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Report No: 53425-ZA

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$3,750 MILLION

TO

ESKOM HOLDINGS LIMITED

GUARANTEED BY REPUBLIC OF SOUTH AFRICA

FOR AN

ESKOM INVESTMENT SUPPORT PROJECT

March 19, 2010

Energy Group
Sustainable Development Department
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate estimated as of February 15, 2010)

Currency Unit = Rand
Rand 7.50 = 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
CPA	Criminal Procedure Act
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
CTA	Coal Transport Agreement
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
DFID	United Kingdom Department for International Development
DMEDNA	Department of Minerals and Energy Designated National Authority
DNA	Designated National Authority
DNI	Direct Normal Insulation
DPE	Department of Public Enterprises
DSM	Demand Side Management
DST	Department of Science and Technology
DoE	Department of Energy
DoEA	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
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
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
IGCC	Integrated Gasification Combined Cycle
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
MET	Medupi Execution Team
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)
MPT	Medupi Project Team
MTBPS	Mid-Term Budget Policy Statement
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
S&I	Supply & Install
SIL	Specific Investment Loan
SOE	State Owned Enterprise
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:	Inger Andersen
Sector Manager:	Subramaniam V. Iyer
Task Team Leaders:	Reynold Duncan and Pankaj Gupta

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PROJECT APPRAISAL DOCUMENT

AFRICA

AFTEG

Date: March 19, 2010	Team Leaders: Reynold Duncan and Pankaj Gupta
Country Director: Ruth Kagia	Sectors: Power (90%), Transport (10%)
Sector Manager/Director: Subramaniam V. Iyer / Inger Andersen	Themes: Infrastructure services for private sector development (40%); Climate change (20%); Regulation and competition policy (20%); Education for the knowledge economy (20%)
Project ID: P116410	Environmental category: Full Assessment
Lending Instrument: Specific Investment Loan	Joint IFC: No Joint Level: N/A

Project Financing Data

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

For Loans/Credits/Others:

Total Bank financing (US$ million): 3,750.00

Proposed terms: A US Dollar denominated, commitment linked, level repayment, IBRD Flexible Loan with a variable spread, with a 7 year Grace Period and 28.5 years Final Maturity, with all conversion options selected with repayment dates of May 1 and November 1 of each year.

Project Financing Plan (US$m)

Source	Local	Foreign	Total
Borrower	3,315.74	1,421.03	4,736.77
International Bank for Reconstruction and Development	2,266.90	1,483.10	3,750.00
Clean Technology Fund – Component B: Renewable Energy Investments Only	252.00	98.00	350.00
Foreign Multilateral Institutions	1,917.94	745.86	2,663.80
Other Bilateral and Commercial Lenders	1,700.10	661.15	2,361.25
Total:	**9,452.68**	**4,409.14**	**13,861.82**

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

Projected Disbursements *(IBRD Loan)*	**FY10**	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**
Annual (US$ million)	498.59	687.5	862.5	637.5	637.5	426.41
Cumulative (US$ million)	498.59	1186.09	2048.59	2686.09	3323.59	3750.00

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 Bank policies? ***Ref. PAD IV.G.*** Have these been approved by Bank management? Is approval for any policy exception sought from the 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 enable Eskom South Africa to enhance its power supply and energy security in an efficient and sustainable manner so as to support both economic growth objectives and South Africa's long term carbon mitigation strategy.

Project description ***Ref. PAD II.D., Technical Annex 4***

Component A: IBRD support of about US$3,040 million for the financing of the Medupi coal-fired power plant (4,800 MW using supercritical technology). This loan will finance supply & install and construction contracts for the power plant and associated transmission lines. Interest during Construction, payable to IBRD and to other lenders to the project will also be financed by the proposed IBRD loan.

Component B: IBRD Support of about US$260 million for financing investments in renewable energy (Wind and Concentrating Solar Power Plants).

Component C: IBRD support of about US$440 million for other low carbon energy efficiency components comprising the Majuba Rail Project (railway for coal transportation) and a technical assistance program for improving supply side efficiencies.

As per the request from the Borrower, Eskom Holding, an allocation for US$ 9.375 million has been made to finance the US$ 9.375 million Front End Fee associated with the IBRD Loan.

Which safeguard policies are triggered, if any? ***Ref. PAD IV.F., Technical Annex 11***

The current assessment is that 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) and Projects on International Waterways (OP 7.50). The first three of 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. OP 7.50 is not included under OP/BP 4.00 (Piloting the Use of Borrower Systems) and issues related to international waterways have been addressed by application of specific Bank Policy - OP 7.50.

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

Board presentation: April 8, 2010
Loan/credit effectiveness: April 20, 2010
Closing date: October 31, 2015

Conditions for Effectiveness of the Loans:

(a) Standard Conditions;

(b) execution and delivery of the Guarantee Agreement, and all conditions precedent to its effectiveness (other than the effectiveness of the Loan Agreement) have been fulfilled;

(c) a special legal opinion satisfactory to the Bank of an independent counsel acceptable to the Bank in connection with certain aspects of the Guarantor's Anti-Corruption Legislation framework.

Conditions for Disbursement:

(a) Conditions for payments of Past Contracts under component 1 of the Project:

- the Bank's has to be satisfied that the contractor or sub-contractor who has been awarded a Past Contract was not debarred, or suspended by the Bank at the time when the contract award was made; and
- the Bank has determined that: (a) the amendments to the Past Contracts to include the Bank's Anti-corruption and right to audit provisions are in form and substance satisfactory to the Bank; and (b) its due diligence review of procurement decisions in connection with the Past Contracts has been completed in a satisfactory manner.

(b) Conditions for payments of Future contracts under component 2 of the Project:

- the Bank has to be satisfied that adequate funds are available to the Borrower to finance the second component of the Project from other sources than the Loan on terms and conditions consistent with the obligations of the Borrower under this Loan Agreement.

IBRD Loan Covenants:

<u>Specific Anti-Corruption Covenants for Past Contracts under Part A of the Project (Medupi Power Plant)</u>

(a) Except as the Bank may otherwise agree in writing, and with regard to all Past Contracts, the Borrower shall negotiate and amend each such contract to include the Audit Right and Fraud and Corruption Provisions in conformity with the Anti-Corruption Guidelines and as such provisions are reflected in the Bank's Standard Bidding Documents, including, *inter alia*, the definition of sanctionable practices included in the said Anti-Corruption Guidelines and Standard Bidding Documents and the Bank's right to sanction a firm or individual determined by it to have engaged in any such sanctionable practice during the bid, award or implementation of a given Past Contract.

(b) Without limitation upon the provisions of [paragraph 1 of this Section] and with regard to all Past Contracts:

(i) the Borrower shall promptly, by notice in writing, inform the Bank regarding any information in its possession, including non-frivolous allegations that reasonably may point to the possibility of the occurrence of any corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contract to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines or the relevant Anti-Corruption Legislation. To this end, all such information shall be provided to the appropriately named official(s) of the Bank;

(ii) the Borrower shall, following due consultation with the Bank, promptly take all appropriate action in accordance with the Anti-Corruption Legislation to commence an investigation in connection with the information referred to in sub-paragraph (i) of this paragraph and any information provided to the Guarantor by the Bank regarding allegations of corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contract to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines;

(iii) in the event that the investigation referred to in sub-paragraph (ii) of this paragraph

confirms that either a corrupt, fraudulent, collusive, coercive and/or obstructive practice has occurred, the Borrower shall promptly take timely and appropriate action to implement the findings of such investigation and enforce the applicable remedies, in accordance with the Anti-Corruption Legislation and share with the Bank evidence or any other information identified or discovered during such investigation in connection with any such contract, it being understood that the Bank will keep such information confidential in accordance with confidentiality procedures that apply to its own investigations;

(iv) the Borrower shall, in writing, adequately and regularly and, in any event, no less frequently than quarterly, commencing with the date on which such allegations were received by the Borrower, inform the Bank regarding any subsequent action taken pursuant to the investigation referred to in sub-paragraph (ii) of this paragraph, and the result of enforcement of any remedies referred to in sub-paragraph (iii) of this paragraph, including any monies that may be recovered as a result of such action; and

(v) in the event that the Bank may, pursuant to information referred to in sub-paragraph (i) of this paragraph, and investigations referred to in sub-paragraph (ii) of this paragraph, determine that a corrupt, fraudulent, collusive, coercive and/or obstructive practice, or any sanctionable practice has occurred in connection with any Past Contract, the Bank shall have the option, in its absolute discretion, to cancel the portion of the proceeds of the Loan allocated to such contract, or require the Borrower to reimburse any amount that has been disbursed out of the proceeds of the Loan under such Past Contract.

Environmental and Social Safeguards

1. The Borrower shall implement the Project in accordance with the provisions of the Environmental Legislation, the Social Legislation, the RODs, the EIA, the EMP, the RPF, the RAPs, if any RAPs are required in accordance with the RPF, and the provisions of this Agreement. Without limiting the generality of the foregoing, the Borrower shall exercise regular monitoring to ensure that emissions from the Medupi Power Plant remain in compliance with the provisions of applicable Environmental Legislation and all the terms of the ROD referred to in paragraph 206 of the SDR.

2. The Borrower shall:

(a) not later than June 30, 2013, develop, adopt and thereafter implement a program, satisfactory to the Bank, to install FGD equipment in each of the six power generation units of the *Medupi* Power Plant, taking into account technical, environmental and financial criteria in accordance with terms of reference to be discussed with the Bank, such program to be designed such that the installation of the FGD equipment for the first power generation unit shall commence on the later of (i) the sixth anniversary of the Commissioning Date or (ii) March 31, 2018 or such later date as the Bank may establish following consultations with the Borrower), and, thereafter, continue the installation of the FGD equipment sequentially, in each case thereafter at the time each of the remaining five power generation units is taken out of service for the first major planned outage, it being understood and agreed that all the FGD equipment for the six power generation units shall be installed and fully operational not later than December 31, 2021, or such later date as the Bank may establish following the said consultations with the Borrower; and

(b) afford the Bank a reasonable opportunity to exchange views with the Borrower on such FGD installation program at each of its preparation and implementation phases.

3. The Borrower shall refrain from carrying out any Project activity 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, Sere Wind Power and Majuba Rail and Transmission projects (all described under Parts B and C of the Project); 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.

4. 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.

5. The Borrower shall, not later than 45 days after the end of each calendar semester, furnish to the Bank reports in form and substance satisfactory to the Bank, showing the volume of the water available for the Medupi Power Plant, and the use thereof. The first such report shall be submitted to the Bank within six months of the Commissioning Date.

6. Except as the Bank shall otherwise agree, the Borrower shall not amend, abrogate or waive any provision of any of the RODs, if such amendment, abrogation or waiver may, in the opinion of the Bank, materially and adversely affect the implementation of the Project, or a substantial part thereof.

IBRD Guarantee Agreement (Government Undertakings):

Safeguards

The Guarantor specifically undertakes to:

(a) complete the Environmental Management Framework (EMF) for the Guarantor's Waterberg district in compliance with the Environmental Legislation;

(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;

(c) adopt the EMF and implement, the applicable policies and plans that are developed consequent to the said EMF, and cause other parties to implement their projects and activities in compliance with the guidelines for environmental management adopted through the said EMF, policies and plans;

(d) ensure that the Record of Decisions for the Medupi Power Plant, the Upington Concentrating Solar Power plant, the Sere Wind Power and the Majuba Railway and Transmission projects and, when it is issued, for the transmission system associated with the Medupi Power Plant, as well as the mitigation measures set forth and to be set forth therein, are implemented and adhered to;

(e) take timely action to ensure adequate supply of water to the Medupi Power Plant for the operations of the Borrower's six units, including the FGD units; and

(f) inform the Bank of, and consult with the Bank on, any proposal to modify any of the RODs if, in the opinion of the Bank, the application of such proposal would result in material and adverse environmental or social impacts upon the Project or any substantial part thereof.

Anti-Corruption

The Guarantor specifically undertakes:

(a) promptly, by notice in writing, to inform the Bank regarding any information in its possession, including non-frivolous allegations that reasonably may point to the possibility of the occurrence of any corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contracts to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines or the relevant Anti-Corruption Legislation. To this end, all such information shall be provided to the appropriately named official(s) of the Bank;

(b) following consultations with the Bank, to promptly take all appropriate action in accordance with

the Anti-Corruption Legislation to commence an investigation in connection with the information referred to in sub-paragraph (a) of this paragraph and any information provided to the Guarantor by the Bank regarding allegations of corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contract to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines;

(c) in the event that the investigation referred to in sub-paragraph (b) of this paragraph confirms that either a corrupt, fraudulent, collusive, coercive and/or obstructive practice has occurred, to promptly take timely and appropriate action to implement the findings of such investigation and enforce the applicable remedies, in accordance with the Anti-Corruption Legislation and share with the Bank evidence or any other information identified or discovered during such investigation in connection with any such contract; it being understood that the Bank will keep such information confidential in accordance with confidentiality procedures that apply to its own investigations;

(d) to adequately and regularly and, in any event, no less frequently than quarterly, commencing with the date on which such allegations were received by the Guarantor, inform the Bank regarding any subsequent action taken pursuant to the investigation referred to in sub-paragraph (b) of this paragraph, and the result of enforcement of any remedies referred to in sub-paragraph (c) of this paragraph, including any monies that may be recovered as a result of such action; and

(e) in the event that the Bank may, pursuant to information referred to in sub-paragraph (a) of this paragraph, and investigations referred to in sub-paragraph (b) of this paragraph, determine that a corrupt, fraudulent, collusive, coercive and/or obstructive practice, or any sanctionable practice has occurred in connection with any Past Contract, the Bank shall have the option, in its absolute discretion, upon notification to the Borrower and the Guarantor to cancel the portion of the proceeds of the Loan allocated to such contract, or require the Borrower to reimburse any amount that has been disbursed out of the proceeds of the Loan under such Past Contract.

Financial Undertakings

If the Borrower has failed to perform its obligation under the Financial Undertakings of the Borrower under the Loan Agreement, then the Bank may issue to the Borrower a notice pursuant to paragraph 7.02(b)(i) of the General Conditions (Notice of Suspension). If such failure to perform continues for a period of sixty days after such Notice of Suspension, then the Bank may issue to the Borrower a notice of default pursuant to paragraph 7.06(b)(i) of the General Conditions (Notice of Event of Acceleration). The Bank may, at any time thereafter, during the continuance of such event, notify the Guarantor of such default, continuance and potential acceleration, which notice shall include a period of one hundred and twenty days, or such longer period as the Bank may agree, if the Bank elects to make a demand upon the Guarantor.

INTRODUCTION

1. After several years of sustained economic growth in South Africa, supported by reliable and sufficient electricity supply, the country's electricity system has fallen under considerable strain. Major capacity constraints came to a head in late-2007/early-2008 seriously affecting the performance of the overall economy. The impact on the country's economy was immediate, driving increased unemployment with the associated poverty impacts, forcing businesses to close, and leading to shutdown of the largest mine operators, thus putting thousands of additional jobs at risk. This led to a downward revision of GDP growth (see Paragraph 29), a trend reinforced by the global financial/economic crisis. The energy crisis of 2007/08 also had serious consequences for the Southern African region as a whole, which has long relied on South Africa for electricity supply, trade, and investment.

2. In response to the supply shortfall, Eskom Holdings (parastatal utility) has embarked upon an Investment Program that entails an investment commitment of US$50 billion over a 5-year period. The new generating capacity (part of it to be supported by the proposed project) when commissioned will account for nearly 12.5 percent of the current generation capacity in South Africa. Any delay in its implementation will have serious impacts on the ability of the South African government to continue expanding electricity access to the remaining nearly 20% of the population that remain unconnected today as power generation would be too severely constrained. Delays would also severely impact on the South African economy as well as the sub-region (Paragraph 30).

3. In pursuing this investment, the Government of South Africa (GoSA) is also acting on the country's commitment to the climate change agenda which requires prompt transition to a low carbon economy. Consistent with this, South Africa has made a number of commitments to low carbon growth, including: signing the Kyoto Protocol, adopting a national Climate Change Response Strategy, issuing regulations for energy efficiency and incentivizing private participation in clean energy, issuing air quality standards, and adopting a renewable energy target of 1,667 MW equivalent of electricity demand by 2013. Further, in 2008, the Cabinet endorsed South Africa's Long Term Mitigation Scenario which targets 34 percent reduction in emissions by 2020 and 44 percent reduction by 2025.[1] This credible commitment takes account of urgent generation expansion, while committing to an aggressive program to lower the carbon trajectory through energy efficiency, demand side management, and adopting renewable and nuclear energy. The present project, as well as the longer term partnership envisaged between the government of South Africa and the World Bank will enable the country to achieve a low carbon trajectory.

4. However, as this PAD will demonstrate, South Africa has no viable alternative to coal in seeking to meet urgent generation needs. Further, the massive financing needs, compounded by the constrained fiscal space as a result of the downturn, calls for IBRD's unprecedented support as a "lender of last resort."

5. The economic and development rationale for the proposed project is strong and straightforward. Faster GDP growth has been the main policy platform of successive post-apartheid governments, to which the current Government has added a stronger emphasis on job creation and more shared growth. Neither objective is meaningfully attainable without tackling the manifest electricity crisis, which clearly demonstrated that the economy had plateaued at existing energy supply levels. While the global economic crisis temporarily eased the supply-demand gap in electricity generation, electricity shortages, unless urgently addressed, are bound to hold back growth and, even more significantly, job creation.

[1] The ministers of energy and public enterprises have publically reiterated GoSA's strong commitment to meeting long-term climate change objectives and advancing renewable energy (Press Release of March 12, 2010).

Box 1: Energy, Employment, Poverty Reduction and Improved Welfare

Electricity as a necessary condition for growth. South Africa has one of the most energy-intensive economies among the Middle Income Countries (MICs) – this was amply demonstrated by the 2007/08 power crisis, which proved to be a controlled experiment to assess the importance of adequate electricity for growth. Almost overnight, the country experienced major load-shedding, causing serious economic disruption with associated social impacts. Thousands of jobs were lost and GDP growth fell to 1.7 percent in 2008Q1, the lowest in more than six years, as mining output fell 26 percent, the sharpest decline on record, and manufacturing by 0.6 percent. It has been estimated by the consulting firm Deloitte that a 10 percent drop in electricity supply would have reduced GDP by 0.6 percent in 2008 followed by a 1.2 percent drop in 2009. In addition, according to the 2009 Investment Climate Assessment, the power outages in South Africa not only undercut growth, they also make production less labor-intensive. It follows then that as the economy recovers from the global crisis, without additional generation capacity, electricity supply will become a "binding constraint" to growth and job creation. In other words, the economy will plateau and additional jobs will not be created: a dangerous scenario for a country with high unemployment and high instances of social disquiet arising from pervasive exclusion.

Good growth, underpinned by reliable electricity supply, has proven to be a partially effective, albeit far-from-sufficient, instrument for tackling the high unemployment and widespread poverty in South Africa. The unemployment rate fell from 27.1 percent in 2003 to 21.9 percent in end-2008, as 1.7 million jobs were created, benefitting from average GDP growth of 5.3 percent during 2004-07. The poverty rate, too, fell from 58 percent to 48 percent between 2000 and 2005, according to the Presidency, although social grants also played an important role: income inequality remained persistent at very high levels, and, according to one estimate, rose between 1995 and 2005. Even just returning to the former 4-5 percent growth path, with attendant benefits for poverty reduction and job creation, now hinges on additional supply of electric power.

Adequate electricity supply, while necessary for growth, employment creation, and poverty reduction, would by no means be sufficient. The unemployment rate before the power and financial crises may likely have already been close to equilibrium levels (Banerji et al, 2008). In that sense, closing the electricity gap, by itself and within the existing policy environment would still not reduce unemployment rate significantly. Reaching a growth path that creates jobs more rapidly and reduces inequality would also depend on a number of other policy interventions, which the GoSA has currently prioritized. These include urgently needed improvements in skills development and the investment climate for more rapid growth in small and medium enterprises, addressing the challenges of the 'geography of apartheid' in urban areas as well as land reform, to name but a few. In addition, the 2010 budget includes proposals for subsidizing the hiring of younger workers without previous experience. This would lower the cost and risk of hiring somebody inexperienced, while also allowing the young worker to benefit from on-the-job learning opportunities. The policies and implementation mechanisms that are needed to attain these "sufficient conditions" for the sustained reduction of poverty and inequality are complex and are currently being shaped by a vigorous process of political consensus-building and policy formulation within the government, which the World Bank Group is supporting through technical assistance and advisory services.

Access to electricity as a basic need: South Africa's mass electrification program started from the implementation of the Reconstruction and Development Programme (RDP) in 1994. Infrastructure development, and broader access to electricity supply in particular, has been held to be the key link from growth to broader social development (See Table 1). Since electricity supply was not constrained until the power outages of 2007/08, its provision was seen more as an issue of basic need and equity than of growth. Household electrification increased from 34 percent in 1993 to 81 percent in 2007. However, the pace of new connections has declined more recently in large part because of lack of generation capacity. Expanding generation, is therefore key if the Government's objective of universal coverage has to be met within a reasonable time period. How did the electrification program improve the lives of those with new connections? A 2008/9 study by the Department of Minerals and Energy (DME) based on a survey of 3,960 households in the Limpopo, Eastern Cape, and KwaZulu Natal provinces provides some insights. Evidence shows that access to electricity noticeably improved the lives of people. Educational outcomes improved, as children (along with women) were spared the task of collecting wood and other fuel, allowing time for study. More opportunities for income generation were created, as the option of cooling allowed enterprise in perishable items. Communities felt safer at night as a result of street lighting. Interestingly, studies found that while households switched from dry-cell batteries and paraffin to electricity for lighting and powering entertainment appliances, they maintained widespread use of firewood for thermal energy use – mostly due to the high cost of appliances and their heavy electricity usage, which raised the electricity bills prohibitively for households. The electrification program also generated a total of almost 33 thousand jobs between 2001/02 and 2008/09.

6. With unemployment in the 24-31 percent range (depending on the measure used), serious service delivery backlogs, and a very high prevalence of HIV/AIDS, the sense of exclusion and deprivation is palpable among large segments of the citizenry, unmistakably highlighted in a series of recent street protests in urban townships. Increased electricity generation in the coming years is essential if access to electricity is to be expanded to the remaining nearly 20% who still today do not have such access. Electricity is critical if job creation is to be resumed in small and medium sized businesses, in the manufacturing sector, through self-employment opportunities, as well as in the

proven mining industry. Given the vast number of unemployed, mostly youth, this represents a key priority for the country. Further, in view of South Africa's dominance in Sub-Saharan Africa, reliable and expanded electricity generation is just as critical to the development outcomes of the region as a whole.

I. STRATEGIC CONTEXT AND RATIONALE

A. Country and sector issues

Country Context

7. 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 (see Table 1 below). 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.[2] Notably, South Africa is a leader in Africa's dialogue and position on climate change and has taken a leadership position in co-drafting and signing the Copenhagen Accord (COP 15).

Table 1: Access to Electricity and Water

Households	1996	2001	2007
Using Electricity (%)			
for lighting	58	70	80
for cooking	47	51	67
for heating	45	49	59
Water (%)			
Equivalent to or above RDP standard (200 m to communal tap)	62	74	88
Tap in dwelling or on site		61	70
Sanitation (%)			
Equivalent to or above RDP standard	52	59	73
Flush toilet		52	60

Source: "Towards a Fifteen Year Review," Policy Coordination and Advisory Services (PCAS), the Presidency, South Africa.

8. 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 priorities GoSA. 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,[3] pockets of poverty remain deeply entrenched mostly among the black

[2] 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.

[3] 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.

population, whose median income is just 8 percent of the median white South African.[4] 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.

Economic and Social Development: Past Performance and Critical Challenges

9. **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. The GDP grew from an annual average of 1 percent in the decade preceding 1994 to 2.7 percent during 1994-98 and 4.1 percent during 1999-08, resulting in a 50 percent increase in GDP in the latter period. This took South Africa's per-capita Gross National Income (GNI) to just under US$6,000 in 2008, further consolidating its position in the ranks of Upper Middle-Income Countries (UMIC).

10. **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 for the first time in 2007/08, causing central government debt to fall from 46 percent of GDP in 1994 to 27 percent in 2008. At the heart of the fiscal achievements were dramatic improvements in revenue collection resulting from a more efficient South African Revenue Service (SARS).[5] Exemplary expenditure management also proved important. The 2008 Open Budget Index prepared by the International Budget Partnership ranked South Africa second after the United Kingdom, ahead of France, New Zealand and the United States.[6,7] Acknowledgement of this record by global investors has enabled the country to tap into international bond markets with reasonable sovereign risk spreads.[8]

11. **Fiscal space generated through budgetary discipline was prudently used for pro-poor and infrastructure-related expenditure.** Access to basic expenditure expanded such as education, health, housing and sanitation. Increased capital spending has focused on improving the provision of basic utility services to schools and clinics, and construction, rehabilitation and maintenance of national and provincial roads. The social grant system has seen a dramatic increase in coverage: from 2.5 million beneficiaries in 1999 to over 13 million in 2009. The grants are mostly for child support (where coverage increased from just 34 thousand in 1999 to 9.1 million beneficiaries in 2009), foster care, care dependency, disability, and old age.[9] Other forms of welfare payments include conditional grants for school feeding and early childhood development, and free health care and nutrition programs for the poor, and reach about 12 percent of the population.

12. **South Africa's economic achievements spread well beyond its borders to the rest of Sub-Saharan Africa**. It is by far the largest economy in the region (see Box 2 and Figure 1) accounting for nearly a third of the SSA's GDP and two-thirds of Southern Africa's GDP. Studies have shown that a one-percent growth of South Africa's GDP is associated with a 0.4-0.9 percent growth of the GDP of

[4] Although researchers mostly agree that poverty did go down in the first half of the 2000s, there is considerable disagreement over the extent of the decline and to what extent these gains were on account of increased expenditure on social grants.
[5] Revenue collection quadrupled and the number of taxpayers more than doubled between 1996 and 2006.
[6] These five were the only countries in the 2008 Open Budget Survey that provided "extensive budget information."
[7] South Africa was commended by the report for the independence of its supreme audit institution, and also fared well in terms of legislative strength.
[8] South Africa successfully raised US$2 billion between May and August 2009 and US$1 billion in February 2010 from global bond markets for 10-yr maturities.
[9] Studies have shown the social grant system to be well targeted, with 62 percent of the total going to the poorest 40 percent of households. By 2005, social grants contributed up to 90 percent of the incomes of individuals in the first two deciles.

the rest of SSA, independent of common regional shocks. South Africa's influence is transmitted via its dominant stake in the intra-regional trade flows, significant direct investments, and the strong and growing presence of its banking sector in southern Africa.[10] As noted, South Africa also provides regional leadership at various multilateral fora, including the recent emergence of its influence on climate change discussions. Its influence is especially felt in the Southern Africa Customs Union (SACU) countries which, in addition to benefiting from access to its sizable market, also rely heavily on transfers from South Africa of import tariff revenues. A negative shock in South Africa will therefore have particularly adverse effects on its neighbors, with the effect being far stronger than that of a positive shock to growth. South Africa also dominates the regional electricity market through Eskom, which generates 95 percent of the country's needs and currently provides a significant share of the power needs for neighboring Botswana, Lesotho, Namibia, Swaziland, and Zimbabwe.

Box 2: South Africa's Importance to Regional Growth

Economic conditions in South Africa have important spillover effects on its neighbors, and indeed, on Sub-Saharan Africa (SSA) as a whole. The channels through which the South African economy contributes to the economic growth of regional neighbors are varied. The most obvious link is through greater cross-border trade. South Africa is the leading exporter and importer in intra-regional trade with nearly all countries in the region. Trade with South Africa accounts for around three-quarters of the total trade of neighboring Lesotho and Swaziland, and for a quarter to one half of that of the other neighbors, including Botswana, Malawi, Mozambique, Namibia, Zambia and Zimbabwe.

Investment flows from South Africa to the region are another important channel. Flows to SADC countries have grown in recent years, from US$1.1 billion in 2001 to US$3 billion in 2006. South African Foreign Direct Investment (FDI) accounts for a significant share of the total inward FDI stock in a number of its neighbors: Mozambique (27 percent), Malawi (18 percent), Mauritius (17 percent); and Botswana (16 percent). While South African FDI has traditionally flowed to primary and extractive industries, investments have become increasingly diversified, with a growing focus on services. South Africa's investments are also reaching geographically more distant economies, and their impact is enhanced by the fact that South African-owned firms export more intensively than domestically-owned ones and are more productive (Isik, G. and Y. Yoshino, 2009).

