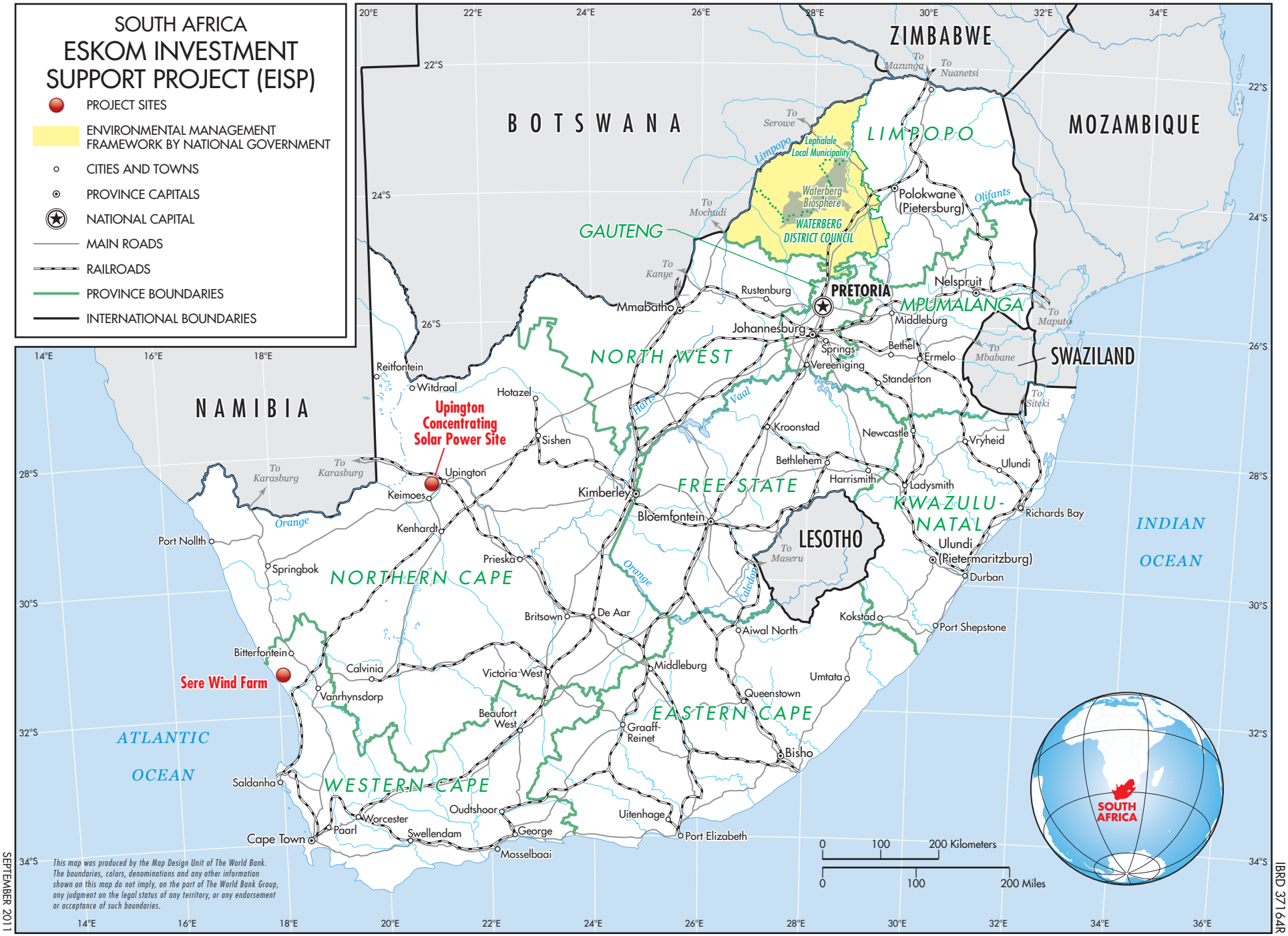


Note: Figures in italics are for years other than those specified. .. indicates data are not available. 4/4/11

Development Economics, Development Data Group (DECDG).

Annex 16: Map (37164R)

SOUTH AFRICA: ESKOM RENEWABLES SUPPORT PROJECT


SOUTH AFRICA
ESKOM INVESTMENT SUPPORT PROJECT (EISP)
PROJECT SITES
ENVIRONMENTAL MANAGEMENT FRAMEWORK BY NATIONAL GOVERNMENT
CITIES AND TOWNS
PROVINCE CAPITALS
NATIONAL CAPITAL
MAIN ROADS
RAILROADS
PROVINCE BOUNDARIES
INTERNATIONAL BOUNDARIES
Upington Concentrating Solar Power Site
Sere Wind Farm
ZIMBABWE
BOTSWANA
MOZAMBIQUE
NAMIBIA
SWAZILAND
LESOTHO
LIMPOPO
GAUTENG
NORTH WEST
MPUMALANGA
FREE STATE
KWAZULU-NATAL
NORTHERN CAPE
EASTERN CAPE
WESTERN CAPE
PRETORIA
Lephalale Local Municipality
Waterberg Biosphere
WATERBERG DISTRICT COUNCIL
Polokwane (Pietersburg)
Nelspruit
Johannesburg
Rustenburg
Mmabatho
Middleburg
Springs
Bethel
Ermelo
Vereeniging
Standerton
Reitfontein
Witdraal
Hotazel
Sishen
Upington
Keimoes
Kenhardt
Kimberley
Bloemfontein
Kroonstad
Newcastle
Vryheid
Bethlehem
Harrismith
Ladysmith
Ulundi
Richards Bay
Durban
Ulundi (Pietermaritzburg)
Port Nolloth
Springbok
Prieska
Britstown
De Aar
Aiwal North
Kokstad
Port Shepstone
Bitterfontein
Calvinia
Vanrhynsdorp
Victoria West
Middleburg
Umtata
Queenstown
Beaufort West
Graaff-Reinet
Bisho
Saldanha
Worcester
Paarl
Cape Town
Swellendam
Oudtshoorn
George
Mosselbaai
Uitenhage
Port Elizabeth
Orange
Vaal
Limpopo
Olifants
Caledon
To Mochudi
To Kanye
To Serowe
To Mazunga
To Nuanetsi
To Maputo
To Mbabane
To Siteki
To Karasburg
To Maseru
ATLANTIC OCEAN
INDIAN OCEAN
SOUTH AFRICA
0 100 200 Kilometers
0 100 200 Miles
This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of The World Bank Group, any judgment on the legal status of any territory, or any endorsement or acceptance of such boundaries.
SEPTEMBER 2011
IBRD 37164R