SOUTH AFRICAN TRADE IN SOUTHERN AFRICA

Country	Exports to RSA (% of total)	Imports from RSA (% of total)
Angola	1.5	7.1
DRC	0.4	17.4
Malawi	12.3	35.6
Mauritius	1.7	10.3
Mozambique	14.9	41.9
Tanzania	2.7	12.0
Zambia	21.4	51.5
Zimbabwe	33.4	57.9

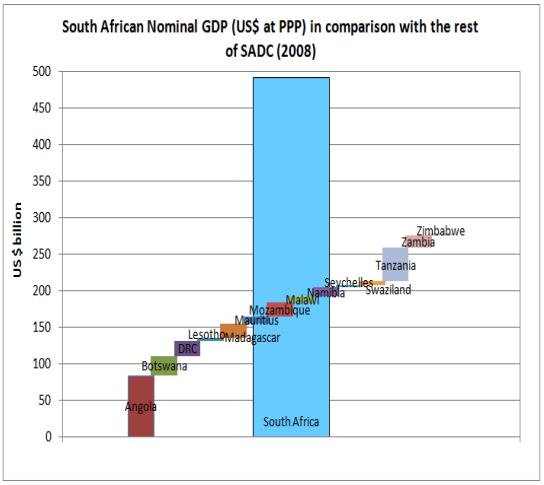
2007 data, IMF

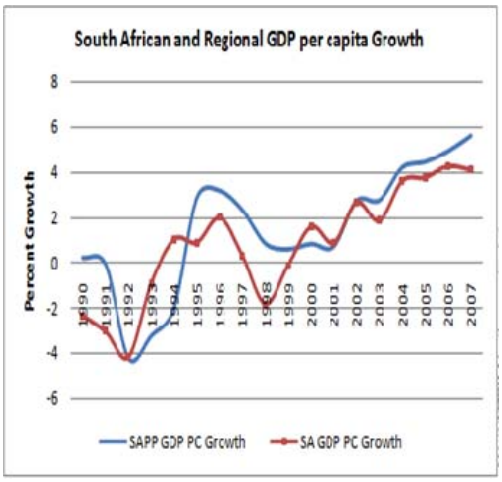
There are other channels as well of South African regional influence. Financial linkages, remittance income (Lesotho receives the highest share of GDP in remittances, at 28 percent, mostly originating from South Africa), technological diffusion through trade or proximity, migration and knowledge flows are all candidates for causal spillovers. Moreover, because of South Africa's size and leadership role in multi-country political and economic initiatives, developments there are likely to influence business and consumer confidence and economic sentiment in other African countries.

While South African growth is highly correlated with regional growth, this relation is likely to be strongly asymmetric (A. Behar, 2008). Countries which experience negative shocks have particularly adverse effects on their neighbors, with the effect being far stronger than that of a positive shock to growth. The negative impacts of a sharp reduction in growth, such as will certainly be experienced if investments in South Africa's power sector are further delayed, will not be contained within South Africa, but are likely to generate secondary impacts on neighboring countries. Given growing integration, as evidenced by larger trade and FDI flows from South Africa reaching more countries and sectors in region, the impact is likely to be very significant.

[10] The Southern Africa Region includes member countries of the Southern Africa Development Community, namely Angola, Botswana, Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. All of these, with the exception of the island countries of Madagascar, Mauritius and Seychelles, constitute the Southern African Power Pool (SAPP).

Figure 1: South Africa, the Economic Powerhouse of Southern Africa





13. **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 31 percent counting the category of "discouraged" workers—which is among the highest in the world.[11] 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.[12]

14. **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. For instance, South Africa's educational outcomes in terms of reading and mathematics scores are modest compared to, for example, Kenya and Tanzania. Similarly, the ZAR34 billion (or about US$5 billion) investment in free housing for the poor has lost a third of its value, because the housing was built in remote and economically unattractive areas. South Africa continues to battle a dual epidemic of TB and HIV/AIDS, despite increased allocation of fiscal resources. In 2007, South Africa had among the highest HIV/AIDs (affecting 18 percent of the population between the ages of 15 and 49 years), TB prevalence rates and number of TB-related deaths in the world, according to the World Health Organization. Unfortunately, these developments undid progress on longevity, as life expectancy at birth fell from 62 years in 1995 to just 50 years in 2007.

15. **South Africa is also highly vulnerable to climate change.** Its impact on human health, agricultural production, plant and animal biodiversity, water resources, and rangelands. 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.[13]

[11] 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.
[12] 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.
[13] Higher than Brazil only if emissions from land use changes are excluded.

The Government's Response

16. **The Government is fully aware of the criticality of employment creation,[14] 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. For that, quick action on electricity generation is a "necessary condition," as starkly demonstrated by the power crisis of 2007/08. The Government has rightly acknowledged that growth will also need to be much more inclusive, with far greater emphasis on job creation.[15] Accordingly, it has sought to play a more proactive role in promoting, through tax and other incentives where necessary, more labor-intensive activity in manufacturing and services, complemented by opportunities for skills development and learning. The policies and implementation mechanisms that are needed to achieve these "sufficient conditions" for sustained reduction of poverty and inequality are inherently complex. They are currently being shaped by a vigorous process of political consensus-building and policy formulation within the government, and keenly followed by the media, civil society organizations, workers unions, and other stakeholders.

17. **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 UNFCC 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.

Recent Economic Developments: Impact of the Global Economic Crisis

18. **Up until late 2007, the South African economy was doing well.** GDP growth exceeded 5 percent for a third year running, bolstered by strong domestic demand, robust construction activity, and a marked pick-up in services and manufacturing. The widespread power shortages in late 2007/early 2008, together with a slowing global economy and lagged effects of earlier monetary tightening in an environment of high household indebtedness, had, however, undercut the country's growth prospects by the end of 2007. The FY09 budget, presented in February 2008, had reduced the growth projections from 5 percent in 2007 to 4 percent in 2008 and 2009. Close to one-half percentage point of that reduction growth could be attributed to electricity shortages, according to a 2009 study by Deloitte on South Africa's electricity sector.

19. **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** (See Annex 1 for a more detailed discussion of the recent economic developments). News of GDP growth of 0.9 percent (quarter-on-quarter, seasonally adjusted and annualized) in 2009Q3 came as a welcome respite following three consecutive quarterly declines during 2008Q4-2009Q2. Growth for 2009 has been estimated at negative 1.8 percent in the 2010 Budget. The decline in economic activity, albeit widespread, has been particularly sharp in manufacturing and mining,[16] as the demand for the

[14] As per the 2009 MTBPS of the Government, "*Creating jobs, particularly among millions of relatively unskilled South Africans, is the country's greatest economic challenge.*"

[15] Overall, the current Government has accorded the following areas its highest priority: (i) more inclusive growth, especially employment creation; (ii) skills development and enhanced quality of education; (iii) improved health care; (iv) rural development, food security, and land reform; (v) fight against crime; and, (vi) regional cooperation and development. .

[16] Manufacturing output fell by 14.5 percent January-October 2009 relative to the same period in 2008, while mining was down 7.3 percent over this time period.

country's exports plummeted, commodity prices fell sharply[17] 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, the unemployment rate increased from 21.9 percent in 2008Q4 to 24.3 percent in 2009Q4, corresponding to a loss of 870,000 jobs.[18]

20. **Fortunately, South Africa entered the downturn with a sound macro/fiscal position, enabling aggressive countercyclical fiscal and monetary responses**.[19] In particular, fiscal space generated by several years of budgetary discipline and low public debt, 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 2008/09 and 2009/10, this caused the fiscal balances to worsen from a surplus of 1.7 percent of GDP in 2007/08 to a deficit of 7.3 percent of GDP in 2009/10: the ratio of public sector borrowing requirements to GDP in the meanwhile increased from 0.3 percent to 11.8 percent. The 2010/11 budget purports to extend the expenditure trends, by proposing a R846 billion infrastructure investment plan for the FY11-13 period, R454 billion of which would be incurred by large State Owned Enterprises' (SOEs) (including R309 billion by Eskom and R49 billion by Transnet) with substantial cover in the form of government guarantees.[20] 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 growth.[21] The budget deficit and public sector borrowing requirement would fall to 6.2 percent and 11.1 percent, respectively, in 2010/11 and further to 4.1 percent and 7.1 percent, respectively, by 2012/13.

21. **Prompted by the economic slowdown and improving outlook for inflation, South African Reserve Bank (SARB) has slashed the repurchase rate by 500 basis points since December 2008**. At 7.0 percent, the repo rate is at its lowest since June 2006. CPI inflation has been hovering around the 6 percent mark since October 2009, when it slipped within SARB's 3-6 percent target range for the first time in 30 months, benefiting from a strong Rand and subdued spending by the private sector. Nonetheless, SARB's Monetary Policy Committee remains cautious. It has left interest rates unchanged since August 2009, citing looming electricity tariff increases and double-digit wage increases earlier in the year as the downside risks.

22. **The strong macroeconomic response by the authorities and the improved global economic environment has eased the economy out of recession, although the recovery remains fragile**. Growth is projected to improve gradually, from negative 1.8 percent in 2009, to 2.3 percent in 2010 and further to 3.6 percent by 2012. Economic recovery remains tentative and uneven, however, particularly on account of continued weakness in domestic private sector demand.[22] Private credit fell for the first time in over 40 years in October of 2009 as households continued to deleverage under the burden of high indebtedness despite lower interest rates. It is especially worrying that private sector

[17] Despite strong recovery in the past few months, most commodity prices remain below their pre-crisis levels.
[18] A broader definition of unemployment, including discouraged workers, saw an increase from 26.7 percent in 2008Q4 to 31.1 percent in 2009Q3.
[19] The framework for South Africa's response to the crisis was discussed and agreed upon by Government, labor, and business, 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.
[20] Other areas of emphasis in the budget include employment programs, social security benefits, health, education, fighting crime, and rural development.
[21] Public expenditure is projected to grow at around 2 percent per year over the FY11-13 period, compared with 7.2 percent growth during FY06-09.
[22] Household spending fell for the 5th consecutive quarter in 2009Q3, reaching 61 percent of GDP, the lowest since 1994Q1.

confidence in economic recovery is still to develop, causing it to shy away from fixed investment.[23] In addition, mining exports have weakened despite record gold prices and strong recovery in platinum, on account of structural issues at mines and a strong Rand.

23. **South Africa's external and financial sectors remain robust despite the global crisis**. After an initial dip, foreign portfolio investment has recovered strongly, comfortably covering South Africa's large current account deficit (7.1 percent of GDP in 2008 and 4.3 percent of GDP in 2009). Foreigners net purchased over US$10 billion worth of equity on the Johannesburg Stock Exchange in 2009, exceeding the net outflow of about US$6.3 billion in 2008. In addition, a slump in imports and a mild recovery in exports have ended a prolonged period of trade deficit, taking considerable pressure off the current account. These developments on the BOP have led to a full recovery in the value of the Rand against the major currencies: the Rand/US$ rate and the nominal effective exchange rate stand firmer today than at end August 2008, just before the onset of the global crisis.[24] FDI has also been strong, with net inflow of $3.7 billion in the first three quarters of 2009, reflecting in large part investments in telecommunications. Gross external debt stood at a comfortable 26 percent of GDP in September 2009 and less than 100 percent of exports of goods and services.[25] Leaning against the wind to prevent excessive appreciation, SARB accumulated international reserves, taking gross reserves from $34.1 billion at end-2008 to $39.5 billion at end-January 2010.

24. **South African banks remain in a sound position, benefiting from limited exposure to foreign currency debt and more disciplined lending practices ensured by the National Credit Act of 2007.** According to a recent SARB Supervision Report, local banks' capital-adequacy ratio increased from 11.8 percent to 13 percent over 2008 and liquid assets held by banks exceeded statutory requirements throughout 2008. Implementation of the Basel II process has been of high quality. The ratio of non-performing loans (NPLs) to loan advances increased from 2.8 percent in July 2008 to 5.5 percent in August 2009 as a result of the crisis, but remains manageable.

<u>The Electricity Sector in South Africa's Development Strategy</u>

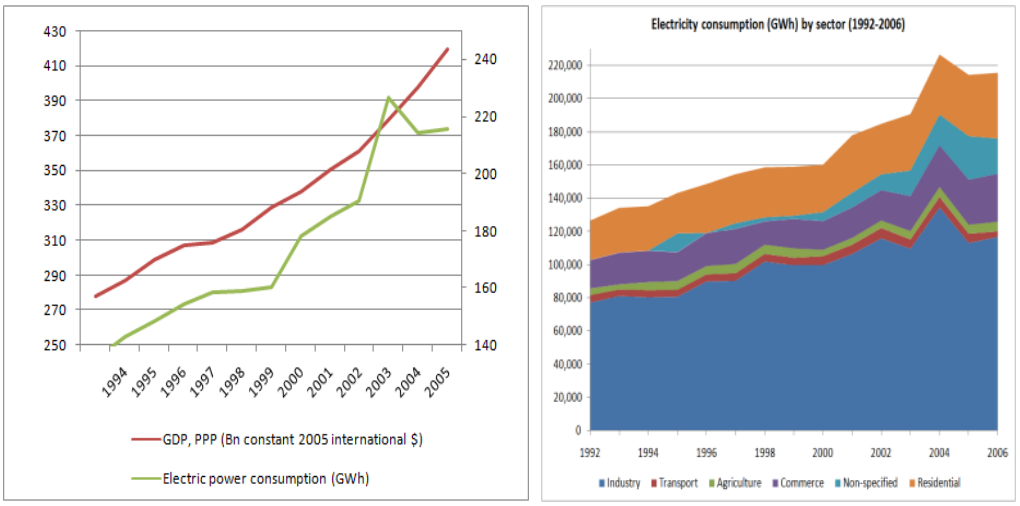
25. **The GoSA's mass electrification program has been a success as a means of meetings citizens' basic needs**. The program started in 1994 with electrification levels of 34 percent, and reached an 81 percent level of electrification by 2007. This large scale electrification took place without any significant additions of new generation capacity. In 2003, the GoSA launched the Free Basic Electricity (FBE) policy, which envisaged provision of a minimum of 50 kWh of free electricity per month to the poor. At present, the FBE covers approximately 3 million households; 1.2 million of whom are customers of Eskom (mostly in rural areas) with the remainder served through municipal distribution companies. In addition, there is a lifeline tariff based on cross-subsidies for consumers utilizing less than 350 kWh per month.

26. **Availability of affordable and reliable power supply has been essential to propelling South Africa's economy.**[26] As shown in Figure 2, electricity consumption increased by 60 percent between 1994 and 2006, responding to the demands of the mass electrification program, a 50 percent cumulative increase in real GDP, and rapid urbanization.[27] Residential consumption of electricity, one-fifth of total consumption, grew by 50 percent, as access to electricity multiplied and rising

[23] Gross fixed capital formation by private sector fell by 14.1 percent in 2009Q3, following declines of 16.8 percent and 9.4 percent, respectively, in Q1 and Q2 of 2009, as firms feverishly ran down inventories rather than invest in production expansion to meet demand; in an apparent lack of confidence in the durability of the recovery.
[24] Among the emerging markets, in 2009 the Rand's recovery against the US$ was second only to the Brazilian Real's.
[25] The Institute of International Finance, January 22, 2010, "South Africa: Looking Beyond the World Cup."
[26] The energy sector, electricity in particular, plays a critical role in the South African economy. The sector directly accounts for 15 percent of the country's GDP and employs close to 250,000 people.
[27] The urbanization rate in South Africa increased from 50 to 62 percent in the last decade.

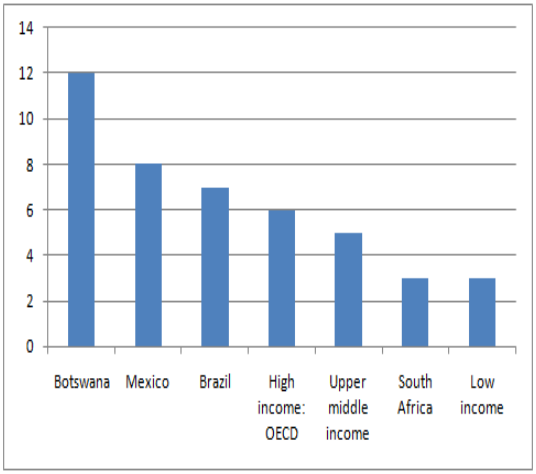
income levels and urbanization saw greater use of electricity in people's lives. Industrial consumption which accounts for 60 percent of total power usage, rose by 55 percent over this period.

Figure 2: Power Supply and Gross Domestic Product[28]



27. **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.[29] South Africa is a globally leading producer of gold and platinum, and the production cycles (extraction, processing, and supply) of both are highly energy-intensive. Even in a slow GDP growth scenario, electricity demand is expected to exceed supply around 2013 (without the proposed project); thereafter a shortage of electricity will negatively impact on households, the provision of basic services, small business and industry, manufacturing and mining activities in the country.

Figure 3: GDP per unit of energy use (constant 2005 PPP $ per kg of oil equivalent)

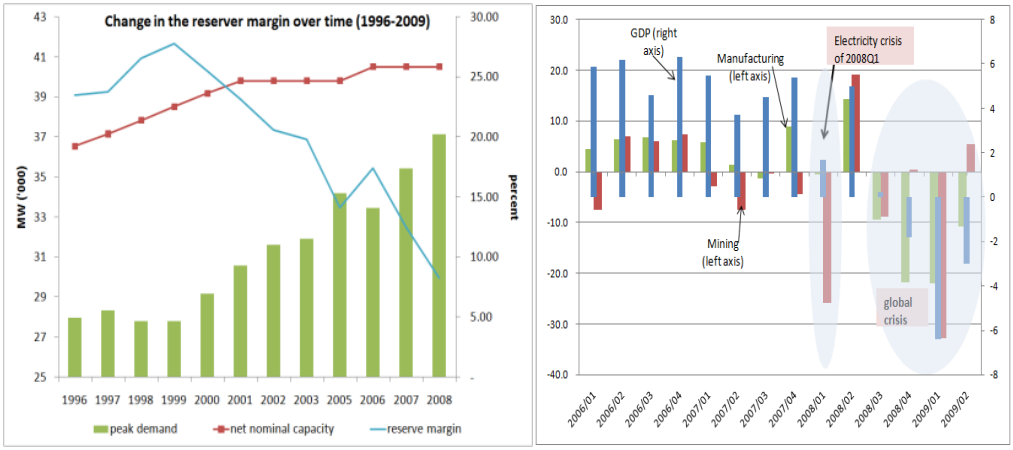


[28] In the first figure, the left y axis represents the GDP and the right y axis represents the power consumption in '000 GWh.
[29] Mining constitutes only 7 percent of GDP, but plays a much more significant role through its contribution of intermediate goods for the next stage of production.

28. **The strong growth in electricity demand unfortunately was not matched on the supply side.** No significant new generation capacity came on-stream in the new millennium. The private sector showed little interest to invest for a variety of reasons,[30] namely: (i) slow structural reforms in the electricity sector and hesitant progress towards market-based supply in light of the California Electricity Crisis of 2000 and other similar failures of competitive market-based reforms in developing countries; (ii) withdrawal from international markets by traditional power sector investors during the post-Enron bankruptcy period in 2001; (iii) low electricity prices prevailing in South Africa adversely impacting financial viability of new investment; and (iv) the GoSA's incomplete policy compendium, which made large-scale investing in the power sector more risky and generally unattractive. Hence, not surprisingly, peak demand caught up rapidly with the country's generation capacity, which caused Eskom's reserve margins to fall to dangerously low levels by the end of 2007.[31] Whereas the appropriate level of reserve margin for South Africa is considered to be around 15 percent by Eskom, it was down to 6 percent by early 2008.

29. **By the end of 2007 generation capacity fell far short of peak demand.** This led to immediate load-shedding by Eskom to prevent the system from complete collapse, which continued until early February 2008.[32] As discussed earlier, the impact of the power crisis on the country's economy was serious and immediate. GDP growth fell to 1.7 percent (quarter on quarter, seasonally adjusted and annualized) in the first quarter of 2008, its lowest level in more than six years. Mining fell 26 percent, its sharpest decline on record, as key mining operations were shut down for two weeks, and manufacturing fell by 0.6 percent (see Figure 4).[33] A study by Deloitte found that a permanent drop of 10 percent in electricity supply would have reduced GDP by 0.6 percent in 2008 and by 1.2 percent in 2009.[34] (see Figure 4 below).

Figure 4: Change in Electricity Reserve Margins & Impact on GDP & Manufacturing



[30] Electricity investment with private participation equaled US$1.3 billion in South Africa over 1995-2007; in comparison, Mexico invested US$10 billion and Brazil US$70 billion with private participation.

[31] This level is similar to the reserve margins California experienced during its emergency period that caused rolling blackouts and threatened the stability of the grid. With such low reserve margins, and fearing a nation-wide blackout, Eskom was forced to postpone taking plants out of service for regular maintenance. Deferral of asset maintenance exacerbated the energy shortages by increasing equipment failures and decreasing overall plant reliability.

[32] Eskom implemented a number of measures during the crisis to lower overall demand by a target level of 3,000 MW. Actions included: (i) power rationing (as a first line of defense) and associated penalties for exceeding rationed amounts; (ii) a program of energy efficiency measures; and (iii) customer awareness campaigns. Voluntary measures to encourage use of alternate sources of energy are also being deployed. Eskom has plans to subsidize households that install solar energy heating systems.

[33] Mining production in 2008Q1 was also negatively affected by industrial action and unscheduled mine closures due to safety concerns. In addition, rising input prices and higher interest rates also served to dampen growth.

[34] Eventually, according to the study, the growth impact would subside as the economy moves to more efficient and less energy-intensive production patterns.

30. **Electricity shortfalls in South Africa also hurt the economic development of the region, which depends on South Africa for its electricity**. A number of Southern African countries, such as Botswana, Namibia, and Zimbabwe, have long relied on Eskom-generated electricity supplies from South Africa. About 70 percent of Botswana's power requirements were met through imports from Eskom in 2008. South Africa's energy crisis has resulted in energy shortfalls in these countries; for example has started regular load shedding, which will worsen as deficits grow until it's domestic capacity comes online. Less reliable electricity is also expected to lead industries and small and medium enterprises (SMEs) to invest in self-generation, which will reduce competitiveness by increasing production costs.

The Government's Power Sector Development Strategy

31. **Universal electrification, backed by affordable and reliable power supply is the cornerstone of the Government's sector development strategy.** The electricity crisis halted the good progress achieved on universal electrification and results slowed in 2007/08 as a result of crisis. The program has been set back by at least a year from the target 100 percent achievement planned for 2013. The crisis reinforced the need to urgently implement Eskom's medium-term investment program. It became apparent that the economic and social cost of inadequate electricity supply was unacceptably high. Moreover, a government faced with spending pressures related to job creation, social protection, service delivery improvement, and infrastructure development could ill-afford to risk losing fiscal revenues resulting from a slowdown in growth.

32. **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.

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

34. **For the longer term, GoSA's policy response accounts for coal being dominant in the generation mix.**[35] Coal is abundantly available to South Africa for large-scale power generation, especially considering the country's need to add over 12,000 MW over the next 5-7 years. 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. The greatest potential for large renewable projects is limited to CSP and to a lesser extent wind; new hydropower potential is largely non-existent. CSP has the potential for substantial scaling-up, and matches most closely with the need for baseload power. However, the technology has not yet reached the gigawatt scale (to meet the large baseload capacity requirements of South Africa), and is currently costly, with significant risks for a country facing a demand-supply imbalance and the

[35]About 87 percent of all electricity generated in South Africa comes from coal-fired power plants. The remainder of generation comes from hydropower plants (including pumped storage, using unused coal capacity during off-peak times), liquid-fueled plants and one nuclear plant.

incremental costs of meeting the new generation needs, estimated at billions of dollars. Wind energy is a commercially mature renewable energy technology, but remains underexploited in South Africa and because it is intermittent, is not well-suited to meet baseload requirements. Current estimates of wind power potential are in the range of 4,000 MW along the East and West coasts of South Africa.

35. **There are no feasible near-term regional renewable 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. The main reasons for the shortages are:

- South Africa dominates the SAPP, accounting for nearly 78 percent of the capacity and about 85 percent of energy generation and is a net exporter to 6 countries. South Africa's troubles with adequate power generation will quickly spread and affect the SAPP countries.
- Demand far exceeds available capacity. New capacities were not added in the last decade while the demand grew, straining the older units whose reliability decreased at the same time. The growing demand exceeded available capacity and eroded the reserve margins . South Africa's crisis - a shortfall of about 7,000 MW (or 20 percent of peak demand) forced load shedding, blackouts, and curtailed exports. Therefore, Eskom is unlikely to maintain exports to SAPP countries over the medium-term.
- The rest of SAPP is too small to handle the solutions alone. The available capacity in the rest of SAPP (about 9,000 MW) is not sufficient to cover short-falls and the transmission system and links are not adequate or flexible to handle shifts of large amounts and directions of power flows. More than 95 percent of the energy in the SAPP network is consumed within the producing countries and the trade / exports are relatively small. South Africa's energy crisis caused ripple effects in the SAPP, especially in Botswana and Namibia.

36. The demand forecasts for the SAPP countries (2008-25) indicate growth at an average annual rate of about 2.9 percent, which is similar to the historical rate of about 2.8 percent growth during (1998-2006). The SAPP system optimization plan prepared by SAPP consultants (Nexant, USA) indicates that about 39,000 MW of additional capacities are needed across SAPP through 2025, of which 22,000 MW (or 56 percent) would be needed in South Africa alone. A part of these new additions will replace about 12,000 MW of old units, especially coal power plants. The specific projects were selected through an optimization model which considered 93 power plant candidates by the SAPP utilities, as well as about 90 transmission links and interconnections associated with specific generation projects. Of the 39,000 MW new additions through 2025, 11,000 MW would be hydro and 28,000 MW thermal (or nuclear), requiring 11 new transmission interconnections.

Table 2: Planned SAPP Base Case Capacity Expansion Plans up to 2025[36]

	Hydro (MW)	Other* (MW)	Total (MW)
SAPP	**11,000**	**28,000**	**39,000**
to 2015	6,000	15,500	21,500
2016-2025	5,000	12,500	17,500
South Africa	**3,300**	**18,800**	**22,100**
to 2015	2,300	9,200	11,500
2016-2025	1,000	9,600	10,600
(* includes renewable – solar, wind, nuclear; thermal - gas, diesel, coal)			

[36] This table only presents the new capacity additions that have reached commissioning. It excludes the CSP and wind project to be considered under the proposed project.

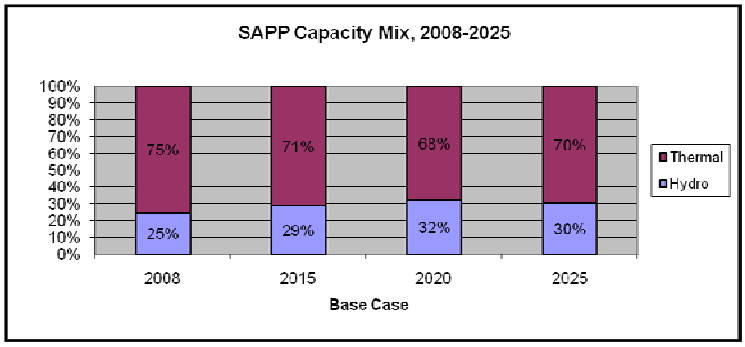
37. The SAPP expansion plan contemplates expanding hydropower capacity from 21 percent now to 26 percent by 2025, and reducing coal power plants from 73 percent now to 67 percent by 2025 (see charts below). While coal-based power continues to be significant due to the region's abundant reserves, the contemplated expansion plan reduces SAPP's CO2 intensity through a gradual reduction. 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.

38. An alternative scenario shows that hydropower may be increased to 16,500 MW by 2025 with a corresponding further reduction in thermal capacity. However, this scenario involves higher risks and uncertainties:

(i) The investments in coal power plants in South Africa and Botswana of about 8,500 MW combined post-2020, are shifted to non-investment grade countries (DRC, Malawi, Mozambique, Zimbabwe) raising financing risks and uncertainties. It is also predicated on Eskom providing PPA guarantees to these projects.

(ii) The plan requires about 50 more transmission interconnections, including the long transmission line from DRC to South Africa to support the 4,300 MW Inga 3 project. Since transmission lines are associated investments to power plants, this assumes the same risks as those of power plants for financing and timeliness.

Figure 5: SAPP Capacity Mix 2008-2025



39. 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 in the continent in DRC (estimated at 40,000 MW). The region also has solar energy potential. South Africa has the fifth largest reserves of world's uranium. Gas reserves are limited, but at the same Botswana has large estimated reserves of CBM (about 190 TCF). Therefore, it is expected that the share of fossil fuels in the energy mix would decline over time in preference for renewable energy. As this project demonstrates, South Africa has started on the lower carbon path. Measures like feed-in tariffs to promote renewable energy from wind and solar, development of regional hydro, exploring nuclear power and coal-bed methane would contribute to long term CO_2 reductions.

40. **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, plateau for a decade, 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 five priority climate change mitigation options in industrial energy efficiency, renewable energy, nuclear, passenger modal shift, and improved vehicle efficiency.

Box 3: 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.

41. **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).

42. **A number of other recent national and international commitments 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 emissions targets for 2020 and 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*.

(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).

43. **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 adopted attractive and private sector-friendly feed-in tariffs[37] and established a suitable legal and regulatory framework to incentivize private participation in development and enhanced use of renewable energy;

(b) 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;

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

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

(e) 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, 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.

Concrete Measures by Eskom and the GoSA to responsibly close the demand-supply gap and implement LTMS options

44. **The GoSA has adopted a proactive policy approach to close the supply-demand imbalances in a responsible manner.** A string of policy actions in recent months adequately demonstrate the Government's commitment to addressing the sector's supply woes in a socially and environmentally responsible manner. Major actions include:

(a) Ensuring financial viability of the electricity sector, most notably through the issuance of the Electricity Pricing Policy (EPP) in December 2008, which directs the National Energy Regulator of South Africa (NERSA) to ensure a tariff trajectory leading to full cost recovery, to put Eskom back on a path of financial sustainability within five years. The Electricity Regulation on New Generation Capacity, which envisages a greater role for the private sector, was approved in August 2009.

(b) Improving domestic and regional electricity supply security through enactment of the National Energy Act in 2008; issuance of the Electricity Regulation on Integrated Resource Planning (late 2009); issuance of the Electricity Regulation on IPP Cost Recovery (late 2009); and issuance of the Electricity Regulation on Energy Efficiency (late 2009). These would help ensure a safe generation reserve margin, generate private sector interest in bidding for power generation capacity, and lock-in off-take electricity purchase agreements with power producers in neighboring countries.

(c) Supporting the poor by implementing the relevant provisions of the EPP. The EPP establishes the principles for electricity pricing levels, including provision of support for the poor, the process for establishing prices and the responsibilities of the regulator for the issue of rules needed to implement the pricing principles. In order to protect the poor from the impact of tariff increases, free basic electricity is currently provided to 27 percent of the poorest connected consumers. Tariff structures also allow subsidized electricity for up to 350 kWh per month for the next block of consumption.

[37] The feed-in tariff system obligates Eskom to buy renewable energy at above-market rates set by the Government to compensate for the cost disadvantages of renewable energy sources.

(d) Promoting energy efficiency. The Government's Integrated Resource Plan emphasizes moderating the growth in demand through various energy efficiency measures. This has resulted in reducing the demand forecast by nearly 3,000 MW over the first 5 years, as well as significant GHG emissions savings.

(e) Restructuring of the energy sector to increase operational efficiency and enhance private sector participation. At the apex level, DoE has undertaken the development of an Integrated Resource Plan (IRP), which will provide the overarching framework for electricity sector development. In parallel, the Government is taking steps to create a single buyer and an independent system operator (to be established as Eskom's subsidiaries in the initial phase). The GoSA plans to take the legislative action that will allow these Eskom subsidiaries to be divested as a separate entity.

45. **Eskom plans to double its 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 percent**. In order to replace coal with a cleaner fuel source, the GoSA is exploring options to increase nuclear capacity by 20,000 MW and taking steps to add 1,700 MW[38] from renewable supply sources, namely solar and wind power with the purpose of priming the market so that private-led renewables investments can follow. 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. This program of increasing capacity based on coal, renewables and nuclear is consistent with the GoSA's low carbon strategy.

46. **In response to the exigent situation, Eskom has embarked upon a New Build and Major Maintenance Program.** This program entails an investment commitment of US$50 billion over a short 5-year period.[39] This is part of its immediate plans to add new generation capacity of up to 20,000 MW over the next 5-7 years, primarily based on domestic sources.[40] The GoSA and Eskom have agreed to focus on adding new capacity, based on supercritical technology to minimize carbon emissions, and on improving efficiency of its coal-fired power plants. The proposed technologies are consistent with the LTMS's emphasis on shifting to higher efficiencies in power supply and carbon capture and storage in coal-fired power plants. Accordingly, Eskom included in its large-scale investment program two coal-fired supercritical plants each with 4,800 MW generation capacities, and a Pumped Hydropower (Ingula) scheme, which would add another 1,300 MW. This would be supplemented with about 750 MW from hydro-based imports, and about 700 MW from renewable energy-based IPPs.

47. **The investment program proposes to accelerate new renewable technologies.** Options available to the Government, at this time are limited to CSP and wind.[41] Studies are underway for 500 MW in the Western and Eastern Cape Provinces and current estimates of wind power potential are about 4000 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. In addition, the Eskom investment program includes energy efficiency investments; Eskom has been taking discrete steps to increase supply and demand side management.

[38] The GoSA is currently assessing the feasibility of a more ambitious RE target.
[39] Beginning CY 2008; at an exchange rate of US$1=Rand 8.
[40] This massive expansion plan is larger than the combined undeveloped generation potential of Mozambique and Zambia, two countries that have the most feasible sources of regional supply in the medium-term, and much larger than all generation projects that have been deemed feasible in the sub-region.
[41] Of the renewable energy options, CSP is the most expensive but offers the greatest potential for baseload power (unlike wind power and solar photo voltaic power) and has a scale-up potential in South Africa. However, at present the technology does not allow large-scale developments. Wind energy is a commercially mature renewable energy technology, but despite a high growth rate of wind farms in the global market, its development in South Africa has been minimal to date.

Nearly 675 MWs of DSM savings were achieved by 2008 and the target is to achieve 3,000 MW of such savings 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 roads to railways for coal transportation. All these measures are expected to provide significant reduction in carbon emissions arising out of the energy sector.

48. **Eskom's 100 MW solar project represents a significant effort on the global scale of today's nascent solar industry.** 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. In September 2009, the Chinese government announced its intention to construct a 2GW solar power plant in Ordos City, Inner Mongolia, which will be constructed over a nine-year period. However, the first phase of this project will only be a 30MW demonstration project. Besides limited maturity in technology and scale, developing and financing such projects is also a challenge. US$1.4 billion in loan guarantees for Bright Source Energy's construction of three concentrated solar plants in the Mojave Desert in California, USA were provided to the project. These plants are expected to generate 400MW of electricity and are the world's largest concentrating solar project to have passed the development stage. At the present time, therefore, it is simply not feasible to consider concentrated solar as a viable alternative to coal-fired baseload power in view of both technology and costs.

49. **With respect to wind**, **South Africa's intends to attract private sector investment into this more mature renewable technology**. Hence, the proposed 100MW wind power project is considered as a demonstration and facilitation project. It will capture lessons and make these available as public goods and build up supportive infrastructure and systems integration elements such as transmission infrastructure for future wind capacity expansion. Because the Government is on track to establish an independent system operator to purchase power from private sector companies (using feed-in tariffs), investing more public financing into additional wind power projects is not optimal.

50. **Supercritical and Carbon Capture and Sequestration (CCS) space-ready coal-fired projects constitute the best feasible domestic generation potential that could be brought on line in South Africa to cover the supply-demand gap over the coming 5-year period**. The Medupi power plant has been developed by Eskom using the best proven technology to minimize carbon emissions. The power plant will be the first in Africa to use the more-efficient "supercritical" technology. In addition to using the supercritical design, the power station will be the largest dry-cooled power station in the world, reflecting the concerns over water scarcity in South Africa.

51. **The GoSA and Eskom have begun the development of South Africa's first commercial utility-scale renewable energy projects.** South Africa's CTF Investment Plan, which supported implementation of the mitigation priorities and strategies and was endorsed by the CTF Trust Fund Committee in October 2009, consists of a **US$2.35 billion program** to scale up CSP and wind (including transmission infrastructure to support private sector developers), support for development of a private sector-led solar water heater market and energy efficiency investments. A second phase of the Investment Plan will focus on sustainable transport options, including modal shifts to public transport. As a follow-up to this IBRD loan, South Africa will approach the CTF to request financing for the solar and wind energy renewable components that are part of the CTF approved Investment Plan.

Box 4: South Africa: Leading the Implementation of Clean and Efficient Coal Technologies in Africa

South Africa has undertaken to use the most efficient technologies available in the development of all of its new coal-fired power plants. This is in line with the GoSA's commitment on climate change. Adoption of these technologies also is in line with the World Bank Group's Climate Change Strategy.

Eskom's New Build Program consists of two power plants designed to operate under supercritical steam conditions to maximize plant efficiency and thereby minimize GHG emissions. These plants will be equipped with Flue Gas Desulfurization (FGD) to control sulfur emissions. Since coal is bound to remain the primary source of energy for some time to come, Eskom and the GoSA are exploring designing all future (after Medupi) coal-fuelled power plants for CCS readiness.

South Africa has also joined the Carbon Sequestration Leadership Forum and is actively investigating Carbon Capture and Sequestration (CCS) as one of the potential tools to limit greenhouse gas emissions. South Africa has already investigated potential carbon sources and storage sites. The Government has embarked on a survey of the geological make-up of the country to determine suitable areas for carbon storage. In addition, a separate GoSA assessment shows that carbon dioxide emissions were concentrated in the central industrial region, the highest emission concentrations being associated with coal-fired electricity generation and synthetic liquid fuel plants. Quantifying the emissions indicated that approximately 39 percent of emissions were non-sequestratable because of their diffused nature. Of the sequestratable emissions, approximately 65 percent were identified to be associated with electricity generation. For its part, Eskom's future power station design allows for sufficient space for carbon capture in all its new power stations.

South Africa is currently taking steps to facilitate implementation of CCS projects. These include identification and characterization of storage sites, development of national regulations that would guide CCS activities in South Africa, and adoption of international regulations that would allow the use of carbon credits. The CCS targets are first test injection in 2016 and first full operation in 2020.

Eskom's first underground coal gasification (UCG) pilot plant has been operating for nearly two years. Though modest in size (production 13 million cubic metres and 100kW of power capacity), its success has accelerated efforts to scale up. Following satisfactory assessment of the plant's performance and environmental impacts, Eskom through its own resources, is executing a larger project 40-times the scale of the pilot. Eskom's goal is to develop a new 350MW UCG-integrated gasification combined-cycle (IGCC) ultra-high-efficiency power station over the next few years. This could be a candidate project for the next round of climate funding.

52. **Complementary to CTF financing that South Africa will pursue, there are programmatic opportunities to benefit from the carbon market for low carbon initiatives.** The World 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 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.

53. **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 role in the initial years, while the GoSA creates an enabling environment that encourages private investment. As mentioned, the GoSA has already adopted attractive and private sector-friendly feed-in tariffs 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.

Eskom's Financial Situation

54. **The financial commitment of the New Build and Major Maintenance Program – about US$50 billion over a 5-year period – places tremendous strain on Eskom's finances**.[42] Current electricity prices in South Africa are unsustainably low. For the last several years, bulk electricity tariffs were based on Eskom's low depreciated asset base, valued at historical net book values and little to no requirements for investment capital. During the 1980s and 1990s, Eskom's tariff thus

[42] At an exchange rate of US$1=R8.

steadily reduced in real terms, which means that electricity prices in South Africa are now far lower than in any other comparable countries and well below full "current" economic cost. The cost of building a new fossil fuel power station is six to seven times that of the average cost of the existing power station per megawatt of capacity. The South African economy is growing, resulting in the need for significant investments in electricity infrastructure to meet continued growth in demand. The GoSA is cognizant of the fact that the cost of this new capacity (developed either by the public or the private sector) will have to be reflected in the future pricing of electricity and to this extent it approved the EPP in December 2008 to ensure full cost recovery tariffs over a period of 5 years.

55. **Despite a cumulative 68 percent increase in tariffs since mid-2008, current average retail electricity tariffs, at about 5 US cents/kWh, are below Long Run Marginal Costs (LRMC).** These tariffs allow Eskom to meet its operating-costs, but would provide only a small portion of its near-term investment finance requirements.[43] Even though there have been delays in the implementation of sector reforms, especially those targeted at full cost recovery through tariffs over the medium term, significant new policy changes have been put in place by DoE such as the Energy Pricing Policy (EPP) and the new regulations providing the enabling framework for private investment in power generation. To date, the regulator has approved three tariff increases, thereby moving the tariff trajectory towards full price recovery. To protect the poor, NERSA has limited the increase to the poor to about 15 percent, thus resulting in a higher average increase to other customers. Based on the principles approved under the 2008 EPP and Eskom's Multi-Year Price Determination (MYPD2) application to NERSA in November 2009, on February 24, 2010, NERSA has announced its decision to allow Eskom to raise tariffs by 24.8% in FY 2011, 25.8% in FY 2012 and 25.9% in FY 2013. The decision will allow the average selling price of electricity sold by Eskom to increase by 98% in three years and reach 10 US cents/kWh by 2014.

56. **The GoSA, Eskom and NERSA realize that high tariffs could impact the economy.** Therefore, NERSA decision followed an extensive consultation process provided for in the legislation, the outcome of which is appropriately reflected in the final decision on the Eskom tariff increase application. Over the years, NERSA has followed sound regulatory principles and engages external expertise as required, using its own resources. The track record of NERSA in approving Eskom's tariff applications over the last two years provides adequate confidence in the regulatory process and the achievement of the Government's policy target under the EPP.

57. **To protect the poor, NERSA has differentiated tariff increases for different categories of residential customers**. While the average cumulative price increase of electricity sold by Eskom in FY11-FY13 will be 98%, the total cumulative price increase for clients consuming less than 50 kilowatt hours (kWh) of electricity per month will be only 11% and for clients consuming more than 50 kWh, but less than 350 kWh per month will be 28%. In 2003, Government launched the Free Basic Electricity (FBE) policy (see Box 5). This policy aims to serve the poor by providing 50 (kWh) of free electricity per month (for a sense of scale one kWh can run a small business kiosk for a day; 50 kWh per month is enough for 3 lights and to run a small appliance like a TV or a refrigerator). Local governments determine who qualifies for free basic services under provincial criteria set for registering households. Today free basic electricity is provided to about 3 million households in South Africa (or 27% of the customer households).

58. **The ongoing global financial crisis and Eskom's recent credit rating downgrades have severely impacted the ability to finance planned investments.** The New Build Program was envisaged to be financed on the balance sheet (corporate financing approach). A large portion of the investments was to be financed with long-term debt from domestic and international commercial markets and Export Credit Agencies (ECAs). Even though the investment needs were large prior to the financial crisis, Eskom was confident of raising the net borrowing requirements from the then deep

[43] Generally about 40-50 percent of investment programs are covered by internal cash generation.

domestic and international commercial markets and export credits. In addition, appropriate tariff increases were projected to ensure suitable internal cash generation. Now, however, Eskom does not have sufficient levels of reserves and equity on its balance sheet to fund its complete investment program. Commercial financing in and outside South Africa for Eskom has dried up and is only available for short tenors. The regulatory mechanism will take time to catch up with the tariff levels needed to address funding needs. Lack of adequate long-term funding has led to delays in parts of the New Build Program.

Box 5: Electricity Tariffs and the Poor

The structure of electricity retail pricing in South Africa is similar to practice in OECD countries. Tariffs reflect cost of supply and therefore households pay more for per-unit electricity consumption than major, high-voltage industrial users. For example, in the U.S. households pay on average US cents 10 per kWh, whereas industrial users pay about US cents 6.0 per kWh on average. In U.K. the corresponding averages are equivalent of about US cents 18 and 11 respectively.[44]

Recognizing that poor consumers cannot afford electricity at cost-recovery tariffs, Eskom, supported by a subsidy scheme through GoSA, implements the FBE scheme for its consumers (as Municipalities and local government distributors do for theirs). The FBE provides 50kWh of free electricity per month to poor families (covering 27% of customer households). Generally municipalities do not charge consumers under FBE any access fees. Those consuming less than 50kWh per month, but not declared indigent received a lower increase (11%) for the first 50kWh compared to the increase (22%) for between 51-350kWh per month consumption customer category. These two categories cover most households – certainly all poor households. Tariffs for customers using up to 350kWh (average township household) is usually 25% lower than for customers who consume more than 350KWh. Though tariff hikes affect everyone, selective allocation of price increases among various categories protects the poor.

Outside the FBE, the recent NERSA decision also provides guidance to municipalities on average municipal electricity tariff level benchmarks for future periods. NERSA benchmarks for next year residential tariffs are: R54-60 cents for consumption below 50 kWh per month, R58-64 cents for consumption between 50 to 350 kWh per month, R71-76 cents for consumption between 351-600 kW per month cents per kWh, R93-90 cents for consumption above 600 kWh per month.

Currently, there is a significant variation among tariffs of different municipalities. For example the current residential tariffs in Pretoria and Johannesburg (including Soweto) are already above the next year benchmark for municipalities. This makes it very difficult to estimate what would be the exact tariff increase in these two cities – it will be a Municipal level decision. The current residential tariffs are: R60 cents per kWh (US cents 8.0) in Johannesburg for up to 500kWh per month, and R74 cents (US cents 10.0) in Pretoria - the latter doesn't depend on the amount of consumed electricity.

59. **Until full cost-recovery tariff levels are achieved, large amounts of GoSA and development partner financing will be required.** The GoSA provided a R60 billion subordinated loan to Eskom in 2008, which is being disbursed over three years, with almost 70 percent disbursed to date. In addition, in February 2009, the GoSA committed R176 billion of its guarantee authority to support Eskom borrowings over the next five years. The proposed IBRD financing (along with the recently approved AfDB loan) supported by the GoSA guarantees would allow Eskom to finance a significant portion of its investment needs related to the New Build Program (in particular the Medupi Power Plant). A financing gap for the larger investment program in the sector will still remain and the GoSA and Eskom are exploring ways to close this remaining funding gap.

B. Rationale for Bank Involvement

"Given the new challenges arising from the dramatic changes in the global economic environment, the main focus in the current period is to minimize the impact of the economic downturn on the country's productive capacity as well as jobs and poverty-reduction measures, to identify opportunities for new areas of growth and economic participation, and progressively to set the country on a new growth and development path. Fundamental to the attainment of all our objectives is a growing economy, appropriately transformed, so that the benefits of growth are shared by all. In this regard, the programmes we undertake should aim at reducing inequality." **The Government's Medium-Term Strategic Framework for 2009-2014.**

[44] The long term contracts for power supply to smelters (Special Purchase Agreements - SPAs) represent only a small fraction of Eskom's total electricity sales and their impact on the company's financials is not significant. In the 2009 financial year SPAs accounted for only around 5% of all electricity sales of Eskom. The terms of these contracts are confidential and cannot be released by Eskom. Tariff increases in these contracts are linked to changes in the commodity prices and will not be affected by NERSA decisions.

60. 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 reasonable time frame, and to ensure stable, sustainable macroeconomic framework. The country's resolve has been seriously tested by the ongoing global financial and economic crisis. But 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. On the basis of the energy crisis experience of 2007/08, this recovery will be thwarted by energy shortfalls unless these are addressed in a timely fashion.

61. The current CPS was discussed by the IBRD Board of Executive Directors in January 2008 and a Progress Report has been prepared. The strategic objectives of the CPS are to support South Africa's development programs in partnership with the World Bank Group and to deepen collaboration in the regional integration agenda. Although the support was primarily designed as a knowledge and technical support partnership at the time, the CPS allows for flexibility, being demand-driven and responding rapidly to emerging needs. This is the case with the proposed support to the energy sector. The CPS Progress Report, which is being processed along with the SIL, provides an update on the progress made in CPS implementation to date and proposes the prospective Bank support to the electricity sector. The CPS progress report seeks to 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.

62. The proposed project will support the Government's poverty alleviation efforts by avoiding electricity shortfalls in the medium term. Such shortfalls would lead to slowdown in growth, cause significant job losses and severely impact the poor. Delays in returning these entities to full operation would increase unemployment and heighten social inequalities and the risk of civil instability. In addition, lack of electricity supply would reverse the significant gains the country has made in access expansion and the associated social and economic benefits, including improved water supply, institutional facilities such as rural schools and hospitals, as well as increased industrial and commercial activities in rural areas. A further slowing of the electrification program, along with the power shortages would seriously impact the GoSA goals of universal access for electrification.

63. Conforming to the Government request for support, the proposed project will provide financing to Eskom (guaranteed by the GoSA) in the midst of a difficult financial crisis. This financing support is critical for sustaining South Africa's and the region's continued economic development by ensuring adequate electricity supply. Without the proposed project, energy investments will face delays, thus reducing the availability of supply in the country and the sub-region. South Africa would not be able to embark on the aggressive implementation of its low carbon initiatives such as investments in renewable energy, energy efficiency and shift in transport modes without this project.

64. The recent global financial crisis has tightened the international as well as the domestic credit markets. This has compromised South Africa's ability to respond to the funding challenges facing the power sector. Decreased availability of low-cost capital with long tenors[45] not only limits Eskom's ability to access new funding, but has also compromised its financial position. The proposed IBRD/CTF financing will bridge the financing gap of the Eskom Investment Program. The Bank is being called upon to play its role as "*lender of last resort*" amidst the financial crisis. The proposed Bank support will also send a signal to private financiers regarding the credibility of Eskom's Investment Program.

[45] In fact, according to the Bank's Public-Private Infrastructure Database, private investments in new infrastructure projects in sub-Saharan Africa declined by 22 percent in 2008 and investment in new infrastructure projects dropped by 73 percent to only US$570 million. In the energy sub-sector, only four countries implemented seven greenfield projects for power generation, involving investment of US$522 million and a total capacity addition of 366 MW.

"*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." **Excerpt from a Statement from South African Presidency, December 6, 2009 for COP15 in Copenhagen.**

65. The proposed project would strongly support interventions on mitigation of climate change. In this respect, it would support the GoSA, through an IBRD Loan and the proposed subsequent CTF concessional financing, in implementing high-impact elements of the low carbon strategy to achieve the mitigation scenario endorsed by Cabinet in 2008. The proposed IBRD/CTF co-financed CSP plant would be a flagship activity: as the largest facility using central receiver technology, it would establish cost and performance benchmarks for the broader deployment of CSP technology in the country and potentially in the sub-region. The replication potential is significant. However, currently CSP has a levelized cost of electricity two to three times that of supercritical coal-fired power plants and very limited operational experience at scale. The Eskom plant would help buy down costs and risks for subsequent IPPs, interested in entering the sector thanks to South Africa's attractive renewable energy feed-in tariffs, but constrained by uncertainties related to cost and risks. Similarly, the strong potential for scaling-up to utility-scale wind power faces major barriers such as high costs relative to coal-fired production, inability to provide baseload power due to output intermittency, and incremental transmission costs to connect isolated wind power sites to the grid. In the absence of Bank and CTF support, the current economic crisis will further delay the implementation of the renewable energy projects.

66. Bank support to the energy sector in South Africa will enable the continued development of local and regional renewable energy sources that could contribute significantly to the country's energy mix over time. The project will thus ensure that South Africa's success to date in leading the sub-regional leadership in support of a low carbon and pro-poor energy sector is not derailed. Further as a leader on the continent, South Africa would help demonstrate large scale renewable generation, thus driving the renewable industry and the private sector towards future investment on the continent.

67. The proposed project will provide financing at a time when Africa's largest economy faces unfavorable conditions in accessing foreign financing due to the global financial crisis. The Bank's supportive role would help South Africa meet the long term financing needed for addressing its urgent need for energy and avoid a heavy economic toll on South Africans, particularly the poor.

68. The Bank's partnership, besides meeting immediate pressing financial needs, also creates opportunities for sustained engagement on the "greening" of South Africa's energy sector consistent with the government's low-carbon strategy and IRP; and begins to strengthen the opportunities for realizing real progress in regional energy integration in the SADC (and SAPP countries).

69. Bank strategies support energy access in Africa from all sources, in a manner that is consistent with both the World Bank's *Africa Action Plan*[46] and the *Clean Energy for Development Investment*

[46] *Meeting the Challenge of Africa's Development: A World Bank Group Action Plan*, World Bank, September 26, 2005, and Progress Report, September 2009.

Framework.[47] The proposed project also responds to the *African Regional Action Plan for MICs* in that the project outcomes would benefit not only South Africa but the entire region. More broadly, it presents an opportunity to deepen the Bank's engagement with South Africa, to establish mutual trust and reinforce Bank support for development of the country and the region.

70. In view of the above and as summarized in Table 3, the project is in line with the approach to provision of energy from coal presented in *Development and Climate Change, A Strategic Framework for the World Bank Group (DCCSF),*[48] which was reinforced by the Board during its discussion of the *World Bank Group Energy Strategy Concept Note*.[49]

Table 3: Assessment of the Proposed Project against DCCSF Criteria

DCCSF criteria	Project Assessment Summary
Demonstrated developmental impact of the project including improving overall energy security, reducing power shortage, or increasing access for the poor	• Supports regional and domestic energy security by increasing capacity through improved efficiency and additional capacity. • Allows for expansion of access to the remaining one-fifth of the South African population, and higher unsupplied populations of neighboring countries.
Assistance is being provided to identify and prepare low carbon projects	• A CTF investment plan has been endorsed, which supports energy efficiency measures, and includes private sector and municipality-led Solar Water Heater programs. • Project is mobilizing additional financing for new low carbon technologies, including wind power and concentrating solar power. • South Africa is taking significant steps on R&D related to carbon sequestration and underground coal gasification with its own resources.
Energy sources are optimized, looking at the possibility of meeting the country's needs through energy efficiency (both supply and demand) and conservation	• Energy strategy includes demand side efficiency improvements and is expected to realize 3,000 MW (equivalent to one power plant) in three years. • RE Strategy aims at adding 10,000 GWh (1,700 MW equivalent) of energy from renewables led by the private sector by 2013. • The Government is implementing other efficiency measures, including Road to Rail transport and Bus Rapid Transit. • On their own, the measures cannot meet the country's demand growth.

[47] *Clean Energy for Development Investment Framework: The World Bank Group Action Plan*, March 28, 2007.
[48] *Development and Climate Change: A Strategic Framework for the World Bank Group: Technical Report* (DCCSF), World Bank Group, 2008.
[49] *World Bank Group Energy Strategy Concept Note, CODE2009-0052, July 8, 2009.*

DCCSF criteria	Project Assessment Summary
After full consideration of viable alternatives to the least-cost (including environmental externalities) options and when the additional financing from donors for their incremental cost is not available	• Integrated resource planning has been undertaken by the GoSA – no other feasible alternatives are present that could substitute for the proposed plants – domestic or regional. • Domestic or regional alternatives cannot meet the required baseload capacity (9,600 MW over 5 years). • Even if the technology was available for renewable base load plants such as CSP, additional financing for the incremental costs of this size is not available.
Coal projects will be designed to use the best appropriate available technology to allow for high efficiency and, therefore, lower GHG emissions intensity	• The Medupi plant will use supercritical technology. • South Africa has decided to construct coal power plants only with super-critical or superior technology.
An approach to incorporate environmental externalities in project analysis will be developed	• The project considers GHG emissions in evaluating options. Combinations of load shedding, diesel generation and other technologies, if viable, will be compared with the proposed plants to identify switching values of CO_2/tone equivalence. A portfolio approach to reducing carbon footprint has been proposed by the GoSA.

71. An external Expert Panel was established in October 2009 to review and advise on the application of the Bank's DCCSF criteria and the Analysis of Alternatives for the proposed project. The Panel's terms of reference cover a review of the project design to assess consistency with the DCCSF criteria. The final report of the Expert Panel has been made available to the public.

Box 6: Expert Panel Review, an extract from the Conclusions[50]
Final Report Dated February 18, 2010

"*South Africa is facing an immediate shortage of electric power that has already crippled its economy. Hence as a transition strategy in the near term we accept that it is necessary to build additional coal-fired electric power units. But this must be coupled to a longer-term strategic shift to an economy based upon a low carbon energy supply.*

The finding of this Expert Panel is that it is essential to help to accelerate the move of developing countries like South Africa into an era of more and better energy services, a more energy and economically efficient economy that produces substantially lower carbon emissions using sustainable energy sources. The focus needs to be on sustainable development that does not add to the environmental, economic and climate burden. Linking large additions of coal-fired capacity to the implementation of a long term low carbon strategy, coupled with immediate energy efficiency and renewables investments is one way to avoid having a major rise in heat trapping gases into the atmosphere just as the world is moving to reduce them. Fortunately, the South African government has already taken actions to move in this direction, and indicated that it has a long-range plan to do so as well as initiatives currently being implemented as part of this plan. It is our recommendation that the World Bank work with South Africa to achieve that goal for its own citizens and to assist neighboring nations that rely on the power production and economic activity of South Africa to do the same."

72. While finding the proposed Project consistent with the DCCSF criteria, the Expert Panel identified the need for Bank support to South Africa especially in the areas of low carbon energy development and energy efficiency as well as the need to develop other cleaner options for the future. The Panel recommended that the Bank's long-term commitment to the above areas should be on a scale that matches its commitment to the project. The Panel also suggests that Bank continue to support South Africa's efforts to demonstrate its CCS potential.

[50] http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTENERGY2/0,,contentMDK:22388829~pagePK:210058~piPK:210062~resourceurlname:ExpertPanelFinalReport%5E$%5Epdf~theSitePK:4114200,00.html

73. In this spirit, the Expert Panel has recommended several measures. While several of these are outside Eskom's direct control, they are mostly part of the GoSA's low carbon strategy. They include DSM, solar water heating, and various demand side energy efficiency measures. The panel has also recommended scaling-up financing for the installation of CSP plants subsequent to the 100- MW Upington plant under the proposed project, developing renewable energy-based distributed generation, as well as improving supply-side efficiency in power plants and other facilities. Specific to Medupi, the Panel has recommended consideration of solar pumping for the large amount of water the power station will need. It has also recommended that power plants should allow space for the possibility of future CCS and that Eskom should explore new technologies such as algae-based capture of carbon dioxide, whose byproduct could be used as a fuel. Eskom's future plants are being designed with space for CCS and other technologies which can be used for CO_2 capture are being researched in South Africa.

74. With regard to the recommendation of the Experts Panel, South Africa is currently pursuing initiatives in the following areas:

(a) expanding carbon-saving public transport;

(b) implementation of a nation-wide CFL distribution program;

(c) capacity building by training engineers, inspectors, government regulators and financial experts in energy efficiency, renewable energy and energy finance;

(d) private sector activities in the areas of reducing heat trapping emissions from the mining and construction industries, coal mine fires, methane leaks and reducing other greenhouse gases; and

(e) preparation of the Integrated Resource Plan for the electricity sector by the Department of Energy.

75. South Africa and the Bank have agreed to strengthen the partnership in the following areas, including those recommended by the Experts Panel to achieve low-carbon objectives, both within the ambit of this project and beyond, and through the CPS. These areas include:

(a) enhancing energy efficiency and demand side management opportunities through technical assistance under this Project;

(b) support to South Africa with resources from the Carbon Capture and Storage (CCS) Trust Fund to help assess CCS options;

(c) support from CTF and IFC for a private-sector led Solar Water Heater program;

(d) IFC support through Climate Change Investment Programme in Africa (CIPA) to help boost sustainable energy investments in Africa, including energy efficiency, renewable energy, and cleaner production investments; and

(e) On regional hydropower, current project includes technical assistance to promote specific regional low carbon projects such as hydropower plants in Mozambique by developing the transmission interconnection with Mozambique.

76. Actions to implement the adopted LTMS would mitigate GHG emissions over the medium term. Therefore, on the portfolio basis, even though in the initial term, the emissions from the energy sector are expected to grow, in the medium term, they are likely to fall based on the increasing share of wind/solar and nuclear power generation in the fuel mix. Table 8 provides an overview of medium term carbon emissions from new generation in the sector arising out of the investments supported by this project and other DSM/renewable energy-related measures that are being undertaken by the GoSA and Eskom. At the regional level, growing share of hydropower in the southern Africa power supply mix would also reduce carbon intensity.

77. Furthermore, consistent with the Expert Panel's recommendation, the Bank's engagement with South Africa through the proposed Project will provide the Bank an opportunity to position itself in the forefront of supporting the core development needs (enabling access to electricity) of South Africa while managing added costs and risks of climate change in an evolving global climate policy. The Bank intends to continue a process of constructive engagement with Eskom and South Africa, both as a part of this Project and beyond as a part of the Country Partnership Strategy to support South Africa's move to low carbon economy. The proposed project will thus allow the Bank to provide a developing country partner with customized demand-driven support through its various instruments — from market-based financing to technical assistance and concessional funds for low carbon initiatives. The Bank through this loan is also providing technical assistance for cross border transmission line which will enable exploitation of the hydroelectric power potential in the subregion, including Mozambique.

C. Higher level objectives to which the project contributes

78. 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.

79. The Government and the Bank have agreed to establish a long-term partnership to meet the targets set by the GoSA's low-carbon strategy. This Project is a first key building block of this partnership to support South Africa as it progresses towards meeting low-carbon trajectory targets. These elements are captured in the CPS Progress Report.

80. The proposed Project supports South Africa's strategic response to the impact of the global economic crisis by providing and mobilizing significant financing for urgent investment needs. This will advance the country's objective to ensure a reliable, secure and affordable electricity supply that is critical for sustaining economic growth and expanding energy access.

81. The proposed project will also enhance South Africa's ability to secure its energy requirements in a timely manner and will have a large positive impact in the sub-region, while accelerating South Africa's commitment towards a lower carbon trajectory. Besides creating the conditions for secure and predictable industrial and commercial growth in the sub-region, South Africa's energy security will also facilitate further expansion of electricity access both in-country and for dependent neighbors like Swaziland, Lesotho and Namibia. Therefore, the impact of the proposed operation will be felt in the Southern Africa region by enabling efforts to diversify economies, greater private sector involvement, reduced poverty and inequality, improved competitiveness of industry and SMEs, and improved living and economic conditions for the poor.

82. The project is also designed to be consistent with the WBG's and Africa Region's MIC strategy. It is also fully consistent with the Bank's energy strategy and regional development priorities in Southern Africa. The project is an important element of South Africa's CTF Investment Plan for the large scale deployment of low carbon technologies, and the proposed CTF loan along with IBRD financing would provide funding for the CSP and wind power components.

II. PROJECT DESCRIPTION

A. Lending instrument

83. IBRD Loan: A US Dollar denominated, commitment linked, IBRD Flexible with a variable spread, with a 7 year Grace Period and 28.5 years Final Maturity, with all conversion options selected with repayment dates of May 1 and November 1 of each year.

B. Project development objective and key indicators

84. The Project Development Objective (PDO) is to enable Eskom Holdings to enhance power supply and energy security in an efficient and sustainable manner so as to support both economic growth objectives and the long term carbon mitigation strategy of South Africa.

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

(a) Increased reliable power generation;

(b) Increased renewable energy supply; and

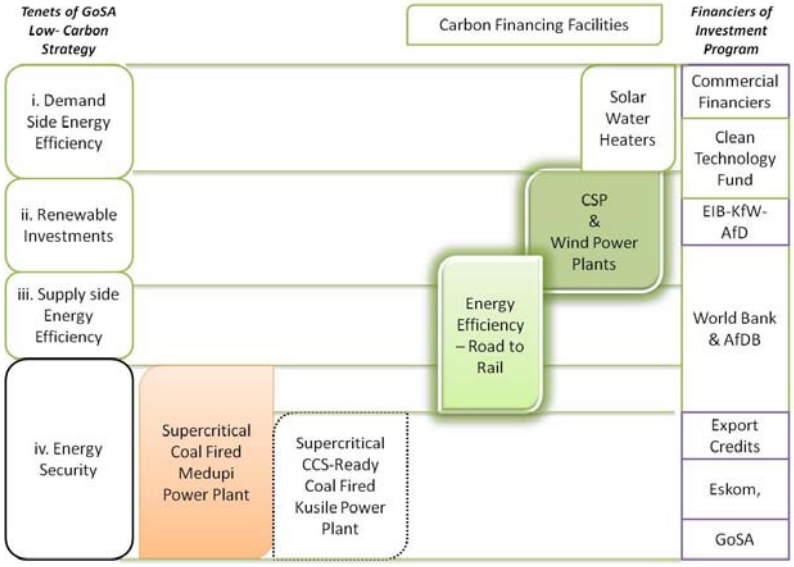
(c) Reduction in carbon intensity.[51]

C. Bank strategy for support to Eskom and project components

Bank Strategy for Support to Eskom

86. The Bank strategy is to finance Eskom's Investment Program which in turn supports both immediate energy security needs (coal-fired projects) and the medium- to long-term investment needs (energy efficiency and renewables) as reflected in the GoSA's low-carbon growth strategy. To this extent and as shown in Figure 6 below, identified investments will be financed through a combination of loans from IBRD, CTF, Export Credit Agencies (ECAs), African Development Bank (AfDB), and other development financial institutions.

Figure 6: Bank Strategy to Support South Africa's move to a Low carbon Energy Sector



87. The proposed Eskom Investment Support Project (EISP) will have a total project cost of about US$13.862 billion, of which IBRD financing would amount to US$3.75 billion. Component A will be parallel financed with AfDB and European ECAs; Component B is proposed to be cofinanced with CTF financing[52] and parallel financed with other financiers; Component C will be financed by IBRD alone.

[51] Carbon intensity will be measured by the cumulative emissions produced by all the components in the project.

[52] A proposal for CTF supplemental financing will be submitted for consideration to the CTF Trust Fund to cofinance the renewable energy component (B) of the Project.

Project Components

88. The proposed project will consist of the following components, which will be implemented by Eskom:

(a) Component A includes the Medupi coal-fired power plant (4,800 MW, based on supercritical technology) and is expected to cost US$12.047 billion,[53] of which IBRD will provide financing of about US$3.04 billion. This loan will be provided against supply & install and civil construction contracts for: (i) the power plant; (ii) associated transmission lines, and (iii) Loan IDC, payable to IBRD and other lenders to the Project.

(b) Component B includes investments in renewable energy (100 MW Sere Wind Power Project and 100 MW Upington Concentrating Solar Power Project). This component is estimated to cost US$1.228 billion, of which IBRD will provide financing of about US$260 million.[54]

(c) Component C includes both sector investments and technical assistance to support lowering Eskom's carbon intensity through energy efficiency and development of renewable energy. The Majuba Rail Project (shift in transportation mode from road to rail) and technical assistance for assessing the opportunities for coal-fired power plant efficiency improvements and for the development and implementation of domestic and cross border renewable energy projects are envisaged under this component. This component is estimated to cost US$576.07 million of which about US$440.77 million will be financed by IBRD.

(d) As per the request from the Borrower, Eskom Holdings, an allocation for US$ 9.375 million has been made to finance the US$ 9.375 million Front End Fee associated with the IBRD Loan.

89. The project comprises about US$1.804 billion of low-carbon renewable and energy efficiency investments, of which IBRD will finance US$700 million (and CTF is proposed to finance US$350 million).[55] Table 4 provides an overview of the project costs and proposed financing plan.

Table 4: Project Cost and Financing Plan (US$ million)

Name of the Component	Estimated Required Financing	IBRD		CTF	Other Lenders, including AfDB, ECAs, AFD and others[56]	Borrower (Eskom Holdings)
		Energy Security	Renewable and Energy Efficiency	*through IBRD and AfDB*		
Medupi Power Plant, of which						
a) Supply & Install and Construction Contracts (incl. Contingencies)	9,999.99	**2,489.86**			4,925.05	2,585.08
b) Financing Costs, incl. Loan IDC	1,251.00	**550**				701.00
c) Other costs, incl. development costs	796.65					796.65
Renewable Energy Power Plants, of which						
a) Wind Plant (100 MW), including development costs	445.43		**110**	100	100	135.43
b) CSP Plant (Pilot 100 MW), including development costs	782.68		**150**	249.375		383.305

[53] The estimate project total cost is based on Interest during Construction directly related to debt that has been raised by Eskom for the Medupi Power Plant. Any Eskom funding costs for its contributions to the plant from the Balance Sheet have not been included and have been considered as Eskom equity to the project.

[54] It is proposed that CTF support will subsequently provide financing of about US$350 million for Component of the Project through AfDB and IBRD.

[55] No approval is being sought for the CTF Loan in this proposal.

[56] Only committed financing from bilateral and multilateral lenders have been presented. Eskom is currently under discussions with other multilaterals and bilateral to finance the Sere Wind and Upington CSP as well.

Name of the Component	Estimated Required Financing	IBRD		CTF	Other Lenders, including AfDB, ECAs, AFD and others[56]	Borrower (Eskom Holdings)
Energy Efficiency Investments, of which						
a) Majuba Rail Line, including development costs	546.07		**410.765**			135.305
b) TA for Coal Plant Rehabilitation	20.00		**20.00**			
C) TA for development and implementation of domestic and cross-border renewable energy projects	10.00		**10.00**			
Front End Fee (IBRD) and Management Fee (CTF)	10.00	**9.375**		0.625		
		3,039.86	**700.14**			
Total	**13,861.82**	**3,750**		**350**	**5,025.05**	**4,736.77**

90. Component A will support the supply, installation, construction, and commissioning of the Medupi Power Plant and the associated transmission system to evacuate electricity from the plant. The Medupi power project has been developed on the basis of several supply and install and civil work contracts awarded by Eskom to competitively selected companies. As noted earlier, Eskom suffered severe capacity shortages in 2008 and current projections indicate an increasing capacity deficit which could severely constrain the economic growth of the country. In 2005, Eskom prudently initiated work on the Medupi Power Plant and has awarded long lead-time contracts and initiated construction activities to ensure that the construction timeline for the plant is not derailed. Eskom has procured these contracts based on the Eskom and GoSA procurement policies and procedures, which, while well organized, are not consistent with the Bank's procurement guidelines. Procurement for all of these contracts has been initiated and in almost all cases contracts have already been awarded, of which some have been signed and work started.

91. To ensure that the construction timetable for Medupi is not derailed, it is proposed that Component A supports financing of contracts already awarded and where Eskom currently does not have any committed financing. This would mean that the Bank will finance contracts that have already been procured and awarded. Of the US$3.04 billion proposed for this component, it is expected that US$1,776 billion (excluding US$130 million of contingencies) will be disbursed for 14 contracts already procured for the Medupi Power Plant. In addition, US$593.03 million is expected to be disbursed for Medupi related transmission lines and two other contracts for the plant; these are yet to be procured.[57]

92. Retroactive financing is proposed to cover disbursements made by Eskom for the agreed contracts beginning January 2007 and up to the date of signing of the Legal Agreements. It is estimated to be 10.67 percent of the proposed IBRD Loan amount (up to US$ 400 million).

93. The lower than anticipated increase in tariffs for the next three years has resulted in a stressful financial situation for Eskom (see Section IV.A for details). Tariff increases alone as approved by NERSA for FY11-FY13, without raising additional debt, may not allow Eskom to cover its immediate debt servicing costs. To achieve financial sustainability in the near term, Eskom would need to

[57] The proposal to finance interest during construction meets the requirements set out in Paragraph 1 of OP 6.00. Bank financing of IDC is appropriate for the proposed IBRD-funded projects as the IDC forms part of the cost necessary to bring the assets to their productive uses. In addition, a review of the financing charges that are being assessed by the multilateral and bilateral lenders for the various components of the Project, and these have been determined to be reasonable. The Bank will not finance any IDC related to private commercial lenders to Eskom. The proposed IBRD loan is being guaranteed by the Republic of South Africa, and thus is a contingent liability for the South African treasury. The Team has undertaken an analysis of contingent liabilities of the South African Government and found them to be within acceptable limits (additional details are provided in Annex 1). The financial management risks associated with the loan have been determined to be low. Eskom has a prudent financial management system and standard disbursement procedures will be followed for this category of financing as well.

finance some of its near-term debt servicing costs for the proposed investment program. Therefore, to maintain financial sustainability of the Bank-financed Project and of the utility notably over the next 3 years until the next tariff increase, the Borrower has requested the Bank to consider financing of IDC in respect of the IBRD Loan and that related to other lenders to the Project. About US$550 million will be disbursed against interest during construction (US$ 400 million on account of IBRD and US$ 150 million on account of other lenders) charges and US$ 9.375 million will be disbursed as the IBRD Front-end Fee.

94. Eskom has completed its financing with the ECAs and is finalizing effectiveness of the AfDB loan (of about US$2.63 billion) which was approved in November 2009. Remaining contracts related to Component A are proposed to be financed by the Bank. Eskom's own funds and on-balance sheet financing (including the GoSA loans to Eskom) will also assist in financing this Component.

95. Component B will support the development of South Africa's first large-scale wind and CSP plants, proposed to be implemented by Eskom Holdings. Specifically, supporting the design, procurement, construction, supply and installation and commissioning of a 100MW wind power plant (Sere Wind Project) and 100MW concentrating solar power plant (Upington CSP Project). Both projects are under development by Eskom Holdings and early development work on the sites (survey etc.) has already commenced. Component B is proposed to be cofinanced (jointly) by the CTF Loan (when approved) and parallel financed with AFD, AfDB, Kreditanstalt für Wiederaufbau (KfW) and the European Investment Bank (EIB). Eskom's own funds and on-balance sheet financing (including the GoSA loans to Eskom) will also assist in financing this Component.

(i) Wind is a commercially mature renewable energy technology but at present there is no significant energy generated by wind in South Africa. The Western Cape Province Wind Energy Facility located 160 km north of Cape Town near the town of Skaapvlei, 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 wind site – the Sere Wind Power Project, consisting of a 100 MW wind farm comprising forty to fifty 2.0 to 2.5 MW (Class 2A) wind turbines. The project is fully scoped and specified. The site has a "moderate" wind resource; based on measurements completed to date at the site, it is expected that the plant will have a load factor of 25 percent. The site is near about 40-kms from the 132-kV sub-transmission line.

The Western Cape facility, together with new transmission capacity to export its power, would act as a flagship to 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 REFIT program. IBRD/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; and finance transmission additions dedicated to serving wind power development. Cumulative emissions savings from Phase 1 of the Western Cape Wind Energy Facility (Sere Wind Power Project) based on annual output of 219 GWh would be 5 million tons of CO_2 over an assumed 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) CSP is the renewable energy source with the largest potential in South Africa. Grid-connected solar thermal power can provide large volumes of firm generation capacity, comparable to what is currently provided by coal-fired power plants. However, in addition to being more costly, the initial CSP plants will have higher risk than coal-fired power plant. The Upington Concentrating Solar Power (CSP) plant is a tower and mirror design configured to operate as a baseload unit. Utilizing molten salt as a thermal circulating fluid and storage medium would allow the plant to achieve a 60-65 percent annual load factor with a rated

capacity of 100 MWe. The capital cost of the project is estimated at about R5 billion; equivalent US$600 million, excluding contingencies. Given the uncertainties around the technology, contingent financing of about US$150 million has been included in the financing plan.

A successful CSP project will demonstrate South Africa's role as leading the low carbon energy agenda for the subregion, with scale-up potential in SAPP countries, including Botswana and Namibia (with an estimated potential of over 20 GW). As such, CSP in the medium term could play a major role in the SAPP. The proposed project would support this development by financing a portion of the first project in South Africa. CTF financing would be used to reduce the financing costs thus making the CSP project financially viable. The investment would be preceded by a review of the feasibility and design work already carried out by Eskom based on the central receiver technology. Cumulative emissions savings from Phase 1 of the Upington CSP based on annual output of 516 GWh would be 9 million tons of CO_2 over an assumed twenty year life of the plant.

96. Component C will support other low carbon and energy-efficiency components which would also help improve efficiency in Eskom's operations, including supply-side energy efficiency. This component consists of the following three subcomponents:

(a) The Majuba Rail Project;

(b) Technical Assistance to support Eskom in the proposed rehabilitation of existing coal-fired power plants to improve operating efficiencies; and

(c) Technical Assistance to support Eskom to develop and implement domestic and cross-border renewable energy and energy efficiency projects.

97. Component C.1 – Majuba Rail Project: This component includes the design, procurement, construction and commissioning of the Ermelo to Majuba railway line that will become the main coal transport system to the Majuba power station, consisting of a single track electrified 3kV rail line including bridges, culverts and substations. The Majuba power station (currently operating at 85 percent of capacity) is a baseload plant. With the introduction of a heavy-haul railway line at Majuba, it is anticipated that 100 percent of the Majuba power plant's capacity can be generated from coal supplied via this line in the future, which not only has a financial benefit (less costly to transport coal) but multiple environmental and other strategic benefits as well, including eliminating the serious accident hazard and road damage caused by coal trucks, reducing annual CO_2 emissions by approximately 250,000 tons, and freeing up capacity in the general freight railway to supply coal to the Tutuka power station).

98. As a railway siding used exclusively by Eskom, the capital costs associated with the proposed design and construction forms part of the capital investment program to be funded by Eskom. Separate environmental authorizations have been obtained for the proposed project.[58] The purchase of rolling stock does not form part of the scope. The rolling stock is to be supplied by the proposed operator, Transnet Freight Rail, and the capital recovery, rolling stock maintenance and management of train operations is a part of the transport tariff. Eskom intends to sub-contract the maintenance of the servitude, the track-work, signaling, control and overhead electrification equipment to a third party.

[58] Record of Decision (RoD) in terms of Section 22 (3) of the Environment Conservation Act, 1989 (Act 73 of 1989) for the construction of the Ermelo-Majuba railway line; Environmental Authorization (EA) in terms of regulation 10(2) of the Environmental Impact Assessment Regulations, 2006 of the National Environmental Management Act, 1998 (Act 107 of 1998) for the construction of an 88kV distribution line to supply power to the Ermelo-Majuba railway line; Mining permits for the mining of sand, aggregate and gravel in terms of Section 27 of the Minerals and Petroleum Resources Development Act, 2002 (No 28 of 2002); and Water Use License in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) for (i) impeding or diverting the flow of water in the watercourse in terms of section 21 (c), and (ii) altering the bed, banks, course or characteristics of a water course in terms of section 21 (i).

99. Component C.2 – Technical Assistance for Coal-Fired Power Plant Efficiency Improvements: This component will support Eskom's objectives of achieving a one percent reduction in the average heat rate of its current fleet of coal-fired power stations by 2012. This will correspondingly reduce the carbon dioxide (CO_2) emissions from the power plants.

100. This component will provide technical assistance to design the improvements for Eskom's currently operational coal-fired power plants (including Hendrina, Matimba and Kendal). The component will finance the cost of international experts to review the work already carried out by Eskom staff, advise Eskom on the best way forward, and prepare the associated designs, implementation plans and technical specifications for the recommended sub-projects. In particular, the consultants will, for each of the sub-projects, assess the feasibility of achieving the estimated heat-rate improvements, provide advice on the proposed designs and on implementation logistics, and prepare the associated implementation plans. It is expected that the work will serve as a model that can be extended to the remaining power stations.

101. Component C.3 – Technical Assistance for development and implementation of domestic and cross-border renewable energy and energy efficiency projects. The proposed component will finance technical, financial and legal advisory services for the implementation of the Upington CSP and other domestic and cross-border renewable projects. Specifically, in relation to the Upington CSP, the sub-Component will assist Eskom in carrying out a technical review of current assessment; a financial review and preparation of bidding documents; an assessment of local manufacturing capability for scale up of CSP technology; and undertaking an advisory panel consisting of international experts to support Eskom during the implementation of the project. With respect to energy efficiency projects, the technical assistance provided to Eskom will support a scale-up of demand side management programs through Solar Water Heaters and assessing the potential for Time of Day metering.

D. Lessons learned and reflected in the project design

102. The proposed operation is the first large-scale investment operation being supported by the Bank in South Africa. It is also the first energy operation in South Africa in recent times and hence there is limited experience on past projects in the country. Some generic lessons learnt from the Bank's experience with MICs have been used to ensure sound project design and concept.

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

104. *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. Eskom will ideally need to rely on internal cash generation for a large portion of its investment needs, which in turn will require full cost recovery from its customers. To achieve this objective, the GoSA has issued, along with a number of other policy measures, the EPP, which mandates a move to full cost recovery over a five-year horizon and provides the overarching framework for NERSA. This policy is expected to provide comfort to commercial lenders for large investment projects.

105. *Long-term Planning for Supply Side Projects is needed*: The lack of investments in South Africa in the last decade, the resulting energy crisis and the urgent investment requirements amidst a global financial crisis have underscored the continued need for realistic planning for long-term power

generation projects. The GoSA is taking steps to strengthen Integrated Resource Planning and move it out of Eskom.

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

107. *There is a Need for Effective Project Planning and Monitoring*: In order to ensure timely completion of large investments an effective planning and monitoring system is essential. Eskom's planning and monitoring arrangements have been found to be efficient, effective and robust.

108. *A Flexible and Pragmatic Approach is Necessary for a first time engagement*: This is the first significant engagement between the Bank and South Africa in nearly two decades and hence both the government and the Bank know little about each other's policy environment and implementation procedures. This includes less than usual familiarity by South African entities with Bank requirements in key areas such as safeguards and procurement. Moreover, the Bank also does not have full knowledge of GoSA policies and processes, which have been found to be rigorous in most cases, although not always fully consistent with Bank policies.

E. Alternatives considered and reasons for rejection

109. 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. The National Electricity Regulator independently carries out a similar national resource planning exercise. Similarly, Eskom continually assesses the projected electricity demand and supply through a process called the Integrated Strategic Electricity Plan (ISEP).[59] In mid-2009, the ISEP was superseded by the Integrated Resource Plan (IRP). Through these assessment 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. As noted above, the planning and 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 review the various planning alternatives.

110. Specifically, Eskom considered the following key variables, leading to its decision to construct and operate the 4,800 MW Medupi coal plant: (a) fuel options (gas, diesel, LNG, coal and nuclear); (b) import of power; (c) renewable energy options; (d) technology and unit size (taking into account system stability, evacuation, and proven technology – FGD, dry cooling); and (e) available sites.

Alternative Fuel Sources (Component A)

111. In 2005, Eskom, during its planning cycle for the next capacity addition, fully investigated the various fuel options available for South Africa. South Africa has no gas reserves[60] and hence gas-based capacity is not feasible. Eskom further studied in detail the feasibility of importing LNG. However, because of the high international price, especially given South Africa's location, the cost of port and

[59] 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.

[60] The only available imported gas option is being exploited. Eskom has signed an agreement to purchase power from a 600 MW gas-fired plant based on gas imports from Mozambique – the only gas supply currently available in the region.

pipeline infrastructure required and the associated transportation costs to suitable power plant sites, LNG was not considered a feasible option when compared to coal, which is abundantly available in the country. Diesel was also considered as another possible option but rejected for large capacity additions because of the high product and transportation costs. However, Eskom has established over 1,000 MW of open-cycle gas turbines based on diesel fuel to meet its peaking power needs.

112. In the long term, South Africa intends to develop nuclear-based electricity capacity. In this context, the nuclear option has been exhaustively studied with a last review in 2008. Development of large nuclear capacity in the time frame of 2015/16 is not feasible. Moreover the cost of nuclear power is substantially higher than the coal alternative and its development raises a number of issues such as security, nuclear fuel disposal, and operational expertise, which are likely to take several years to address.

113. In addition to various fuel options, other regional options such as hydroelectric or other renewables were reviewed. None of the regional hydro plants, except those in Mozambique, can potentially supply electricity in the medium term; these plants can supply only about 2,500 MW, which is well below South Africa's current needs. In addition, these plants are being developed in the private sector as IPPs, which adds an additional level of uncertainty to their commissioning schedule and could delay the availability of power from these plants even beyond the current planned schedules. There are no other renewable resources in the region that can be developed in the medium term.

114. Based on comparison of alternatives and the least-cost analysis, Eskom decided that the only feasible option to install about 9,600 MW of new baseload capacity in the medium term should be based on domestic coal. In selecting the most appropriate means to meet demand, the IRP gave priority to moderating the growth in demand through various energy efficiency measures. This resulted in the demand forecast being reduced by some 3,000 MW over the first 5 years, which amounts to about three-fifths of the capacity of a new power station like Medupi.

115. Once this decision was made, Eskom carried out a site-selection analysis. The Medupi site, which is located at Eenzaamheid, only five kilometers to the southwest of the existing Matimba power station, is considered as an optimal location for the first 4,000-4,800 MW power plant due to availability of adequate land, easier power evacuation options, and least environmental and social impacts. Although water is available, the amount is not adequate for wet cooling, thus requiring dry air cooling (see discussion on Eskom Expansion Plan in Annex 1 that describes analysis of technically and economically feasible options).

Alternative Coal-Fired Technologies (Component A)

116. Having concluded that coal-fired generation provided the only feasible solution, the next step was to decide what technology to adopt, a key consideration being that the technology should minimize carbon emission and should be proven to ensure reliability of supply. The technologies for consideration were Subcritical, Supercritical, Ultrasupercritical pulverized coal, Fluidized Bed Combustion, and Integrated Gasification Combined Cycle (IGCC). Subcritical pulverized coal had been Eskom's conventional technology but it was rejected due to low efficiency and high carbon emissions.

117. The decision to use Supercritical technology was made in 2006[61] and was based on the following considerations:

(a) Supercritical is a mature and proven technology which is the choice for most of the new large coal power plants in large MICs such as India and China. It should be noted

[61] The Bank hired Nexant LLC, a San Francisco based engineering consulting firm which has reaffirmed the choice of supercritical technology for the Medupi Power Plant.

that almost 80 percent of the existing capacity in OECD, India and China is still subcritical. China has been operating indigenously manufactured supercritical capacity since 2005 and India is just beginning to develop new plants based on this technology (for larger units it is still largely relying on outside vendors). Supercritical technology enables higher efficiency of around 38-40 percent (High Heat Value, HHV) depending on ambient conditions, compared to 35-38 percent (HHV) for subcritical technology under similar ambient conditions. Selection of the supercritical technology with lower carbon emissions compared to subcritical technology is therefore appropriate.

(b) Although a more advanced and less-polluting technology than conventional subcritical, Fluidized Bed Combustion was rejected because it was not available in large unit sizes, which were needed to meet Eskom's needs. In 2006, boiler sizes were in the range of 200-300 MW for this technology.

(c) The next and most advanced level of proven technology, Ultrasupercritical, with efficiency levels of around 40-42.5 (HHV) percent was not considered appropriate for South Africa because:

  (i) The technology has a limited operational track-record in developing countries. Other than China not many developing countries have experience in using this technology and thus it has not been demonstrated reliably in South African conditions. Worldwide ultrasupercritical is about 2 percent of capacity;

  (ii) Virtually all ultrasupercritical power plants under operation use water for cooling, unlike the situation in South Africa where plants have to be designed to use air cooling due to water scarcity (the first air-cooled ultrasupercritical unit was commissioned in Australia only in 2007, and therefore there is a again limited track record of performance).

(d) IGCC technology was not considered by Eskom. The planned new capacity additions are about 25 percent of current national capacity. Hence, it was determined that a move to adopt a less mature technology with no operational track record for large-sized power plants was operationally risky.

Alternative forms of Bank Support (Project as a whole)

118. The Bank, the GoSA and Eskom considered the appropriateness of various World Bank instruments to meet the urgent financing needs. A fast-track SIL was found most appropriate as the financing is required for Eskom's Investment Program. The GoSA in February 2009 formally requested Bank support for Eskom's investment program through a SIL and reiterated this request to the Bank in November 2009.

Alternatives – Majuba Road to Rail Component (C.1)

119. In addition to the "do-nothing" scenario, the economic evaluation of the Majuba road to rail coal transportation project (carried out in 2004 as part of the project's prefeasibility analysis) compared two sets of scenarios: the Ermelo-Majuba railway line (13 MTpa); and two separate conveyor systems, one from Elders and one from Leandra (each separately cannot supply the full coal requirements of the Majuba Power Plant). The prefeasibility evaluations clearly indicated that the Ermelo-Majuba railway line is the preferred option for the following key reasons: (a) shortest potential implementation time – the Ermelo-Majuba railway line has the potential to be in operation 2 years earlier than the conveyor systems, which will require finalization of a contract with a long term coal supplier; (b) the implementation of the railway transport option is not dependent on the conclusion of new coal supply contracts due to the flexibility of coal supply options (potentially more coal is available than what is required at Majuba); (c) improved source flexibility – all future and existing mines exporting via Transnet coal rail line will be able to supply coal to Majuba power station; (d)

capacity – the system can exceed 13 MTpa on relatively short notice and with limited cost impact by using additional rolling stock; and (e) security of supply – more than one mine will supply Majuba and there will be two alternative rail routes to Majuba, which greatly reduces the risk of non-supply.

III. IMPLEMENTATION

A. Partnership arrangements

120. The project will have large amounts of joint cofinancing and parallel co-financing from multilaterals, bilaterals and ECAs.

121. As noted earlier, Component A is proposed to be financed (parallel) by AfDB and European ECAs (Coface and Hermes). Eskom has secured a loan of US$2.63 billion equivalent from the AfDB for Medupi (turbines and boilers contracts). Component B is proposed to be parallel-financed by the CTF (joint and parallel) and development financial institutions (see Table 5).

122. The approved CTF complete Investment Plan (IP),[62] in addition to the public sector projects, includes 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 Component B of this project, US$150 million is expected to support implementation of the GoSA's Solar Water Heater program and private sector-led energy efficiency and renewable energy activities. For clarification purposes, IBRD is not financing this specific component, which will be implemented by the private sector.

Table 5: CTF Investment Plan (November 2009)
Proposed Low carbon initiatives to be financed by CTF and other Public Lenders[63]
(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**

123. 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. A regional PPIAF grant is supporting assessments targeted to improve the creditworthiness of several power utilities in Southern Africa, thus enhancing their ability to secure financing for the large power sector investment program. 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

[62] The CTF investment committee approved a US$500 million CTF financing plan for South Africa in October 2009.
[63] Excludes Eskom's equity financing for the renewable projects.

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 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

124. 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.

125. 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 has not implemented a program of this size in the recent past and has lost some of the skills that it had then. To address this deficit the utility has been recruiting 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. See Annex 6 for Eskom's institutional arrangements.

126. Component A – The Medupi Power Project: Eskom has appointed experienced engineering houses as execution partners with the necessary skills. For Medupi, the execution partner is Parsons Brinckerhoff (PB). PB leads the execution team, which comprises a mix of Eskom and PB staff, and their mandate includes the transfer of skills to the local workforce.

127. The project will be overseen by a Medupi Leadership Committee which consists of eight senior management representatives (Chief Operating Officer (COO) / Senior General Manager / General Manager) from Eskom and PB. The PB representatives include the COO of PB Africa and COO of their US arm. The overall Medupi project, which includes addressing the transmission interfacing, licensing, public liaison, industrial relations and other traditional functions, is the responsibility of the Medupi Project Team (MPT) under the management of the Medupi Executive Project Manager. The MPT is further supported by various divisions in Eskom; in particular, Finance, Treasury and Corporate Services. In total, there are 38 Medupi Execution Teams (MET) for specific contracts to review vendor design, system integration and project execution.

128. Coal will be supplied from an existing independent coal mine (Grootegeluk), owned by Exxaro (a private sector entity) and transported to the power plant via a conveyor system. The mine currently supplies coal to the nearby Matimba Power Station. A Coal Supply and Offtake agreement has been entered into by Eskom for the supply of coal to the Medupi Power Plant.

129. Responsibility for the timely supply of water for Medupi rests with the Department of Water Affairs (DWAF). The six units of Medupi will require about 6 million cubic meters of water per year to operate. In addition, the FGD proposed to be installed later by Eskom will require at least another 6 million cubic meters per year. The source for the initial 6 million cubic meters will be the Mokolo River and dam. There is currently enough water in the Mokolo River, and Eskom has permits, to operate the first three Medupi units. To permit the next three units, and to ensure the environmental base flow, augmentation of the current Mokolo River pipelines and related infrastructure is required. Improvements to the existing Mokolo River system (Phase 1) include: (a) a weir and a short pipeline to overcome a gradient and pipe bottleneck that will increase flow through by 20 percent; and (b) laying a new pipeline parallel to the existing pipeline from the Mokolo dam to the Medupi site. Phase 1 investments will add 6 million cubic meters per year to the existing capacity and will cost an estimated R1.9 Billion. Construction time is expected to be about 2.5 years and in time for the operation of the last three units of the Medupi Power Plant. The GoSA is fully committed to completing the

investment program for water availability in a timely manner (see Section III.F for the agreed covenant).

130. Upon commissioning, the power plant will be handed to the Generation operations division. Eskom has already identified staff that will be responsible for operation and maintenance of the power plant. In preparation for operations, arrangements have been made to provide training to the O&M staff. Consistent with best international practices, this includes on-the-job-training by the construction contractors as well as hands-on training at similar facilities outside the country.

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

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

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

134. Component C.1 ¬ Majuba Rail Project: The proposed Majuba Rail project has been well-studied for a number of years and the technical design of this component is complete. The process for every contract that needs to be procured will be led by a dedicated staff. Eskom has already established a project management unit for this component, headed by a project manager, under CED, for construction supervision and management. Transnet Freight Rail (a public entity that owns and operates most of the rail transport network in South Africa; TFR) will provide the Eskom team expert advice as and when required. TFR will also be responsible for engineering compliance.

135. Eskom will construct and own the railway line infrastructure assets, while TFR will be the rolling stock owner and operator. A Coal Transportation Agreement (CTA) will be signed between TFR (the proposed operator) and Eskom. Within Eskom, the operation of the project will be the responsibility of the Primary Energy department, also reporting to Generation Business.

136. Component C.2 ¬ Technical Assistance for Energy Efficiency Improvements: The proposed technical assistance component will be managed by a project manager within Generation Business.

137. Component C.3 ¬ Technical, Legal and Financial advisory services for development and implementation of domestic and cross-border renewable energy projects: The proposed technical assistance component will be managed by a project manager within the Corporate Services Department.

138. IBRD Implementation Support: The IBRD support during implementation takes cognizance of the size and complexity of the project, the challenges of working with a new client unfamiliar with IBRD procedures and the arrangements required to support the use of country systems for safeguards. It applies lessons from other operations, some of which have been referred to an Inspection Panel as a result of unsatisfactory implementation support.

139. To ensure a smooth transition from preparation to supervision, the majority of members of the 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 field staff will include team leadership, financial management and procurement. The implementation support plan (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 strengthen capacity.

140. 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. 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 and the Ermelo-Majuba Rail 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.

141. At least one implementation support mission will be undertaken before the end of FY2010, soon after the loans become effective, and three missions will be undertaken in FY2011. Missions will also include safeguards and fiduciary staff. Implementation support will be coordinated with other financiers such as AfDB (and other potential lenders) where possible and maximum utilization will be made of field-based staff. IBRD implementation support is expected to cost US$2 million over the implementation period of 5 years.

C. Monitoring and evaluation of outcomes/results

142. Monitoring and impact evaluation of the overall project will be the responsibility of Eskom Holdings, with support from NT 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 five project managers and between Eskom, the shareholder (DPE), DoE and NT.

143. 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 would be carried out within approximately 30 months from effectiveness of the loan. 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

144. The proposed project is critical for the continued economic growth and energy security of Southern Africa. In addition, it is critical to ensure that Eskom Holdings remains a strong electricity utility and plays its ongoing role as an anchor off-taker for regional projects. The following matters provide a sound basis for sustainability of the Project:

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

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

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

(d) The demand forecast for electricity in South Africa has been reviewed and shows that the proposed project is critical for maintaining acceptable reserve margins.

E. Critical risks and possible controversial aspects

145. A detailed Risk Identification Sheet was prepared following the Operational Risk Assessment Framework, which is provided as a separate document. The overall risk of the operation is considered to be Substantial considering in particular the reputational risk associated with coal and the impact of coal-fired power plants on environment, as well as the fact that this will be the first major IBRD operation in South Africa and will require consideration by the Board of one-time policy exception for financing the contracts that have already been awarded.

146. Key risks, categorized as Project Stakeholder, Operating Environment (country and sector), Implementing Agency and Project (operation-specific) risks, are detailed below:

(a) The Project Stakeholder Risks comprise Borrower relations, reputational risk to the Bank and HIV/AIDS in the project area, which are considered Substantial or High.

(i) *Borrower relations – Country engagement with the World Bank (Substantial)*: This is the first large SIL being proposed for South Africa after a long hiatus and the Borrower has not been exposed to Bank processing and policies. There is continuing concern about Bank conditionality as part of its engagement. 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 will help alleviate these concerns.

(ii) *Reputational risk to the Bank (High)*: The risk of negative public perception of the Bank's support for coal-fired power plants is high. The Borrower has carried out a rigorous selection process and ensured that the best proven available technology will be adopted. A robust communication strategy has been developed with a view to providing a clear understanding of the Bank's position on addressing climate change and energy access/security needs. The main messages are that in the short-term coal investments will ensure energy security, thus boosting the economy, while investment in renewables will help South Africa meet its low carbon strategy and COP15 commitments.

(iii) *Reputational risk related to Procurement (Substantial):* Complaints from firm(s) that learn about the Bank's financing of the Medupi Power Plant contracts and may raise issues not known to the Bank during its due diligence, or allegation of fraud and/or corruption, is substantial. The Bank will reserve the right to refuse financing of the concerned contract and cancel the amount allocated from the loan for contracts where fraud or corruption is established. In the case of already disbursed amounts, reimbursement will be requested.

(iv) *HIV/ AIDS incidence around the project areas worsen (Substantial)*: Eskom has an HIV/AIDS workplace program, which it extends to contractors and suppliers, and will apply to the project sites. The program has been evaluated by independent experts and found to be successful.

(b) Operating Environment Risk (Country and Sector Risk), is considered to be moderate.

(i) *Economic management (Moderate):* Continued sound fiscal and macroeconomic policies gain special importance in the context of an ongoing economic downturn – a large current account deficit in the face of disappearing global capital flows poses a considerable macroeconomic policy challenge for South Africa. An established record of macroeconomic policy credibility and a sound domestic banking sector help mitigate the impact of the financial storm and protect the longer-term economic prospects. The fact that the country is officially out of recession is an indicator of good macroeconomic management.

(ii) *Delays in attracting private investment in power generation and implementing measures to improve energy efficiency (Substantial):* To mitigate the risk, the Government is modifying the incentive framework so as to make the sector attractive for private sector investments, and strike a realistic balance between public sector and private sector financing of the power development program. The framework includes tariff revision; establishing an improved regulatory framework for procurement; and implementation and operation of private sector projects, which address potential private sector concerns. Technical support and ongoing advice from the Bank team mitigate this risk. In addition, the GoSA is exploring private participation in ownership and operation of existing assets.

(c) Project (operation-specific) risks, consisting of issues concerning the energy mix and continued reliance on coal and sensitivity around the use of country systems.

(i) *Sensitivity around the use of country systems (Substantial):* South Africa has robust environmental and social safeguard systems in place. No specific

waiver is required for the Use of Country Systems. However, in order to mitigate the sensitivity associated with piloting the use of country systems for the first large investment operation in the country, the Project Team has disclosed the safeguards documents in addition to the Safeguards Diagnostic Review. Public consultation on the SDR took place in December 2009.

(ii) *Absent FGD, measures to mitigate sulfur-dioxide emissions from the power plants would not be consistent with World Bank environment health and safety guidelines for new thermal power plants, nor with South Africa's proposed emissions standards for new plants (Substantial).* Although the Medupi plant is classified as an "existing" plant under South Africa's proposed emissions regulations (due to the fact that the EIA was approved prior to the issuance of the new plant regulations), the Department of Environment Affairs is planning to designate the Waterberg airshed a priority area for air pollution control. Thus, Eskom's plans of and is therefore supportive of appropriate measures, such as FGD, to bring Medupi emissions in line with ambient air limits.

(iii) *Sufficient amount of water might not be available in time for the commissioning of the last three units or the FGD equipment (Moderate).* Progress on the project to supply the required amount of water is on schedule. Nevertheless, the Bank has requested evidence from the Department of Water Affairs to Eskom, committing to timely water supply.

F. Loan/credit conditions and covenants

Conditions for Effectiveness of the Loans:

(a) Standard Conditions;

(b) execution and delivery of the Guarantee Agreement, and all conditions precedent to its effectiveness (other than the effectiveness of the Loan Agreement) have been fulfilled;

(c) a special legal opinion satisfactory to the Bank of an independent counsel acceptable to the Bank in connection with certain aspects of the Guarantor's Anti-Corruption Legislation framework.

Conditions for Disbursement:

(a) Conditions for payments of Past Contracts under component 1 of the Project:

- the Bank's has to be satisfied that the contractor or sub-contractor who has been awarded a Past Contract was not debarred, or suspended by the Bank at the time when the contract award was made; and
- the Bank has determined that: (a) the amendments to the Past Contracts to include the Bank's Anti-corruption and right to audit provisions are in form and substance satisfactory to the Bank; and (b) its due diligence review of procurement decisions in connection with the Past Contracts has been completed in a satisfactory manner.

(b) Conditions for payments of Future contracts under component 2 of the Project:

- the Bank has to be satisfied that adequate funds are available to the Borrower to finance the second component of the Project from other sources than the Loan on terms and conditions consistent with the obligations of the Borrower under this Loan Agreement.

IBRD Loan Covenants:

147. Specific Anti-Corruption Covenants for Past Contracts under Part A of the Project (Medupi Power Plant)

(a) Except as the Bank may otherwise agree in writing, and with regard to all Past Contracts, the Borrower shall negotiate and amend each such contract to include the Audit Right and Fraud and Corruption Provisions in conformity with the Anti-Corruption Guidelines and as such provisions are reflected in the Bank's Standard Bidding Documents, including, *inter alia*, the definition of sanctionable practices included in the said Anti-Corruption Guidelines and Standard Bidding Documents and the Bank's right to sanction a firm or individual determined by it to have engaged in any such sanctionable practice during the bid, award or implementation of a given Past Contract.

(b) Without limitation upon the provisions of paragraph 1 of this Section and with regard to all Past Contracts:

(i) the Borrower shall promptly, by notice in writing, inform the Bank regarding any information in its possession, including non-frivolous allegations that reasonably may point to the possibility of the occurrence of any corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contract to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines or the relevant Anti-Corruption Legislation. To this end, all such information shall be provided to the appropriately named official(s) of the Bank;

(ii) the Borrower shall, following due consultation with the Bank, promptly take all appropriate action in accordance with the Anti-Corruption Legislation to commence an investigation in connection with the information referred to in sub-paragraph (i) of this paragraph and any information provided to the Guarantor by the Bank regarding allegations of corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contract to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines;

(iii) in the event that the investigation referred to in sub-paragraph (ii) of this paragraph confirms that either a corrupt, fraudulent, collusive, coercive and/or obstructive practice has occurred, the Borrower shall promptly take timely and appropriate action to implement the findings of such investigation and enforce the applicable remedies, in accordance with the Anti-Corruption Legislation and share with the Bank evidence or any other information identified or discovered during such investigation in connection with any such contract, it being understood that the Bank will keep such information confidential in accordance with confidentiality procedures that apply to its own investigations;

(iv) the Borrower shall, in writing, adequately and regularly and, in any event, no less frequently than quarterly, commencing with the date on which such allegations were received by the Borrower, inform the Bank regarding any subsequent action taken pursuant to the investigation referred to in sub-paragraph (ii) of this paragraph, and the result of enforcement of any remedies referred to in sub-paragraph (iii) of this paragraph, including any monies that may be recovered as a result of such action; and

(v) in the event that the Bank may, pursuant to information referred to in sub-paragraph (i) of this paragraph, and investigations referred to in sub-paragraph (ii) of this paragraph, determine that a corrupt, fraudulent, collusive, coercive and/or obstructive practice, or any sanctionable practice has occurred in connection with any Past Contract, the Bank shall have the option, in its absolute discretion, to cancel the portion of the proceeds of the Loan allocated

to such contract, or require the Borrower to reimburse any amount that has been disbursed out of the proceeds of the Loan under such Past Contract.

148. Environmental and Social Safeguards

(i) The Borrower shall implement the Project in accordance with the provisions of the Environmental Legislation, the Social Legislation, the RODs, the EIA, the EMP, the RPF, the RAPs, if any RAPs are required in accordance with the RPF, and the provisions of this Agreement. Without limiting the generality of the foregoing, the Borrower shall exercise regular monitoring to ensure that emissions from the Medupi Power Plant remain in compliance with the provisions of applicable Environmental Legislation and all the terms of the ROD referred to in paragraph 206 of the SDR.

(ii) The Borrower shall:

(a) not later than June 30, 2013, develop, adopt and thereafter implement a program, satisfactory to the Bank, to install FGD equipment in each of the six power generation units of the Medupi Power Plant, taking into account technical, environmental and financial criteria in accordance with terms of reference to be discussed with the Bank, such program to be designed such that the installation of the FGD equipment for the first power generation unit shall commence on the later of (i) the sixth anniversary of the Commissioning Date or (ii) March 31, 2018 or such later date as the Bank may establish following consultations with the Borrower), and, thereafter, continue the installation of the FGD equipment sequentially, in each case thereafter at the time each of the remaining five power generation units is taken out of service for the first major planned outage, it being understood and agreed that all the FGD equipment for the six power generation units shall be installed and fully operational not later than December 31, 2021, or such later date as the Bank may establish following the said consultations with the Borrower; and

(b) afford the Bank a reasonable opportunity to exchange views with the Borrower on such FGD installation program at each of its preparation and implementation phases.

(iii) The Borrower shall refrain from carrying out any Project activity 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, Sere Wind Power and Majuba Rail and Transmission projects (all described under Parts B and C of the Project); 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.

(iv) 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.

(v) The Borrower shall, not later than 45 days after the end of each calendar semester, furnish to the Bank reports in form and substance satisfactory to the Bank, showing the volume of the water available for the Medupi Power Plant, and the use thereof. The first such report shall be submitted to the Bank within six months of the Commissioning Date.

(vi) Except as the Bank shall otherwise agree, the Borrower shall not amend, abrogate or waive any provision of any of the RODs, if such amendment, abrogation or waiver may, in the opinion of the Bank, materially and adversely affect the implementation of the Project, or a substantial part thereof.

IBRD Guarantee Agreement (Government Undertakings):

149. Environmental and Social Safeguards: The Guarantor specifically undertakes to:

(a) complete the Environmental Management Framework (EMF) for the Guarantor's Waterberg district in compliance with the Environmental Legislation;

(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;

(c) adopt the EMF and implement, the applicable policies and plans that are developed consequent to the said EMF, and cause other parties to implement their projects and activities in compliance with the guidelines for environmental management adopted through the said EMF, policies and plans;

(d) ensure that the Record of Decisions for the Medupi Power Plant, the Upington Concentrating Solar Power plant, the Sere Wind Power and the Majuba Railway and Transmission projects and, when it is issued, for the transmission system associated with the Medupi Power Plant, as well as the mitigation measures set forth and to be set forth therein, are implemented and adhered to;

(e) take timely action to ensure adequate supply of water to the Medupi Power Plant for the operations of the Borrower's six units, including the FGD units; and

(f) inform the Bank of, and consult with the Bank on, any proposal to modify any of the RODs if, in the opinion of the Bank, the application of such proposal would result in material and adverse environmental or social impacts upon the Project or any substantial part thereof.

150. Anti-Corruption: The Guarantor specifically undertakes:

(a) promptly, by notice in writing, to inform the Bank regarding any information in its possession, including non-frivolous allegations that reasonably may point to the possibility of the occurrence of any corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contracts to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines or the relevant Anti-Corruption Legislation. To this end, all such information shall be provided to the appropriately named official(s) of the Bank;

(b) following consultations with the Bank, to promptly take all appropriate action in accordance with the Anti-Corruption Legislation to commence an investigation in connection with the information referred to in sub-paragraph (a) of this paragraph and any information provided to the Guarantor by the Bank regarding allegations of corrupt, fraudulent, coercive, collusive and/or obstructive practice in connection with the bidding process, the award, or implementation of any contract to be or being financed out of the proceeds of the Loan, as these terms are understood under the Bank's Anti-Corruption Guidelines;

(c) in the event that the investigation referred to in sub-paragraph (b) of this paragraph confirms that either a corrupt, fraudulent, collusive, coercive and/or obstructive practice has occurred, to promptly take timely and appropriate action to implement the findings of such investigation and enforce the applicable remedies, in accordance with the Anti-Corruption Legislation and share with the Bank evidence or any other information identified or discovered during such investigation in connection with any such contract; it being understood that the Bank will keep such information confidential in accordance with confidentiality procedures that apply to its own investigations;

(d) to adequately and regularly and, in any event, no less frequently than quarterly, commencing with the date on which such allegations were received by the Guarantor, inform the Bank regarding any subsequent action taken pursuant to the investigation referred to in sub-paragraph (b) of this paragraph, and the result of enforcement of any remedies referred to in sub-paragraph (c) of this

paragraph, including any monies that may be recovered as a result of such action; and

(e) in the event that the Bank may, pursuant to information referred to in sub-paragraph (a) of this paragraph, and investigations referred to in sub-paragraph (b) of this paragraph, determine that a corrupt, fraudulent, collusive, coercive and/or obstructive practice, or any sanctionable practice has occurred in connection with any Past Contract, the Bank shall have the option, in its absolute discretion, upon notification to the Borrower and the Guarantor to cancel the portion of the proceeds of the Loan allocated to such contract, or require the Borrower to reimburse any amount that has been disbursed out of the proceeds of the Loan under such Past Contract.

151. Financial Undertaking

If the Borrower has failed to perform its obligation under the Financial Undertakings of the Borrower under the Loan Agreement, then the Bank may issue to the Borrower a notice pursuant to paragraph 7.02(b)(i) of the General Conditions (Notice of Suspension). If such failure to perform continues for a period of sixty days after such Notice of Suspension, then the Bank may issue to the Borrower a notice of default pursuant to paragraph 7.06(b)(i) of the General Conditions (Notice of Event of Acceleration). The Bank may, at any time thereafter, during the continuance of such event, notify the Guarantor of such default, continuance and potential acceleration, which notice shall include a period of one hundred and twenty days, or such longer period as the Bank may agree, if the Bank elects to make a demand upon the Guarantor.

IV. APPRAISAL SUMMARY

A. Economic and financial analyses

Summary Economic Appraisal

152. In the short to medium term, South Africa needs to deliver adequate power supply to continue meeting its poverty alleviation goals and economic development objectives. This assessment finds that it cannot meet national electricity use needs without addition of baseload capacity in the short term, and that the most economically viable option is the development of the Medupi coal-fired project. Over the next 20 years, according to the LTMS, South Africa's GHG emissions are expected to increase by 500 million tons, and Medupi would account for 6.8 percent of this growth in CO_2 emissions. However, South Africa's adoption of supercritical technology (as an initial step in its low carbon growth) will result in an emissions savings of about 150 million tons (based on Eskom proposed new coal plants) over this period, when compared with sub-critical coal-fired power plants.

153. In line with South Africa and Eskom's commitment to reduce GHG emissions, this operation also supports investments in two other components: (a) Renewable Power Plants (wind and CSP projects) are being developed primarily to help deliver on South Africa's commitment to follow mitigation strategies set out in the LTMS; and (b) the Majuba Rail Project, which would not only reduce GHG emissions as a result of traffic transferring to the more fuel-efficient rail system, but also result in operating cost savings for the traffic diverted to the new line. These projects would help South Africa reduce growth in emissions immediately and are expected to play a catalytic role in the envisaged larger-scale development of these technologies.

154. The economic analysis has been carried out for all three components separately, and for the project as a whole. The economic assessment for the Project covers the following main aspects. Details are provided in Annex 9.

- Assessment of whether additional baseload power is required and whether Medupi currently represents the least-cost option to deliver the required power. If so, assessment of Medupi's economic net present value.

- Assessment 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).
- Assessment as to whether the Majuba railway project is economically viable (principally using analysis of economic rates of return from the project and economic net present value).

155. *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.[64] The ERR has also been evaluated at the just approved tariff with increases of 24.8% in FY11; 25.8% in FY12; and 25.9% in FY13. The switching value of the tariff increases (required in FY14-FY19) have also been calculated that allow for the ERR to equal the hurdle rate. Assessment of benefits at the tariff levels provides an estimate of the lower bound of WTP.[65]

156. *Calculating economic rates of return – rate of discount*: 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; for the LTMS prepared for DME, 10 percent was used.

157. *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 Medupi, this value is added as a cost of generating power. For each of the renewable energy projects and the railway project, 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.[66]

Component A – Medupi Coal-Fired Project

158. Eskom's expansion plan studies have demonstrated that in order to meet South Africa's power needs, coal is the most economic option for meeting the baseload power requirements. This result is also true of the low demand forecast (which includes assumptions related to lessening of the electricity intensity of the economy and a DSM program that will reduce the 2020 load by 15,562 GWh and 3,225 MW. The economic analysis has confirmed this by a detailed examination of a range of possible alternatives to Medupi (see Annex 9 for details).

159. The economic analysis also indicates that the (shadow) prices of carbon as a switching value for alternatives to the Medupi Power Plant are high, with only one exception — hydropower developments on the Congo River in DRC (Inga III and/or Grand Inga) – US$7 per ton of CO_2. More importantly, the renewable energy alternatives to Medupi have incremental finance requirements, beyond South Africa's access to carbon or public finance. In part this is also a consequence of lower load factors for renewable energy plants when compared to fossil fuel based power plants. For example, to produce energy equivalent to the proposed Medupi Power Plant (~4,800 MW) would

[64] If Medupi were a small project, and supplied only the first few kWh of this total expected increase in demand, then 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 since Medupi is a large project, accounting for more than half the expected growth in demand, and since 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, use of the average WTP is appropriate and ensures a conservative result.

[65] 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.

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

require an installed wind capacity of 15,310 MW (at a 27 percent average load factor), with an estimated project cost of at least US$20 billion.

160. Once Medupi reaches full output, its gross GHG emissions are on the order of 30 million tons per year. Over the next 20 years, South Africa's GHG emissions are expected to increase from around 500 million tons CO_2 to 1,000 million tons, an increase of 500 million tons. Medupi thus accounts for 6 percent of this growth in CO_2 emissions. However, in net terms the increase in emissions would be much less, some 10.7 million tons. This is based on the fact that if Medupi were not constructed, electricity consumers would use diesel self-generation (in the non-domestic sectors), and candles, kerosene and dry cells for the domestic sector. These alternatives are not free of GHG emissions. Generation with diesel has typical emission coefficients of 710-740 gm/kWh for gasoil, and 650-700 gm/kWh for larger captive units using heavy fuels. Emissions from coal combustion at a highly efficient supercritical plant are on the order of 900gm/kWh (gross). Alternatively, if Medupi were simply replaced with the next best economic alternative, which is LNG in combined cycle, this would reduce the GHG emissions to around 0.5 kg CO_2 /kWh associated with a high efficiency gas combined cycle plant. In this case net GHG emissions increase to 13.3 million tons. If Medupi were replaced by a sub-critical plant, this would increase the GHG emissions by 7.4 percent annually, and the net GHG emission increase would be 2.51 million tons of CO_2 per year, or a lifetime increase of 75.15 million tons CO_2.[67]

161. The baseline economic rate of return (ERR) of the Medupi coal project is estimated at 24.0 percent, with an economic net present value (ENPV); at a discount rate of 10 percent of US$15.7 billion.

162. The ERR at the existing average tariff (about 4 UScents/kWh) is negative, which points to the importance of raising electricity tariffs. Under the tariff increases just approved by the regulator (24.8% in FY11; 25.8% in FY12; and 25.9% in FY13 (nominal) - and no increases in real terms thereafter), the ERR increases to 2.47%. Under the tariff scenario that allows for financial sustainability of the Company (assumed 12.5% increase in FY14 and FY15, and one percent above inflation thereafter), ERR increases to 8.13% (at which point the tariff is 8.9 UScents/kWh). However, as noted, this is a lower bound of economic returns: indeed, the consumer group with the lowest WTP is large industry (which in the absence of the power provided by Medupi would use captive generation based on fueloil), and which has a WTP of around 12 .7 UScents/kWh, demonstrably above this lower bound. The switching value of the tariff increase required in FY14-FY19 is 5.4% above inflation.

163. The robustness of these economic returns to the main risk factors has been confirmed based on an extensive sensitivity analysis as demonstrated in Table 6.

Table 6: Medupi Power Plant – Summary Economic Analysis

Risk factor	Units	Baseline Assumption	Switching Value (ENPV =0)	Assessment of Risk
Construction cost increase	$/kW	2,203	6,131	very low
World oil price (no change in Medupi coal price)	US$/bbl	75	17	very low
Consumer WTP	UScents/kWh	17.5	10	low
Value of Medupi coal	US$/ton	31.9	155	extremely low
Lower than expected plant efficiency (net)	[%]	37.5%	0.08	extremely low
Average annual plant factor (first year)	[%]	90%	39%	extremely low
Opportunity cost of water	Rand/m3	20	>200	extremely low
Plant life	years	50	5	extremely low

[67] Based on an estimated plant life of 30 years.

164. *Impact of GHG emissions*: The ERR decreases from 24.0 percent to 21.5 percent when the net increase in GHG emissions is taken into consideration with a CO_2 valuation of US$29/ton.[68] The sensitivity analysis of economic returns against the CO_2 price shows a shadow price of CO_2 (i.e., the value of CO_2 emission reductions at which the project would be equal in economic viability to the Medupi power project) of US$142/ton (see Figure 3 in Annex 9). This is almost twice the higher estimate provided in the Stern Review of US$85 per ton CO_2.

165. The analysis of GHG emissions has also been assessed on the basis of life cycle emissions.[69] In the case of Medupi, this increases gross GHG emissions, with a slight decrease in ERR from 21.5 percent to 21.3 percent. But in such an analysis the emissions of other options also increase. Consequently the carbon shadow prices also change: in the case of LNG from $105/ton CO_2 to $135/ton CO_2, because of significant emissions in liquefaction and transport, and small decreases in shadow price relative to the renewable energy alternatives and nuclear power. The details of the life cycle GHG emissions analysis are provided in Annex 9.

166. The robustness of the project to exogenous uncertainties has also been examined in a scenario analysis: two scenarios have been assumed:

- *Optimistic scenario*: robust global economic growth leading to increasing world oil and commodity prices, and hence higher costs of coal (and also a higher WTP as oil prices increase). Construction cost overruns are also likely in this scenario as equipment prices increase in a seller's market when order books are full, and steel prices are high.
- *Pessimistic scenario*: lower economic growth, high damage costs to South Africa from climate change leading to less-than-expected electricity demand growth and increasing water shortages. This is coupled with disappointing project performance – less-than-expected efficiency, construction cost overruns.

167. The results of this scenario analysis are shown in Table 7. As expected, the downside risk exceeds the upside risk. However, even under the worst case scenario (low world oil price, construction cost overruns, and low consumer willingness to pay), the ERR falls from 23.9 percent to 16.0 percent, and when higher GHG damages are included in the pessimistic case, the ERR falls to 10.6 percent, slightly above the 10 percent hurdle/discount rate.

Table 7: Medupi Power Plant: Economics – Scenario Analysis

	Pessimistic	**Baseline**	**Optimistic scenario**
ERR	16.0%	24.0%	25.8%
ERR including GHG damage costs	10.6%	21.5%	23.9%

168. Based on the above analysis, it is concluded that the Medupi Power Plant is economically viable, has high economic returns and that the returns are robust to wide ranges of uncertainty in assumptions. Hydro and nuclear options are also part of Eskom's expansion plans, and are complements to rather than substitutes for Medupi. Moreover renewable energy alternatives (wind and CSP) have carbon shadow prices far in excess of the likely social costs of carbon.

[68] The $29/ton valuation is based on the Stern Report (see Annex 9), and is also roughly equal to the 2008 EU ETS price. However, 29$/ton$CO_2$ is significantly higher than the 2008 CDM market price of (US$16.8/ton in the primary CDM market).

[69] This includes emissions over the entire life cycle of a technology (including construction and decommissioning), and the emissions across the entire value chain (for example, in the case of LNG, includes emissions associated with flaring, liquefaction, transport and regasification; or in the case of coal, in coal mining, and coal transportation). The life cycle emissions for mine-mouth coal projects such as Medupi are lower than those associated with imported coal involving long transportation distances.

169. The net GHG emissions of Medupi must be placed in the context of the Government's overall program to achieve a lower-carbon expansion path. Analysis was conducted to compare the net emissions of the DSM program, the renewable energy target under the REFIT program, and the Medupi power project. To carry out a conservative assessment, it is assumed that the 10,000 GWh RE target is reached four years later – in 2017 – and that the Medupi project is replacing gas-fired (LNG) generation. As shown in Table 8, CO_2 emission savings from the GoSA DSM program and the REFIT renewable energy program exceed the incremental emissions from the Medupi Power Plant for the life of the coal-fired power plant.

Table 8: CO_2 Emissions – Medupi Power Plant v/s GoSA REFIT & DSM Programs

	DSM program		**Renewable energy program (REFIT)**			**Medupi**	**Net impact [5]-[6]**
	Energy	*Avoided CO_2 emissions*	*Energy*	*Avoided CO_2 emissions*	*Total [2]+[4]*	*Net CO_2 emissions*	*Net CO_2 emissions*
	GWh	**mtpy**	**GWh**	**mtpy**	**mtpy**	**mtpy**	**mtpy**
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
2009	428	0.4	0	0.00	0.4		-0.4
2010	662	0.7	500	0.52	1.2		-1.2
2011	1,156	1.2	1,000	1.03	2.2		-2.2
2012	3,058	3.1	2,000	2.06	5.2	2.4	-2.8
2013	5,291	5.4	4,000	4.12	9.6	7.2	-2.4
2014	7,140	7.4	6,000	6.18	13.5	11.5	-2.0
2015	8,782	9.0	8,000	8.24	17.3	15.6	-1.7
2016	10,477	10.8	9,000	9.27	20.1	16.7	-3.3
2017	12,172	12.5	10,000	10.30	22.8	16.7	-6.1
2018	13,867	14.3	10,000	10.30	24.6	16.7	-7.9
2019	15,562	16.0	10,000	10.30	26.3	16.7	-9.6

170. Incremental Financing Requirements to replace Medupi with Renewable Energy: While the carbon shadow price conveys a relative measure of GHG efficiency for the alternatives, a more practical measure of the incremental costs of GHG emission-free alternatives is the amount of carbon finance required to cover the up-front investment. Table 9 shows the total completed financial cost of Medupi and its alternatives.

Table 9: Incremental Finance Requirements
(project scaled in size to deliver the same energy output as Medupi)

Technology	**Incremental Finance Requirement** *US$ billion*
CCGT-LNG	-9.3
CCCT(HFO)	-8.5
Hydro(Inga-III as the sample project)	-4.7
Underground Coal Gasification	-1.9
Medupi Power Plant	
Nuclear	19.6
Wind	20.5
Concentrating Solar Power	25.4
CSP storage	31.5

171. Renewable energy alternatives to Medupi score best on the GHG emission attribute, but have significantly higher financing requirements, which far exceed what can reasonably be expected from the presently available carbon financing sources. Wind and CSP would require about US$20-25

billion of additional carbon finance, 30-40 times the financing provided by CTF and IBRD for the wind and CSP components of the proposed project. This level of carbon or public finance at present is not currently available to South Africa.

Component B – Renewable Energy Projects - Sere Wind Power Project and Upington CSP

172. 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 would fail to capture the full benefits of these investments. They are being developed primarily to help deliver on South Africa's commitment to follow mitigation strategies set out in the LTMS.

173. 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 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

174. 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. It will test the institutional/regulatory conditions and will help reduce uncertainty with borrowing, terms relating to bankable power-purchase agreements, and the operation of the REFIT. 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.

175. The results of the economic analysis 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 10.7 percent, assuming a 25 percent load factor. The ENPV has been calculated to be positive at US$9.2 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 14.1 percent (still assuming a load factor of 25 percent). The ENPV increases to US$54 million. The sensitivity analysis shows that the ERR is strongly dependent upon the achieved load factor.

Upington CSP Project

176. The results of the economic analysis 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 1.8 percent. Even though it is intended to operate at a load factor of 60-65 percent, because of the limited long-term experience with the technology, the economic analysis is based on a much more conservative load factor of 40 percent. At this load factor, the ENPV has been calculated to be negative US$266 million. The proposed CSP 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 4.0 percent at a load factor of 40 percent.[70] The ERR is strongly dependent upon the achieved load factor and rises to 9.0 percent at a load factor of 60 percent and 10.8 percent at a load factor of 68 percent.

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

177. Such an assessment should not ignore the wider (and currently difficult to quantify) 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 Western Cape 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 this project would be the largest commercial CSP plant in operation. 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). CSP is a technology with significant unrealized economies of scale and there is potential for technical improvements in various components. Initial projects such as this one are expected to significantly lower costs of follow-on plants leading to more and/or earlier adoption of CSP globally. Given the scale of the long-term potential for CSP globally and the displacement of CO_2 emission-related costs this would entail, this is a significant benefit from the project that is almost impossible to quantify.

178. There are certain proxies that we can consider for quantifying the additional benefits of this project. South Africa does not have green tariffs 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 feed-in tariff set for CSP (US cent 28.0/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 40 percent load factor and including value of displaced CO_2 emissions) would rise to 9.6 percent and ENPV to negative US$15.2 million. With a 60 percent load factor, the ERR would rise to 15.7 percent and ENPV to positive US$248.9 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 CSP project and a further US$750 million specifically towards CSP projects in the Middle East and North Africa regions.

Component C – Majuba Rail Project

179. The benefits of the Majuba railway electrification project have been calculated for the 30-year period following project completion, from 2014/15 to 2044/45, and estimated economic internal rate of return (EIRR) and net present value (NPV) were calculated using a discount rate of 10 percent. The estimated NPV, discounted to 2014/15, is R3.28 billion (US$437 million) in 2009 prices with an EIRR of 19 percent. The details of assumptions are presented in Annex 9.

180. The project results in net savings of GHG emissions, and hence when GHG emissions are included in the analysis, the economic returns increase (to 19.6 percent when valued at US$29/ton CO_2). The sensitivity analysis shows returns to be robust to the main uncertainties, including 50 percent capital-cost increases. Even if the analysis is restricted to benefits from the operating-cost savings, discounting all external benefits associated with the road traffic, the EIRR is still 16 percent.

Project Economics as a Whole

181. The aggregate project returns are dominated by Medupi, and are shown in Table 10. The baseline aggregate project economic return is 22.7 percent, with an NPV of US$15,298 billion.

Table 10: Project Economics as a Whole

Component	ERR	NPV @ 10%
	(as a %)	*US$ Millions*
A - Medupi Coal	24.0%	15,727
B.1 - Wind	10.7%	9.2
B.2 - CSP	1.8%	-266
C.1 - Majuba Railway	19.0%	437
Project as a Whole	**22.7%**	**15,907**

182. As shown in Table 11, 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 decrease. As expected, the bulk of the impact is attributable to the Medupi coal project, whose returns are negatively affected as it is the only carbon-emitting project. The economic returns of the wind, CSP, and Majuba Railway project components all increase slightly.

Table 11: Project Economics as a Whole, including CO_2 valued at US$29/ton

	EIRR (w/o GHG)	EIRR (w/ GHG)	Change in EIRR	ENPV
	(as a %)	(as a %)	(as a %)	US$ Millions
A - Medupi Coal	24.0%	21.5%	-2.5%	12,585
B.1 - Wind	10.7%	14.1%	3.4%	54
B.2 - CSP	1.8%	4.0%	2.2%	-206
C.1 - Majuba Railway	19.0%	19.6%	0.6%	457
Project as a Whole	**22.7%**	**20.5%**	**-2.2%**	**12,890**

Summary Financial Appraisal

183. While operationally efficient, Eskom's financial performance has been deteriorating since 2006. This performance broadly reflects the cumulative impact of the policies over the last decade and the impact of the large investment program currently envisaged by the company.

184. As is usual and customary for large utilities, Eskom Holdings has historically financed its investment needs on its balance sheet, which also helped optimize tax efficiencies. Corporate financing traditionally meant that Eskom would project its investment and operational needs for the medium term and accordingly secure long- and short-term debt facilities on local and international capital markets. The general principle under which Eskom operated was that if adequate long-term funding could not be identified, a portion of its investment program (non-urgent capex) would be temporarily deferred till the availability of additional funding.

185. Given this framework, it was envisaged that the proposed Project would be funded at the Eskom Holdings level within the overall Eskom funding plan. This would have allowed Eskom to leverage its strong balance sheet and unique market position to achieve optimal cost funding for the project and Eskom as a whole. It would further allow Eskom to manage its funding portfolio to protect its credit rating in the best possible way.[71] Even though the investment needs were large, prior to the financial crisis, Eskom was reasonably confident that it would be able to raise the necessary funds from then deep local and international capital markets. In addition, appropriate tariff increases were projected to ensure that suitable internal cash generation was maintained.

[71] Limited recourse project finance was not considered as it was expected to increase the cost of funds to the project, but also delay the schedule due to the lead time required in raising project finance.

186. The recent global financial crisis has severely impacted South Africa, and coupled with Eskom's recent ratings downgrade, 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,[72] and in February 2009, the South African government committed its guarantee authority for up to R176 billion over the next five years. Shareholder loan and debt guarantees will provide Eskom with over R200 billion or 86 percent of its total external funding needs during the next five years;
- Seek regular tariff increases from NERSA;
- Continue issuance of local and international bonds, but lower expectations to fit market appetite;
- Enhance access to ECA-backed funding where feasible; and
- Approach IFIs, such as AfDB and the World Bank to fill the financing gap as lenders of last resort.

187. Annex 10 provides a detailed financial analysis for Eskom Holdings. In summary, all of Eskom's financial ratios have deteriorated during the last three years due to rapid growth of operating expenditures coupled with an increase in borrowings needed to finance the accelerated capital expenditures program. The Operating Margin, which is an indicator of operating efficiency and adequacy of pricing, has dropped from around 33 percent in FY06 to 17 percent in FY07, to 8 percent in FY08, becoming negative 3 percent in FY09. Return on Total Assets decreased from 9.1 percent in FY06 to negative 0.8 percent in FY09, while Return on Average Equity dropped from 9.5 percent to negative 16 percent during the same period of time. The major reason for the weakening of Eskom's financial ratios is the fact that Eskom tariffs have been growing much more slowly than operating costs: the average selling price of electricity during the last three years increased by 47 percent from R cents 17.01/kWh in FY06 to R cents 24.97/kWh in FY09, while the average total cost of electricity sold increased by 87 percent during the same period of time from R cents 14.8/kWh in FY06 to R cents 27.63/kWh in FY09. The average total cost of electricity sold was higher than the average selling price in FY08 and FY09. The other important factor that has negatively affected Eskom's financial performance is the increase in borrowings to finance significantly increased capital expenditures: the debt to equity ratio for Eskom has risen from 0.2 in FY06 to 1.22 in FY09, while the interest cover ratio deteriorated from a healthy 3.8 in FY06 to negative 0.7 in FY09.

188. Tariffs. Eskom's revenues are almost entirely regulated by tariffs set by the NERSA. The Company's long-term profitability and financial sustainability are dependent on NERSA's approval of future multi-year tariff increases. In 2006, NERSA replaced its annual rate-of-return methodology with MYPD (Multi Year Price Determination), a forward-looking, multi-year system that sets a predetermined tariff over a three-year period. On February 24, 2010, NERSA announced its decision to allow Eskom to raise tariffs by 24.8% in FY 2011, 25.8% in FY 2012 and 25.9% in FY 2013. The approved tariff increases are lower than those requested by Eskom in November 2009 (35 percent annual tariff increase for FY11-FY13).

189. Financial Sustainability. Financial projections indicate that tariff increases for FY11-FY13 approved by NERSA in February 2010 will limit Eskom's ability to generate sufficient cash flows to fully finance its Investment Program in the medium-term. A summary of the projected financial performance and main ratios is presented in Annex 10.

190. In order to maintain financial sustainability in the near term Eskom would need to either adjust cash flow requirement by canceling/postponing certain projects or obtain additional support from

[72] R10 billion of this amount was disbursed in FY09, while the remaining portion will become available to Eskom in FY10 (R30 billion) and FY11 (R20 billion).

GoSA in the form of additional equity injection and/or shareholder loans. In addition, Eskom would need to request additional annual tariff increases of around 25 percent in its MYPD3 (FY14-FY15) in order to be financially sustainable in the long term. Sensitivity analysis also indicates that the financial position of the Company is vulnerable to decreases in electricity demand that could materialize as a result of stagnation in the South African economy and/or as a market reaction to the proposed tariff increases.

191. Financial Analysis of Project Components: Financial analysis of each of the project components (other than the Technical Assistance Component C.2) has also been carried out. As shown in Table 12 below, the Medupi Power Project and the Majuba Rail Project are financially viable. However availability of long-term, low-cost financing from IBRD and other financiers is shown to be critical for these projects to achieve an acceptable 18 percent FIRR[73] under the base case. Appropriate sensitivity and scenario analyses have also been conducted on these results, which are presented in Annex 10.

Table 12: Financial Analysis of Components A, B1, B2 and C1

Component	Project IRR	Project NPV (Rand billions)	Eskom IRR	Eskom NPV (Rand billions)
A.1 – The Medupi Power Plant	17.5%	117	21.4%	129
B.1 – The Sere Wind Power Project	6.8%	-678	18.0%	398
B.2 – The Upington CSP	7.6%	-909	18.0%	1
C.1 – The Majuba Rail Project	30.3%	5.7	69.5%	6.5

B. Technical

192. Component A: The decision to build Medupi was taken in 2005. Procurement began in 2006 and the first unit of the plant is planned to be commissioned in April 2012. The Medupi Power Plant has been developed as a greenfield coal-fired baseload power plant project in Lephalale, a northern province of South Africa, with a gross installed capacity of 4,800 MW. The plant is expected to have an annual energy generation of 3,200 GWh and an average load factor of 84.2 percent, with a planned load factor of about 90 percent in the early years of operation.

193. Medupi is designed as a mine-mouth, six-unit power station with supercritical pulverized coal-fired units, directly dry cooled and FGD-ready. Due to constraints on water availability and with approvals from the Department of Environmental Affairs, the plant will be built as "FGD ready", i.e., with physical space, as well as linings built into the smoke stacks, to allow for FGD installation without excessively long outage times required. Because of the limited global experience in "dry-type" FGD for large units, Eskom has decided to install "wet-type" FGD units on a sequential basis, beginning in 2018 and completing in 2021, by which time the required amount of water is planned to be available.

194. A site for the construction of the plant was selected, based on a rigorous assessment of alternatives, five kilometers to the southwest of the existing Matimba power station. Land acquisition has been completed, with re-zoning of the land from an agricultural to an industrial site having been completed in March 2007. The transmission system to evacuate power from the Medupi Power Plant is being progressively developed as a part of the integrated transmission system and matching the commissioning of the generating units at the Medupi Power Plant. It involves six circuits of 400-kV

[73] Under the base case, it is assumed that Eskom will recover a nominal FIRR of 18 percent for its contribution to the project. This assumption is consistent with NERSA's announcement on Renewable Energy Feed-in Tariffs (REFITs) on October 29, 2009 in which the regulator indicated that it would allow renewable energy producers to recover the real weighted average cost of capital (12 percent) plus the rate of domestic inflation (6 percent).

lines (with one possible 765 kV line) and construction of a switchyard and upgrading of associated substations. Coal and water supply arrangements for plant operations have been found to be adequate for the proposed plant design. These are further discussed in Annexes 4 and 11.

195. The total base cost of the 6 x 800-MW project, excluding FGD, and including all development costs, all escalation, all overheads, interest during construction[74] and the cost of transmission integration, is estimated at US$12.05 billion. The cost of the supply & install and construction contracts is about US$10.0 billion excluding contingencies and expressed in terms of US$ per kilowatt of installed capacity; this amounts to US$2,080/kW (at current exchange rate of R7.5=US$1) installed.

196. The Bank has hired independent consultants (Nexant Inc. of USA) to benchmark the Medupi cost with other similar plants contracted at the same time (around 2005-6), while incorporating the impact of the location and any plant-specific adjustments. Their assessment is that the unit cost of generation capacity compares well with similar plants ordered during the same timeframe in developed and developing countries. Nexant has also undertaken a technical review of the plant design, construction and operational arrangements. Nexant has opined that the design of the Medupi Power Plant meets or exceeds performance, reliability and availability requirements of similar coal-fired plants in operation or being constructed today.

197. Component B: This component comprises renewable energy investments: the Sere Wind Power Project (100 MW); and the Upington CSP (100 MW).

198. *Component B.1 – Sere Wind Power Project*: Wind measurements are underway at the (Sere) wind farm site. Data for a continuous 12-month period will be available in April 2010 and only thereafter will the procurement process for the plant commence. An analysis of the data available so far shows that optimum generation would be from 50 x 2- MW turbines, giving an annual gross output of 219 GWh.

199. The project is fully scoped and specified, except for the transmission links in the Western Cape province with respect to the REFIT 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.

200. *Component B.2 – Upington Concentrating Solar Power Project*: The Northern Cape Province, where the proposed plant is located, 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 proposed Upington CSP plant is a 540- MWt tower and mirror design, configured to operate as a partial baseload unit. The proposed CSP plant 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 60 to 65 percent annual load factor with a rated capacity of 100 MWe.

201. CSP is an evolving technology with a number of innovative developments taking place globally. Prior to undertaking implementation of the CSP plant, Eskom plans to undertake a detailed review of CSP-related development work already undertaken, including the proposed technology, current design and proposed size in order to: (a) validate the proposed design; (b) optimize plant size and design in light of current technological developments; and (c) incorporate any new and feasible design features based on global state of the art. Based on this review, detailed feasibility work will be undertaken followed by preparation of the bidding documents for engineering, procurement, and construction of the plant.

[74] The estimated IDC relates to loans made for the Medupi Power project and excludes all IDC associated with the funding of Eskom Equity (balance sheet financing).

202. When operational, it is expected to be the largest power facility for grid use based on CSP technology in the world. It is a first-of-its-kind, large-scale baseload solar thermal power plant and could lead to a pipeline of similar projects undertaken by Eskom or 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.

203. Component C: Low carbon Energy-Efficiency Investment and Technical Assistance: This component consists of the following three subcomponents:

(d) The Majuba Rail Project;

(e) Technical Assistance to support Eskom in the proposed rehabilitation of existing coal-fired power plants to improve operating efficiencies; and

(f) Technical Assistance to support Eskom to develop and implement domestic and cross-border renewable energy and energy efficiency projects.

204. *Component C.1 — Majuba Rail Project*: This component includes the design, procurement, construction and commissioning of the Ermelo to Majuba railway line that will become the main coal transport system to the Majuba Power Station. The Majuba Power Station (currently operating at 85 percent of capacity) is a baseload plant. By introducing a heavy-haul railway line at Majuba, it is anticipated that 100 percent of Majuba Power Plant capacity can be generated from coal supplied via this line, which not only has a financial benefit (less costly to transport coal) but also multiple environmental and other strategic benefits (including freeing up capacity in the general freight railway to supply coal to Tutuka Power Station).

205. The proposed coal-transport project between Ermelo and Majuba is a 68-km private siding railway link connecting a take-off point located 8 km west of Ermelo on the Transnet Freight Rail coal export railway line to the existing Majuba Power Station rail siding and tippler. The proposed project will also include a new rail yard layout to ensure an off-loading rate of up to 14Mtpa, but excludes modifications to the existing Majuba Coal Stockyard System.

206. Eskom, together with Transnet Freight Rail (TFR), has also designed the tie-in between the coal export railway line and the proposed railway line. Eskom's design consulting engineers have completed the design. An agreement for the tie in and alterations to the railway line needs to be concluded between Eskom and Transnet Freight Rail.

207. Eskom will construct and own the railway line infrastructure assets (classified as a siding for exclusive use by Eskom) and Transnet Freight Rail will be the rolling stock owner and operator. The commissioning of the line is expected in January 2014. Eskom will sub-contract the maintenance of the servitude, the track-work and overhead electrification equipment. A Coal Transportation Agreement (CTA) is under development between TFR (operator) and Eskom. The CTA will include the terms and conditions for the operations of the Ermelo-Majuba railway link using rolling stock supplied, maintained and managed by TFR.

208. *Component C.2 — Technical Assistance for Coal-Fired Power Plant Efficiency Improvements*: The proposed component will support Eskom's objectives of achieving a 1-percent reduction in the average heat rate of its current fleet of coal-fired power stations by 2012. The proposed technical assistance component will assist Eskom with the improvements that require external engineering support (engineered improvements) to improve the net heat rate of the plants. In the first instance, the proposed component will provide technical assistance to design the improvements specifically for three of Eskom's power plants. It is expected that the work will serve as a model that can be extended to the remaining power stations.

209. *Component C.3 — Technical Assistance for development and implementation of domestic and cross-border renewable projects.* This component will support the implementation of the Upington

CSP. Eskom has completed a prefeasibility assessment of the proposed CSP project. However, there is a need to undertake a comparison of its assessment to international best practices which is proposed to be financed by this component. The outcomes of this assessment will be used to advise Eskom on the way forward in terms of project design. Based on the recommendation of this assessment, the component will also support Eskom in undertaking the preparation of a financial review and bidding documents for the Upington CSP. An international advisory panel to support Eskom in the implementation of the Upington CSP is also envisaged to be financed under the component. In addition, this component will provide technical, financial and legal advisory services to Eskom to develop domestic or cross-border renewable projects.

C. Fiduciary

Procurement

210. Procurement activities will be carried out by Eskom Holdings Limited (Eskom). Eskom is a Public Company with a single shareholder, the Government of the Republic of South Africa, represented by the Minister of Public Enterprises.

Eskom Procurement Capacity and Controls

211. 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.

212. 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. 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.[75] Eskom's policies and procedures are consistent with this legislation. In addition, an anti-corruption cell is managed by Eskom which refers any wrongdoing cases to GoSA agencies in charge of ensuring fraud-free procurement by public agencies.

213. Bid evaluation is conducted by independent evaluation panels, headed by a senior manager. Four separate panels, one each for commercial, financial capability, ASGI-SA and technical compliance, conduct the evaluation. A panel may call on specialized staff or independent consultants for advice on specific aspects as and when required. Evaluation is conducted under strict confidentiality, at premises specifically provided for the purpose, with restricted entry and no external communication facilities. Internal audits are conducted for procurement above R300,000,000 (about US$37,500,000) and external audits are conducted for procurement exceeding R750 million (about US$100 million) prior to contract approval. The bid evaluation report is approved by the tender committee at the relevant level. Complaints on the procurement process are addressed by the general manager of the Enterprises division, Commercial department, and reviewed by the general manager of the legal division. In the event that the supplier is not satisfied with the response, he has the right to

[75] In addition to the PFMA, Eskom also is mandated to comply with the following legislation: Promotion of Access to Information Act, No. 2 of 2000; Prevention and Combating of Corrupt Activities Act No. 12 of 2004; Preferential Procurement Policy Framework Act No. 5 of 2000; Promotion of Administrative Justice Act No. 3 of 2000; Broad Based Black Economic Empowerment Act No. 53 of 2003 (BBBEE); and The Construction Industry Development Board (CIDB) Act 38 for 2000.

escalate the complaint via the legal process. For example, the Promotion of Administrative Justice Act 3 of 2003 grants persons materially adversely affected by "administrative action" the right to be given written reasons by the administrator for the action in question. An anticorruption department is also managed by Eskom, and besides its own investigation, it refers any transgression to GoSA agencies in charge of ensuring fraud-free procurements by public agencies.

214. The project includes implementation of three distinct components by Eskom. For Component A, about U$1.766 billion of IBRD financing (see Table 13 and Table 14) would finance contracts that have already been procured or whose procurement is close to completion, following Eskom and GoSA policies and procedures and South Africa's legal framework. US$593.03 million of IBRD Loan (see Table 15) for Component A would finance new procurement that would follow IBRD policies and procedures. The justification for the former is the lack of other funding for the Medupi Power Plant and the dire consequences for South Africa and the region if the power plant were delayed or not constructed. The situation the region faces is unprecedented and thus calls for an unprecedented approach to address it. These issues have been explained earlier in the Rationale for Bank involvement in the project.

Procurement under Component A (Medupi Power Plant, excluding Transmission Lines):

215. The procurement action for the Medupi Power Plant was initiated in late-2005. At that time Eskom and the Government expected Eskom to fund the program through a combination of internal cash generation and commercial debt, which Eskom could normally have raised on the market with its strong credit rating and GoSA support. They had no intention of seeking financing from the World Bank or other multilateral agencies, and therefore had no reason to follow other procurement guidelines and procedures but their own. The situation changed when a combination of a slower-than-expected tariff progression and the global financial crises resulted in major funding shortfalls. The GoSA and Eskom approached the AfDB[76], IBRD and bilaterals, among others, to help bridge the financing gap that emerged after having initiated all, or as of the present, having virtually completed all procurement for the Medupi Power Plant. Contracts, comprising about 80 percent of the plant value, have been awarded. Remaining contracts are expected to be awarded and signed during the next few months. The current situation that the GoSA and Eskom are facing is unprecedented; IBRD support has been requested for a utility/corporation midway though a large and nationally (and regionally) critical project and the Bank has had no previous engagement in the country for major investment lending.

216. The Medupi Power Plant comprises various supply & install and construction contracts that are being undertaken by Eskom as the employer for a cumulative value of US$9.999 billion, including about US$765 million of contingencies. Eskom has requested the Bank to finance contracts that amount to US$2.359 billion (excluding contingencies).

217. Invitations to bid for all contracts were internationally advertised and sent to relevant embassies in South Africa. For boilers and turbines, all major manufacturers were approached individually along with domestic advertisements. The procurement process and contract award have gone through stringent pre- and post-review audits by Eskom's internal and external auditors.

218. Table 13 provides an overview of the contracts (about US$7,437.40 million) that have already been awarded.

[76] AfDB's Board approved the loan of US$2.63 billion equivalent on November 25, 2009. AfDB's loan will finance some of the already committed and procured contracts for Medupi Power plant.

Table 13: Medupi Power Plant – Supply & Install and Construction Contracts Already Awarded, excluding additional contingencies

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing (US $ Millions)
Proposed to be Financed by IBRD, of which	**1,383.72**	**1,383.72**
Coal Overland Conveyor	28.88	28.88
LP Services	155.93	155.93
Water Treatment plant	105.47	105.47
Chimney & Silos	118.02	118.02
Main Civils	599.24	599.24
Electrical Power Installation	127.18	127.18
Medium Voltage Switch Gear	39.61	39.61
Coal Stockyard Equipment	130.90	130.90
Dust Handling and Conditioning	78.49	78.49
Other Contracts not financed by IBRD	**6,053.68**	-
Total	**7,437.40**	**1,383.72**

219. Procurement processes for the following contracts worth about US$382.65 million (or about 3.8 percent of the total value of the construction costs) which are proposed to be financed by IBRD. Bids have been received; most of them are under evaluation or in the process of being finalized for award. Table 14 below provides an overview of these contracts.

Table 14: Medupi Power Plant – Supply & Install and Construction Contracts in Advanced Stages of Procurement, excluding additional contingencies

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing
Proposed to be Financed by IBRD, of which		
Low Voltage Switch Gear	80.95	80.95
Ash Dump Equipment and Ash Overland	115.72	115.72
Terrace Coal and Ash System	138.11	138.11
Uninterrupted Power Supply	20.49	20.49
Water Reservoirs	27.38	27.38
Total	**382.65**	**382.65**

220. As the GoSA and Eskom have requested the Bank to finance contracts which have not been procured using the Bank's Procurement Guidelines, the Bank has undertaken: (a) independent review and/or due diligence at the aggregate level to establish that the overall procurement meets global industry standards and cost parameters; (b) due diligence at the contract level to ensure that all contracts financed by the Bank fully comply with Eskom procedures; and (c) there are no sanctioned firms involved in the Medupi Power Plant contracts proposed to be financed by the Bank (see details below for the current status of these assessments).

221. Review at the Aggregate Level: The review was carried out by Nexant Inc. of USA, a San Francisco based engineering consultancy firm. Nexant was commissioned to establish whether the overall procurement process for the Medupi Power Plant met general principles of industry-wide standards of economy, efficiency and transparency for this scale and timing of procurement. In so doing, the Consultant was requested to benchmark the costs of the procurement of the plant (at an aggregate level) for similar-size supercritical coal-fired power plants in the world. The following paragraph provides a summary of Nexant's analysis.

222. Nexant has opined that although the procurement processes have been drawn out, they have proved to be fair, transparent, and in compliance with the existing laws of South Africa. Nexant also indicated that during the tendering period, the international market for 800-MWe boilers was

essentially sold-out. In addition, site location at the tip of Africa, along with the fact Eskom had not been active in the international market for large power plant equipment since 1989, negatively impacted Eskom's position as a serious buyer in the large equipment market. This notion is also corroborated by procurement carried out under Bank financed projects over the last few years, where energy projects have not generated substantial participation from international suppliers because of commitments in developed parts of the world (which is a preferred market for suppliers).

223. Nexant has opined that the total base project cost for the Medupi Power Plant is comparable to the US market and is on the low end of the EU market (without the FGD). However, Eskom's costs are higher[77] when compared to plants being constructed in India and China – largely based on East Asian and Indian suppliers.[78] Nexant also noted that such data is mostly based on domestic supply of plant equipment.

224. Based on Nexant's observation of large power-plant developments during 2005-2008, the availability of (a) production capacity; (b) commodities such as specific types of high-strength steel; and (c) resources and skills including labor, commercial, financial and technical (engineering) was globally under pressure. In Nexant's opinion, Eskom's tendering experience for the supply of the six boiler and steam turbine generator units for the Medupi project reflects the very competitive worldwide power plant equipment and components market that existed from 2005 through 2008 for major equipment procurement by Eskom.

225. Review at the Contract Level: The Bank commissioned an independent Bank retiree consultant (ex-chair of the OPRC) review to support Bank Procurement Specialists in carrying out due diligence and to ensure that the procurement process undertaken for each of the contracts proposed to be financed by the Bank has followed Eskom/GoSA policies and procedures. The review of the procurement processes, which has been completed has concluded that the procurement process followed by Eskom, although not in full compliance with the Bank's Procurement Guidelines, was transparent, focused on economy and efficiency, gave the same opportunity to several bidders from developed and developing countries and included procedures to encourage development of domestic contractors.

226. The review of the procurement processes revealed areas of divergence between the Bank's procurement procedures and Eskom's procedures. Some of the key deviations include: (a) Eskom uses own bidding documents with modified FIDIC conditions of contract, which *inter alia* do not have fraud and corruption and right to audit clauses as required by the Bank; (b) bids are opened in public, prices are not read out; (c) negotiations conducted with the lowest evaluated bidder; (d) merit point system is used to evaluate bids for works; (e) Accelerated Shared Growth Initiative of South Africa (ASGI-SA)[79] and Competitive Supplier Development Program (CSDP) are taken into consideration in the evaluation of bids; (g) use of registration of bidders grading firms based on the capability criteria as a condition of contract award; and (h) parent company guarantees are required.

227. The review of Eskom's procurement procedures, including the analysis of the deviations from Bank procedures (see Annex 8 for details), has concluded that these procedures were well established and transparent.

[77] Estimated by up to 40 percent on some contracts.

[78] The increases in construction costs particularly during the 2004-2008 time period are still being experienced by proposed coal-fired power plants due, in large part, to a significant increase in the worldwide demand for power-plant design and construction resources, commodities and equipment. The limited capacity of EPC firms and equipment manufacturers also has contributed to rising power-plant construction costs. This has meant fewer bidders for work, higher prices, earlier payment schedules and longer delivery times. The demand for and cost of both on-site construction labor and skilled manufacturing labor also have escalated significantly in recent years.

[79] ASGI-SA preference is given to persons disadvantaged by unfair discrimination.

228. Fraud and Corruption (F&C) and Audit Rights: The contractual clauses (in the modified FIDIC documents that Eskom is using for Medupi procurement) did not provide the Bank exactly the same rights with respect to Fraud and Corruption as the Standard Bidding Documents (SBDs) of the Bank. To this extent, Eskom has agreed to incorporate such rights (for the Bank) in the contracts awarded for the Medupi Power Plant and proposed to be financed by the Bank. Eskom has begun the process of inclusion of these clauses (consistent with Bank requirements on Fraud and Corruption and Audit Rights) in the contracts already awarded or currently being finalized. The Bank will not finance any contracts which do not include the Bank's Fraud and Corruption related clauses.

229. It is not possible to obtain Audit Rights for the bidders who were not selected as they do not have any obligations to Eskom. The Bank, therefore, will not have Audit Rights on such bidders.[80] To this extent, the Bank has reviewed the legal framework for F&C in South Africa and is comfortable with the rights that Eskom and the GoSA have to pursue any F&C allegations or procurement-related complaints.[81] [82] However, as a measure of abundant caution, the Bank has received an assurance from the GoSA and Eskom to cooperate with the Bank, based on South African law, in case the Bank is required to pursue F&C allegations or suspicion with regard to the procurement process of any of the contracts proposed for Bank financing. GoSA and Eskom have committed themselves to ensuring their full support to the Bank to investigate any issues as and if they arise. A legal covenant to this effect has been negotiated in the IBRD Guarantee and the IBRD Loan Agreement. Moreover, in the event the Bank finds any misrepresentation of information from Eskom it would have the right to cancel the loan disbursed for the contract.

230. Eskom has provided the Bank with a list of Contractors and Subcontractors for ten contracts that IBRD will finance for the Medupi Power Plant. The Bank will ensure that the firm chosen is not and was not at time of award or contract signing on: (a) the Bank's Debarred List of firms; or (b) Temporarily Suspended List of firms. Contracts awarded to firms debarred or suspended by the Bank (or those which include debarred or temporarily suspended subcontractors/subsuppliers) will not be eligible for the Bank financing. For the purposes of implementation of Bank-financed contracts, Eskom has established a procedure of checking new subcontractors/subsuppliers that may be proposed by the contractors to ensure that Eskom does not approve a debarred or temporarily suspended firm as a new subcontractor or subsupplier.

231. Conclusion: Based on the satisfactory completion of the above-mentioned review and due diligence including the benchmarking and continuing compliance check to ensure that procurement of the contracts has met general principles of industry-wide standards of economy, efficiency and transparency for this scale and timing of the procurement, verification that the contractors and subcontractors that were awarded the contracts were not debarred or suspended at the time of contract award or signing, and the incorporation of F&C and Audit Rights provisions in the contracts, specific Board approval is sought to finance the contracts for the Medupi Power Plant already awarded by Eskom under Component A using Eskom/GoSA procedures. The one-time exception is being sought for application of the Bank's Procurement Guidelines (not Consultant Guidelines), only for the Medupi Power Plant contracts (excluding the transmission lines) under Component A of the proposed project.

232. The current situation that GoSA and Eskom is facing is unprecedented; IBRD support has been requested for a utility/corporate midway through a large, and nationally (and regionally) critical project and the Bank has had no previous engagement in the country for major investment lending. Alternatives to seeking the proposed one-time exception are difficult. The alternative would be to seek

[80] These Audit Rights to permit the Bank to inspect their accounts and other records relating to the bid submission arise out of provisions in the Standard Bidding Documents. Also refer to Paragraph 1.14(e) of Procurement Guidelines.
[81] Eskom does not register procurement process related complaints and provides such complaints to other GoSA agencies for further action.
[82] In this connection, a legal opinion from Eskom's independent counsel is a condition of effectiveness of the IBRD Loan.

rebidding of the identified and already procured contracts, which is not feasible; any rebidding of such contracts would result in major contractual consequences (penalties, etc.). Rebidding of contracts which are yet to be awarded has serious consequences as well. Despite major contracts being awarded, the plant would not be able to reach commissioning without the goods and equipment yet to be awarded and therefore rebidding would result in a delay of at least 2 to 3 years in the commissioning schedule for the project. The Medupi Power Plant's generating capacity, when commissioned, will account for nearly 12.5 percent of the current generation capacity in South Africa. If full commissioning, now expected in August 2015, is delayed to 2018, it will have serious impacts on the South African economy and that of the subregion.

Procurements under Components A (Medupi related Transmission Lines), B and C

233. Procurement processes for the remaining Medupi contracts worth about US$593.03 million (or about 5.9 percent of the total value of the construction costs) have not yet begun. Table 15 below provides an overview of these contracts.

Table 15: Medupi Power Plant – Supply & Install and Construction Contracts, where Procurement Process has not begun, excluding additional contingencies

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing
Proposed to be Financed by IBRD, of which		
Ash Dump and Dams	221.61	221.61
Buildings	129.33	129.33
Associated Transmission Lines	242.09	242.09
Total	**593.03**	**593.03**

234. Additional Procurement for the associated transmission lines under Component A, and for contracts under Components B and C of the proposed project, is yet to be carried out. This procurement will be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004, revised October 2006; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006; and the provisions stipulated in the Legal Agreement.

235. Eskom will carry out procurement using the Bank's Standard Bidding Documents for all ICB and the Bank's Standard Request for Proposals for selection of consultants.

236. The Bank has reviewed a set of bidding documents prepared by Eskom at the Bank's request which included the above methodology and found them equivalent to the Bank's SBDs with changes as permitted by the Procurement Guidelines (paragraph 2.12). However, a change in contract terms post-award that provides an incentive through availability of more favorable contract payment terms, which would not be taken into account in the evaluation, but which potentially could affect equal opportunity of some bidders (local or foreign) is not contemplated in the Bank's Procurement Guidelines. It is the Bank's assessment that the risk of occurrence of such a scenario is low for the type and size of contract packages which the future procurement would comprise.

237. Based on the above and the country-specific considerations noted previously, Board approval is being sought for the inclusion of the ASGI-SA related provisions as proposed by Eskom. The approved solution would be used in the procurement of goods, works, and supply & installation contracts.

Procurement Risk Assessment

238. The risks concerning the procurement already carried out are identified in Annex 8.

239. The overall project risk for procurement is **Substantial** and the residual risk after consideration of the corrective measures is **Substantial**. 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.

Financial Management

240. A financial management assessment of Eskom Holdings shows strong financial management capacity in accordance with applicable legal frameworks and Eskom's policies and procedures.

241. For FM implementation of the project, Eskom will use its existing, acceptable SAP-based FM system with appropriate oversight by DPE and the Board. This is based on the capability of the system to produce reliable and regular unaudited financial reports (IFRs) and other financial reports.

242. Eskom's Directors are 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 Chief Finance Officer. 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. It ensures that Eskom's risk management strategies and processes are aligned with best practices. The Audit Committee chairman also sits on the Risk Management Committee to ensure that common issues are addressed adequately. The Board also ensures that an integrated crime-prevention plan is implemented to minimize exposure to criminal acts, particularly fraud. A Security Risk Management Department addresses these threats. Its work covers crime prevention, detection, response and investigation. Where serious fraud, corruption and irregularities are suspected, forensic investigations (a division of Security Risk Management) establishes the facts to enable management to deal appropriately with the matter and prevent a recurrence.

243. 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. For the financial year ended 31 March 2009 it was jointly audited by KPMG Inc and SizweNtsaluba VSP, who concluded that the financial statements present fairly, in all material respects, the financial position of the company and of the group as of 31 March 2009 and their financial performance and their cash flows for the year then ended in accordance with International Financial Reporting Standards, and in the manner required by the Public PFMA 1 of 1999, and the Companies Act of South Africa.

244. Eskom's auditing arrangements are considered acceptable. Eskom's annual audit report together with a management letter as it pertains to the project 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.

245. Eskom went through a short period of leadership uncertainty in late October 2009, when both the Chairman and Chief Executive Office (CEO) resigned. The responsible Minister (for Public Enterprises) took immediate action to normalize the situation by appointing one of the Board members as acting Chairman/CEO. Under his leadership, Eskom has made progress in dealing with issues related to its MYPD 2 tariff application and continues to address Eskom's financing problem over the short and longer term, including postponement of some investment, and bringing in private equity for the coal-fired power plant. The Minister also took immediate steps to appoint a new CEO. As of mid February 2010, a short-list of candidates had been identified and the selection process was at an advanced stage.

246. The Board of Directors has also implemented a strong corporate governance framework, and Eskom's systems and processes are regularly reviewed to ensure that compliance is monitored in this regard. In addition, Eskom also adopted best corporate governance practices embodied in the King Report on Corporate Governance for South Africa – 2002 (King II) and the Protocol on Corporate Governance in the Public Sector – 2002. Eskom has a unitary board structure with 13 non-executive directors and two executive directors. All of the non-executive directors are independent directors, appointed by the shareholder, drawn from diverse backgrounds (local and international) and reflecting South Africa's demographics. They bring a wide range of experience and professional skills to the board. In addition, a number of respected external individuals have been appointed to Board committees, bringing additional experience to the table.

247. Eskom's articles of association stipulate that the shareholder will, after consulting the board, appoint a chairman, chief executive and non-executive directors. The remaining executive directors are appointed by the Board after obtaining shareholder approval. In compliance with good corporate governance the composition of the Board is also reviewed on a regular basis and rotation of directors occur at regular intervals. The term of office of non-executive directors is a maximum of three years. Unless otherwise called for, regular Board meetings are scheduled annually in advance.

248. Eskom will maintain a US Dollar denominated segregated Designated Account (DA) in a commercial bank for the implementation of the Bank-financed components of the project. Disbursements by the Bank into this account will be based on the quarterly Interim Unaudited Financial Report (IFR) and withdrawal applications prepared and submitted by Eskom to the Bank. The submission will be required within 45 days of the end of each reporting period. Upon effectiveness of the loan agreement and submission of a withdrawal application, the Bank will initially disburse an amount equivalent to six months estimated project expenditures into the DA. Subsequent disbursements to the DA will be based on six- monthly estimated expenditure, taking into account the balance in the DA at the end of each quarterly reporting period and reporting on the use of the advances previously made. 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 that have a value above the Minimum Application Size (US$75 million equivalent); (ii) the Reimbursement disbursement method, whereby Eskom will be reimbursed for expenditures which it has prefinanced from its own resources and submits withdrawal application for reimbursement above the Minimum Application Size (US$75 million equivalent); and (iii) 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 above the Minimum Application Size (US$75 million equivalent).

249. The FM arrangements meet the Bank's minimum requirements under OP/BP 10.02 Financial Management. (See "Annex 7- Financial Management" for details.)

D. Social

250. 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).

251. 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.

252. One key area in which South African legislation, and Eskom's practice to date, differ from Bank practice 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 Bank resettlement process has been filled for EISP through two actions by Eskom. On October 7, 2009, Eskom disclosed two documents that together constitute a Resettlement Policy Framework for Components B and C: the corporate resettlement policy and procedure, which clearly explains the principles and procedures Eskom follows in acquiring land and other assets,[83] 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 addressing involuntary resettlement, land acquisition, and livelihood restoration (rehabilitation), including preparation and disclosure of RAPs for any future resettlement.[84] In addition, Eskom will arrange for independent audits of any resettlement already carried out for EISP project components (i.e., some of the transmission lines for the Medupi project, and acquisition of the right-of-way for the Majuba rail spur).

253. Involuntary resettlement issues are virtually non-existent at the Medupi Power Plant (which is under construction). Eskom purchased from willing sellers two large game farms for the Medupi site; the directly affected parties were the two sellers, one of which was a corporation. The other farm owner lived in town and owns another farm; one full-time worker had lived on the farm purchased for the project site for about one year before the purchase and has been relocated to the other property at the expense of the same owner. The extent of resettlement necessary for transmission lines to connect the Medupi Plant to the grid is not known because the exact alignment of the lines has not been finalized with the various property owners from whom the right-of-way will be acquired. In deciding on the alignment, Eskom tries to avoid resettlement altogether, and the number of houses that will need to be relocated, if any, is likely to be small. Eskom compensates landowners for the right-of-way on the basis of either 100 percent of market value for the land or 100 percent of the financial loss. Eskom either pays for or replaces trees or structures such as windmills and water tanks that need to be demolished.

254. Eskom has nearly completed the acquisition of the 16 km^2 needed for the WPP. The land is being 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 is negotiating the purchase of land for the Upington CSP from a single farm owner. The CSP itself will occupy 4 km^2, 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.

255. The route for the Majuba Rail Project line is 67 km long and crosses the lands of 43 separate farm owners. Eskom has acquired the land for the entire route through a combination of rights-of-way and outright purchases – a total of approximately 330 ha. Twenty-one households with 152 residents are being resettled, mainly because of potential noise impacts that cannot be otherwise mitigated. On-

[83] "Procedure for the Involuntary Resettlement of Legal and Illegal Occupants on or from Eskom-procured Land" (July 2009).
[84] "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).

farm relocation has been agreed in the case of 16 of those households. Land has been acquired for the other five families.

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

257. Corporate Social Responsibility. Eskom endeavors to enhance the social and economic benefits of individual projects and to minimize adverse indirect impacts. For example, at Lephalale, the municipality in which the Medupi Power Plant is located, Eskom operates a training center to prepare local residents for employment at the site. Eskom maintains information centers for its various projects, and the names and qualifications of citizens who come to the centers looking for employment or business opportunities are registered in a database that is provided to contractors. Eskom is also assisting the local government at Lephalale to upgrade wastewater treatment systems and other municipal infrastructure that is being overloaded in part because of the construction-related increase in local population. In the case of the Majuba Rail Project, Eskom will be directing its contractors to source and house their workforces in the local communities, where there is excess housing already available. To prevent hardship for the approximately 100 small trucking companies that currently haul coal to Majuba, Eskom will redeploy some trucks to short haul (from mine to rail) and will phase out the remainder over a 10-year period guaranteeing certain tonnage in the meantime.

258. 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.*"

259. 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.

260. Eskom held an "HIV/AIDS Awareness Day" at its Matimba Power Station on December 1, 2009, to which Company and contractor personnel working at the Medupi construction site were invited. Eskom also takes its programs to community centers and schools in the vicinity of its facilities.

E. Environment

261. According to a review conducted by the Bank, South Africa's legal, regulatory and institutional framework is nearly fully equivalent to the World 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 safeguards.[85] 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 Medupi Power Plant and other project components showed that the South African processes followed were consistent with World Bank requirements.

262. 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.

263. The DoEA (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, DoEA had 1,874 authorized staff positions with an 18 percent vacancy rate. DoEA 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. As of end December 2009, EQP had 213 authorized staff positions, 56 of which were vacant, and 22 additional contract employees.

264. Environmental Assessment: The Bank has so far reviewed the EIAs as well as construction stage and early draft operational stage Environmental and Social Management Plans for the Medupi plant and associated transmission lines, which represent the largest financing needs, and the EIAs for the Sere WPP, the Upington CSP, and the Majuba Rail Project. Bank safeguards specialists have visited the sites for these facilities. With respect to Medupi, the main concern relates to the management of air quality impacts and related health risks of sulfur dioxide (SO_2) emissions. The baseline SO_2 concentrations in the area are affected primarily by the existing Matimba Power Station, and use of coal in home heating systems in the nearby town of Marapong. Prevailing winds are from the northeast all year, and the highest SO_2 levels occur in the sparsely populated game farm area to the southwest. The GoSA interim ambient standards did not include a one-hour limit for SO_2, but in the EIA analysis a one-hour limit of 350µg/Nm^3 was applied, based on European Commission standards.

[85] 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).

To put this in perspective, California has defined a one-hour threshold risk level of 660 µg/Nm^3 for at-risk individuals.

265. Sampling data from various periods between 1991 and 2005 show that these limits were exceeded relatively infrequently even at monitoring stations directly downwind and within 4 km of the Matimba plant. The percentage of the hours sampled that exceeded the EC 1-hour standard of 350 µg/Nm^3 in sampling periods between 1989 and 2004 ranged from 0.02 to 0.23. The daily average of125 µg/Nm^3 was exceeded only three times and at only one station, 3 km immediately west of the Matimba plant. There was consistent compliance with the annual average in all sampling programs. An intensive 10-month Eskom sampling campaign in 2004-5 at 10 stations surrounding Matimba included one station 8 km downwind of the plant, at which the EC hourly SO_2 limit was exceeded only once and the daily average was not exceeded at all. Annual averages ranged from 3 to 11µg/Nm^3 at the ten stations, not even approaching the limit of 50.

266. The EIA concludes that "little potential exists for… health risks due to sulfur dioxide levels" in the high-exposure areas downwind of the plant. The most populated locality that is affected is the town of Marapong (population 17,000) which is near Matimba but to the northeast, hence normally upwind. There, although ambient concentrations are lower and limits are exceeded less frequently than at downwind stations, the health risk rises because a population of 17,000 will include a significant number of individuals with respiratory conditions. The report points out that the evaluation of risk in Marapong is based on short-term exceedence of health thresholds occurring on average only four times per year. Eskom established a continuous monitoring station in Marapong in January 2008, and quarterly monitoring reports show that through December 2009, the 1-hour limit for SO_2 in the then-proposed (and since adopted) new DoEA standards was exceeded five times during those two years. Two of the exceedences occurred when the wind was from the northeast; the Matimba Plant could not have been the source of the SO_2 on those occasions.[86]

267. Operation of the six units of the Medupi Power Plant without FGD was predicted to raise the number of times the daily concentration limit is exceeded in the maximum impact area downwind to 33 times per year, and to more than double the size of that area. The EC hourly limit could be exceeded 419 times in a year downwind. The additional area affected is likely to remain as sparsely populated game farms, and the risk of health effects therefore remains low. At Marapong, the dispersion model predicts exceedence of the EC hourly limit 35 times and of the daily limit 4 times per year. These numbers continue to be relatively low because the wind blows only infrequently from the southwest. The maximum 1-hour and 24-hour concentrations at Marapong are predicted to be 1,481 and 153µ/Nm^3, respectively. The annual average is predicted to be 42.7µg/Nm^3 in the high impact area and 6.8µg/Nm^3 at Marapong, both below the interim annual limit. The EIA concludes that installation of FGD with at least 80 percent removal efficiency at Medupi would maintain the health risk potential at the baseline condition – i.e., with Matimba only. Eskom is building Medupi to be FGD ready and has made a commitment to install FGD with better than 90 percent removal efficiency, so that Medupi will not cause the ambient SO_2 standard to be exceeded. The understanding reached between Eskom and the Bank on the schedule for installation is a covenant in the Loan Agreement (see Section III.F above).

268. On December 24, 2009, the Minister of Water and Environmental Affairs issued final ambient air quality standards, to take effect immediately.[87] Unlike the interim standards, the final ones are expressed as a combination of limit values and frequencies of exceedence. For SO_2 a 1-hour limit value of 350µg/Nm^3 has been introduced; the other limit values are unchanged. Consequently, the conclusions and predictions in the EIA concerning exceedence of limits remain valid. The frequencies

[86] Eskom Corporate and Services Division, "Marapong Air Quality Quarterly Report," 2008 and 2009. Eight quarterly reports were reviewed. No other ambient air quality limits were exceeded.
[87] *Government Gazette* No. 32816, 24 December 2009.

of exceedence represent the maximum number of times a limit value can be exceeded at a given sampling location in a calendar year without resulting in non-compliance with the standard: for SO_2 it is 526 times for the 10-minute standard, 88 times for hourly, 4 times for daily, and zero for the annual average. If these exceedence frequencies had been in effect at the time the EIA was written, its conclusions would have been that the baseline data showed virtually no instances of non-compliance with any of the standards, and the SO_2 concentrations predicted by the dispersion model would not result in non-compliance in Marapong. Similarly, the five exceedences measured in Marapong over 2008-9 are well within the tolerance for the 1-hour standard, and the SO_2 concentrations predicted by the dispersion model would also not result in non-compliance there. However, the predicted numbers of exceedences of the hourly and daily limits in the maximum impact area downwind of Medupi are greater than the permissible frequencies of exceedence in the final standards. Although the risk for human health effects remains low, because the downwind area is expected to remain sparsely populated, the Bank believes that installation of FGD, as planned by Eskom and described below, would be consistent with internationally recognized good practice.

269. DoEA (then DEAT) took into account the baseline conditions and model predictions in its environmental authorization for Medupi issued September 21, 2006, by setting the following conditions:

- Eskom must initiate a program for the continuous monitoring of ambient concentrations of pollutants in the Marapong residential area as well as surrounding areas around the proposed power station and existing Matimba Power Station. The program must also detail reporting procedures including, among others, the submission of quarterly reports to the department.
- Eskom shall install, commission and operate any required SO_2 abatement measures that may be necessary to ensure compliance with any applicable emission or ambient air quality standards.
- Notwithstanding the measures referred to [above],…should the monitoring…indicate non-compliance with ambient SO_2 standards, Eskom shall install, commission and operate any required SO_2 abatement measures in respect of the Matimba Power Station as may be necessary to ensure compliance with any applicable emission or ambient air quality standards.
- Eskom must initiate a program of support for initiatives aimed at improving air quality in the Marapong residential area. This program must be included in the construction EMP and carried through to the operational EMP.

270. DoEA is in addition considering designating the region around Medupi – the Waterberg airshed – as a National Priority Area for Air Pollution Control. Normally this occurs when an airshed is out of compliance, but in this case, the action would be proactive. DoEA's objective is to avoid the deterioration of ambient air quality that could otherwise occur if, as expected, there is further residential and industrial development (besides Medupi) that would increase emissions of air pollutants generally. This designation will result in expanded monitoring, more intensive scrutiny of development proposals, and the likelihood that project developers will be required to install pollution control equipment sufficient for compliance with ambient standards, not merely the applicable emission standards. The expanded monitoring and more intensive scrutiny would also be relevant to the SO_2 abatement measures for both Medupi and Matimba power plants, as noted above regarding the environmental authorization for Medupi.

271. Eskom's staged approach to FGD is consistent with the environmental authorization and in fact anticipates the response to "any required SO_2 abatement measures" by designing Medupi so that it can be retrofitted with wet FGD equipment. Eskom proposes to install FDG on the Medupi units in a sequential manner, as each operating unit undergoes its generation outage for major maintenance (normally after six years of operation). This timetable, which is reflected in a legal covenant in the

Project Agreement with Eskom, is expected to begin in 2018 at the earliest and continue through 2021, at which time Medupi will be fully equipped with FGD. The Bank recommends that Eskom install FGD at Medupi as soon as it is technically and operationally feasible to do so, recognizing that a necessary condition to beginning the installation is availability of additional water supply from the DWA project described below. In the meantime, Eskom will operate Medupi beginning at commissioning to comply with the proposed GoSA SO_2 emission standards for an "existing" facility, as approved by DoEA, which is also consistent with the approach to existing facilities as stated in the Bank's Environmental, Health and Safety Guidelines for Thermal Power Plants that went into effect in December 2008. Should unhealthful SO_2 concentrations develop in Marapong, the fact that they are predicted to be of short duration makes possible a variety of measures to reduce or eliminate adverse impacts on individuals at risk, some of which are as simple as warnings based on predictions of southwest winds, and health advisories for at risk individuals to stay indoors. Eskom has already begun a research program in Marapong to identify and explore possible initiatives; one example would be supporting conversion of other air pollutant sources such as home heating systems to technology that would have lower SO_2 emissions.

272. The three transmission lines for Medupi were initially not to be financed by the Bank but were considered to be associated facilities for EIA purposes. However, they have subsequently been included as one of the investments the project will support. The EIA for "Medupi Transmission Integration" identifies visual and landscape changes, risk of bird collisions with cables, and degradation of certain natural habitats as the most significant impacts of the transmission line that will connect Medupi to the grid. The EIA proposes a preferred corridor to minimize these impacts and recommends mitigation measures that reduce most of the impacts to "low".

273. No new coal mines will be developed to supply fuel to Medupi. The plant site is adjacent to the Grootegeluk Colliery, an open-pit, back-cast mine operated since early 1981 by Exxaro and located on the southern end of the vast Waterberg coal bed. Grootegeluk currently produces 18.6 million metric tons of coal per year (M mt/yr), of which 15.3 M mt/yr of thermal coal is supplied to the Matimba Power Plant. Grootegeluk will expand production in phases to meet the needs of Medupi – an additional 14.6 M mt/yr of thermal coal when in full operation – under a long-term contract. As a result, coal will be mined at an accelerated rate, but Grootegeluk's reserves, 5,600 million tons within the authorized area of mining operations, will be sufficient for the lifetimes of Matimba and Medupi. In order to support the increased coal sales to Eskom, Exxaro will add two new coal processing (beneficiation) units to the six already operating at the mine. Because neither any mining nor the construction of the new processing units and associated coal stockyard will occur outside the permitted boundaries of the mine operations, GoSA regulations do not require a full EIA and an environmental authorization from DoEA.[88] Instead, the company's obligation under national environmental legislation is to obtain approval of an amendment to its Environmental Management Program for Grootegeluk from the Limpopo Department of Minerals and Energy (LDME).

274. For this purpose, in 2006 the mine owner prepared an environmental document entitled "Amendment to the Grootegeluk Mine Environmental Management Programme Report (EMPR): Matimba Brownfields Expansion Project." Scoping for this report was conducted with stakeholder participation in March 2006, and the draft report was publicly disclosed for stakeholder consultations in July 2006. LDME issued its approval for the amendment to the EMPR in 2007. The Bank has reviewed the report and considers the assessment adequate for the expansion of mine production within its already approved area of operations. The key concerns identified beyond the mine site boundaries are increased water use, traffic and traffic hazards, possible exposures to dust on two adjacent farms, and indirect effect of expanded employment such as pressure on local infrastructure and housing due to a larger workforce, and elevated incidence of HIV/AIDS and other sexually

[88] The Coal mine is owned by the private sector and has been in operation since 1980. The EIA for the mine was on the Exxaro website until 2006, consistent with the South African requirements.

transmitted diseases associated with an influx of workers and job-seekers. The recommended amendments to the EMPR address all of these impacts.

275. The Medupi Power Plant is being constructed with dry cooling in order to minimize its demand for water. Water consumption will begin with the commissioning of the first generating unit (expected in 2012), increasing gradually to 3 million cubic meters per year (M m3/yr) with three units operating (in about 2014), then to 6 M m3/yr in full operation (about 2016 or 2017). Phased installation of FGD over the period from 2018 to 2021 will gradually raise consumption to the anticipated full volume, 12 M m3/yr. Expanding production at the Grootegeluk Mine to supply coal for full operation at Medupi will entail use of approximately 2 M m^3/yr of water beyond the mine's current allocation from Mokolo Dam. Medupi's full operation and FGD water needs as well as the additional needs of the mine will be met by DWA as it implements the first two phases of the Mokolo-Crocodile (West) Water Augmentation Project (MCWAP), which is an outgrowth of a Catchment Management Strategy formulated by the South African Department of Water Affairs (DWA) in 2004, to meet the 25-year planning horizon that anticipates high and growing demand for water for public supply, irrigation and industrial use in the Lephalale-Steenbokpan corridor in which Medupi is located. Sufficient water is available in the Mokolo Reservoir for the early operation of Medupi, by means of re-allocation from other uses for which the present allocation is not fully utilized. There is already a water transmission main, owned by Exxaro, operator of the Grootegeluk mine that conveys water from Mokolo to the mine, the Matimba Plant, and Lephalale Municipality. A short extension is being built from Matimba to Medupi as part of the Medupi construction project. A preliminary activity in MCWAP is the "debottlenecking" of 9 km of this water main to increase its capacity from 13.5 to 20 M m3/yr by early 2011, so that it can better serve Lephalale as well as Medupi in its early stages of operation. Under country systems, DoEA requires a "Basic Assessment Report" for the debottlenecking, and that report was publicly disclosed in draft for review and comment on November 2, 2009.

276. Phase 1 of MCWAP involves construction of a new pipeline in the right of way of the present one. The new main is expected to be operational by mid-2013, and the combined delivery capacity of the two mains will then be 53.4 M m3/yr, of which Medupi will be using 3 M m3/yr by 2014. DWA is proceeding in parallel with Phase 2 of MCWAP – the transfer of 169.3 M m3/yr through a new pipeline from the Crocodile River to the Steenbokpan-Lephalale Corridor – and expects this transfer infrastructure to be fully operational by the end of 2015. Phase 2 is effectively a large-scale water reuse scheme, because the Crocodile River receives a large amount of treated wastewater from plants in the northern parts of Johannesburg and Pretoria that are in the Crocodile River Watershed but are supplied with water from the Vaal River Basin. The present volume of these return flows is 340 M m3/yr, which is an amount roughly equivalent to the yearly natural runoff and groundwater discharge from the Crocodile watershed.

277. MCWAP has been planned for implementation by DWA with or without the Medupi Power Plant, and Medupi will use only 6 percent of the volume of water it will provide to the Lephalale-Steenbokpan region by the time Phase 2 is completed. DoEA requires EIAs for Phases 1 and 2, and they are being prepared in parallel. DWA disclosed the Scoping Reports for both EIAs on November 2, 2009, and a revised Scoping Report for Phase 2 covering additional alternatives suggested by stakeholders who took part in the initial scoping was disclosed on January 15, 2010. Once DoEA has approved the scoping reports, the EIA phase will begin, likely in mid-2010.

278. Complementary to the EIA process for Medupi, DoEA has initiated the preparation of an Environmental Management Framework (EMF) for the surrounding Waterberg District Municipality, where Medupi is located, as provided for as part of the NEMA EIA regulations issued in April 2006. The objectives of the EMF are to ensure that water resources, biodiversity and associated ecosystem services in the region are sustained and secured for the benefit of current and future generations. March 2011 is the target date for completion. DoEA has successfully undertaken EMFs and is

implementing management plans for three other development-intensive regions in South Africa. The GoSA is fully committed to completing the EMF in a timely manner. To this extent, an appropriate covenant has been agreed with the GoSA under the Guarantee Agreement for the IBRD loan (see Section III.F for the proposed covenant).

279. In addition, because several coal-fired power stations are operating or being built on both sides of the Botswana-South Africa border, and both countries envision future expansion of industry and power generation in this area, there is a need to address the possible cumulative, long-range, and transboundary effects of these investments. Consequently, in the course of preparation of the Morupule B Generation and Transmission Project in Botswana, the Bank initiated discussions with the authorities in both countries to jointly undertake a Regional Environmental and Social Assessment (RESA). The terms of reference for the first phase of the RESA have been agreed with Botswana Power Corporation, the Department of Environmental Affairs and the Department of Waste Management and Pollution Control in Botswana, as well as with Eskom and the DoEA in South Africa. The World Bank will use trust fund resources to carry out the first phase as well as the full RESA, with full participation of the relevant authorities in Botswana and South Africa. The two governments have already established a cooperative framework for the management of transborder environmental and related social impacts from development projects affecting the two countries.

280. 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 EISP 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.

281. 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 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.

282. The most significant environmental impacts of the Majuba Rail Project will be strongly positive: the replacement of 700 daily truck trips with six loaded and six empty trains pulled by electric locomotives will: (a) eliminate the traffic that keeps roads in a continuous state of disrepair and causes frequent and often fatal accidents, and (b) reduce annual CO_2 emissions by an estimated 250,000 tons.

283. Natural Habitats: The Medupi project is located in relatively flat terrain in the Bushveld, a landscape dominated by thick growth of woody shrubs and low trees. The project area is occupied by large game farms and scattered hunting lodges. Mammalian wildlife populations are managed by the game farms. The project is located on land occupied by two game farms that were purchased by Eskom and does not produce a significant loss of natural habitat. The transmission lines traverse relatively small amounts of habitat that may support threatened flora or fauna. The most sensitive habitat types identified are ridges and wetlands, and the mitigation measures recommended in the EIA will reduce impacts on both of them to "low".

284. 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.

285. The EIA for the Majuba Rail Project identified a number of sensitive natural features that would potentially be damaged by construction of the track, including springs and wetlands, hillside seeps, and a short but relatively broad section of the Vaal River floodplain that contains wetlands and oxbow lakes. Eskom has adopted all the recommendations in the EIA for adjustment of the right-of-way alignment to avoid springs and seeps and to cross the Vaal River at a less sensitive location. Stone-filled wetland "underpasses" will be installed as the railroad embankment is constructed in order to maintain natural water flow in the wetlands.

286. Physical Cultural Resources: The Physical Cultural Resources (PCR) safeguard is not triggered by the Medupi Power Plant. During installation of the related transmission lines, graves may be encountered, and the EIAs recommend detailed field surveys in advance of construction. Eskom has developed the institutional capacity and effective procedures to implement South African legal requirements, including standard procedures for "chance finds." The procedures have been successfully implemented at other sites where historic homesteads identified during the EIA process have been preserved and protected, and human remains identified during both the EIA process and as "chance finds" during site clearance have been exhumed and moved in accordance with national standards.

287. Sixteen Late Stone Age middens[89] 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.

288. PCR is not an issue at the CSP site. In the case of the Ermelo-Majuba Rail Line, the EIA did not identify any PCR. However, the detailed pre-construction survey of the right-of-way recommended in the EIA revealed the existence of several graves. Those that were directly in the path of construction have been relocated, in consultation with the affected communities and village leaders, and in a culturally acceptable manner. The other graves are being protected by walls or fences to prevent inadvertent damage during the installation of the rail line.

289. 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 11 of this PAD. In

[89] A midden, also known as a kitchen midden, or a shell heap, is a dump for domestic waste. The word is of Scandinavian via Middle English derivation, but is used by archaeologists worldwide to describe any kind of feature containing 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.

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 11 have been completed as described in Table 16 below.

Table 16: 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 will be conducted and disclosed.

290. International Waterways. OP 7.50, Projects on International Waterways, is triggered by the project because the water supply for the Medupi Power Plant and the subsequent additional allocation for FGD will be sourced from phases I and II of DWA's MCWAP and the Mokolo and Crocodile rivers, which are tributaries to the Limpopo river. The Limpopo river forms the boundary between South Africa and Zimbabwe and part of the Botswana-South Africa boundary, and it flows through Mozambique to the Indian Ocean. OP 7.50 is not one of the safeguards policies covered under use of country systems, hence the GoSA must meet the requirements specified in the OP. The GoSA subscribes to the SADC Revised Protocol on Shared Watercourses, which describes how the countries deal with and manage their use of the shared watercourses, including notification and provision of information when required under the Protocol. Also, the four riparians have established the Limpopo Basin Permanent Technical Committee (LBPTC) as a forum to inform one another and to discuss plans involving shared water resources. In accordance with the Revised Protocol, the GoSA has informed the riparians via the LBPTC of its planned MCWAP, under which it will supply Medupi and other users in the vicinity of Lephalale and Steenbokpan with water from the Mokolo River and offset the amounts consumed by transfers from the Crocodile River.

291. The Acting Director of the GoSA Department of Water Affairs (DWA) reported to Eskom in a letter dated December 18, 2009, that the MCWAP proposal was first discussed at the regular meeting of LBPTC on July 6, 2007. LBPTC members were given updates at meetings on June 20, 2008, and July 12 and November 19, 2009, all consistent with the provisions of the Revised Protocol. In furtherance of the provisions of the Revised Protocol, the GoSA has provided additional information to the other riparian states, in letters dated February 23, 2010, with which it transmitted copies of the Scoping Reports for the two phases of MCWAP. Eskom has provided copies of these letters to the Bank, through a letter dated February 23, 2010. The DWA, in its February 23 letter to the other riparians, explained that there will be no adverse effects on any of the co-basin states because some of the water will come from present allocations at the existing Mokolo Dam and the rest from surplus return flows to the Crocodile River that do not originate in the Limpopo Basin.

F. Safeguard policies

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. OP 7.50 Projects on International Waterways is not covered in OP 4.00 and therefore applies to the proposed Project.

* 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

292. Past Procurement under Component A of the Project. South Africa faces near- and medium-term electricity shortages. Taking into consideration the long lead time for such large investment, Eskom began the procurement process for the Medupi Power Plant (Component A of the Project) in 2005 to avert the looming power crisis. At that time Eskom and the Government expected Eskom to fund the program through a combination of internal cash generation and commercial debt. They had no intention of seeking financing from multilateral institutions, such as the World Bank and, therefore, had no reason to follow any procurement policies and procedures other than their own, i.e., the procurement policies and procedures of Eskom. The situation changed when a combination of energy and global financial crises resulted in major funding shortfalls.

293. Construction of the Medupi Power Plant to satisfy the immediate energy needs requires the continued performance of supply-and-installation and construction contracts that already have been procured (which account for 58 percent[90] of financing allocated to all contracts under this Project) using the procurement policies and procedures of GoSA and Eskom. Going forward, Eskom has committed to use the Bank's Procurement and Consultant Guidelines to procure contracts for procurement related to the Medupi Power Plant, associated transmission lines, and renewable and energy efficiency investments (which account for 42 percent of financing allocated to all contracts under this Project)[91].

294. Internal and external due diligence of the procurement processes of the Medupi Power Plant at the project level and at the contract level have concluded that the procurement has been carried out in a fair and transparent manner, and in compliance with the existing laws of South Africa. The process followed focused on economy and efficiency, and gave opportunity to potential suppliers from both developed and developing countries to participate in the bids. In addition, the Borrower has committed to follow the Bank's Procurement and Consultant Guidelines for future contracts, and agreed to the inclusion (by contract amendment) of the Bank's fraud & corruption and right to audit provisions in the contracts already awarded by Eskom to be financed from the proposed loan.

[90] Based on current cost estimates.
[91] Based on current cost estimates.

295. Construction of the Medupi Power Plant (Component A of the project) to meet South Africa's immediate energy needs requires the uninterrupted execution of supply-and-installation and construction contracts that already have been procured using the Guarantor's and the Borrower's procurement policies and procedures. This justifies an exception from the following specific provisions of the policies relating to Bank Financing (OP/BP 6.00) and Procurement (OP/BP 11.00) in order to allow Bank financing of contracts already awarded by Eskom using Eskom/GoSA procedures. *Therefore, a one-time exception from application of the Bank's Procurement Guidelines is being sought with respect to the contracts already awarded or in advanced stage of procurement and to be financed under Component A of the Project.* The Bank's fraud & corruption and right to audit provisions shall be incorporated into all such Medupi related contracts.

296. A retroactive financing arrangement of up to 10.67% of the loan amount (up to US$400.00 million) will be provided to cover payments made prior to the signing of the Loan Agreement but on or after January 1, 2007, for all eligible expenditures financed by the Bank loan. OP 6.00 (Bank Financing), footnote 3, allows, in extraordinary circumstances, exceptions to the applicable conditions for retroactive financing. One such condition requires that payments made by the Borrower should not be more than 12 months before the date of Loan Agreement signing. Regional Management, exercising the authority provided in such footnote, has agreed to the retroactive financing beyond the usual 12 month period.

297. Prospective Procurement. 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. The Bank has reviewed a set of bidding documents for prospective procurement and found them equivalent to the Bank's SBDs with changes as permitted by the Guidelines (Paragraph 2.12). However, change in contract terms post-award that provides an incentive through availability of more favorable contract payment terms, which is not taken into account in the evaluation, but which potentially could affect equal opportunity of some bidders (local or foreign) is not contemplated in the Bank Guidelines. It is the Bank's assessment that the risk of occurrence of such a scenario is low.

298. Based on the above and country specific considerations noted, Board approval is being sought for the inclusion of the ASGI-SA related provisions as proposed by the Borrower.

299. The Project is ready for implementation. Component A (the Medupi Power Plant) is under implementation by Eskom and the procurement plan for the first 18 months has been completed for Components B and C.

Annex 1: Country and Sector or Program Background

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

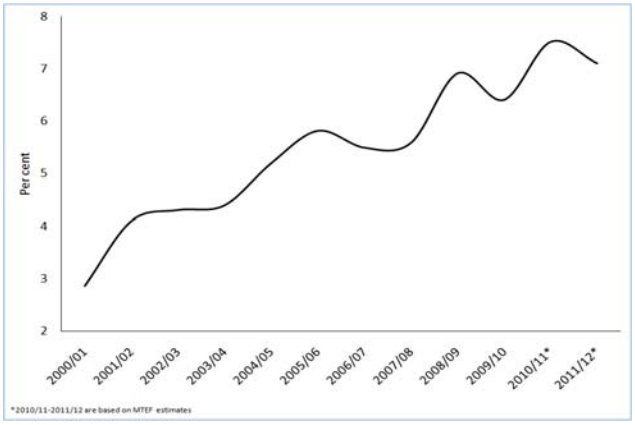
Country Background

1. South Africa has a population of about 49 million and a GDP of about R2400 billion (about US$300 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 (17.5 percent in 2008) and manufacturing (16.9 percent).

2. Supported by a strong infrastructure base, the country has done well in stabilizing and strengthening its economy since transitioning from Apartheid in 1994. However, in recent years bottlenecks have begun to appear. For example, the stable and low-cost electricity supply the country has had over this period is now constrained, to the point that the demands of 2007/08 could not be met. This had a severe impact on the economy, especially for the manufacturing and mining sectors, whose operations had to be scaled down and some employees laid off.

3. In the Budget Policy Statements of February 2009 and February 2010, the Minister of Finance recognized that in the current economic context, South Africa would need to invest more in its physical infrastructure in order for it not to become a binding constraint on growth. The Government has decided to step-up infrastructure investments and support state-owned enterprises by providing selective guarantees on their borrowings. In addition, appropriate pricing of utility services, such as electricity needs to be encouraged for efficiency and for mobilizing long-term financing of capacity expansion programs. The Government is also creating a more amenable environment for the private sector to invest in economic and social infrastructure and to improve the operational and financial efficiency of public sector institutions. Figure 1 below shows capital spending on infrastructure has been trending upward in recent years.

Figure 1: Capital Spending on Infrastructure Sectors (as a % of GDP)



4. Other key economic vulnerabilities and critical policy challenges have arisen in recent times. Domestic investment remains constrained by relatively low levels of savings, and foreign investment is relatively insignificant, particularly in "green field investments." In addition to the weakening infrastructure, investors appear to be deterred by certain factors, including crime, high cost of skilled labor, exchange rate volatility, and labor relations.[1] Strong domestic demand has led to rapidly rising household indebtedness and imports, leading to widening of the current account deficit, as exports

[1] Investment Climate Assessment, 2004; Draft Investment Climate assessment, 2009 http://rru.worldbank.org/Documents/EnterpriseSurveys/ICA/SouthAfrica.pdf

failed to keep up pace.[2] High instance of HIV/AIDS has put tremendous strain on communities and undermined the human capital base of the economy.

5. Finally, although growth has been respectable, its distribution has not. A recent report from the Presidency acknowledges increasing inequalities across race, gender and location. Between 1995 and 2005, inequality between racial groups increased from a ratio of 0.64 to 0.69. Such a rise in inequality has at its base a growth pattern that did not create the jobs needed to give all South Africans a share in the country's success. Unemployment at 24.3 percent remains very high, and the legacies of Apartheid continue to deprive the poor of access to economic opportunities and basic services.

Macroeconomic Update

6. The South African economy seemed well-poised up until late 2007, before being buffeted first by a power crisis and then by the global economic crisis. GDP growth exceeded 5 percent for a third year running in 2007, bolstered by strong domestic demand, robust construction activity, and a marked pick-up in services and manufacturing. Buoyed by a more favorable business environment and benign global conditions, the private investment rate rose to 15.1 percent in 2007; up from 10.9 percent in 2002. The budget balance was in surplus for the second straight year in 2007, allowing national government debt to GDP ratio to decrease by almost 5 percentage points to 28 percent. External debt was at a reasonable 27 percent of GDP (40 percent of it Rand-denominated) by end-2007, and the banking sector showed solid balance sheet positions with limited exposure to foreign currency debt and interest rate fluctuation.

7. Widespread power shortages in late 2007/early 2008, together with a slowing global economy and lagged effects of earlier monetary tightening in an environment of high household indebtedness, had, however, undercut the country's growth prospects by the end of 2007. The FY09 budget, presented in February 2008, had reduced the growth projections, from 5 percent in 2007 to 4 percent in 2008 and 2009. A reduction of close to one-half percentage point in growth could be attributed to electricity shortages according to a 2009 Deloitte study on South Africa's electricity sector.

8. 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. News of GDP growth of 0.9 percent (quarter-on quarter, seasonally adjusted and annualized) in 2009Q3 came as a welcome respite following three consecutive quarterly declines during 2008Q4-2009Q2. Growth for 2009 is estimated at -1.8 percent, compared to last year's projections of 3-4 percent for 2009.[3] The decline in economic activity, albeit widespread, has been particularly sharp in manufacturing and mining,[4] as the demand for the country's exports plummeted, commodity prices fell sharply,[5] 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, 870,000 jobs were lost between 2008Q4 and 2009Q4, with the unemployment rate increasing from 21.9 percent to 24.3 percent.

9. Fortunately, South Africa entered the downturn with a sound macro/fiscal position, enabling aggressive countercyclical fiscal and monetary responses.[6] In particular, fiscal space generated by

[2] Import volume grew at an average rate of 12.4 percent over 2003-07, compared to only 5 percent growth for export volumes.

[3] GDP growth for 2009 was projected at 4 percent in the FY09 budget announced in February 2008, which the 2008 MTBPS then revised down to 3 percent in October 2008.

[4] Manufacturing output fell by 14.5 percent January-October 2009 relative to the same period in 2008, while mining was down 7.3 percent over this time period.

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

[6] 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,

several years of budgetary discipline and low public debt (net debt of the national government was just 22.7 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 2008/09 and 2009/10, this caused the fiscal balances to worsen from a surplus of 1.7 percent of GDP in 2007/08 to a deficit of 7.3 percent of GDP in 2009/10: the ratio of public sector borrowing requirement to GDP meanwhile increased from 0.3 percent to 11.8 percent. The 2010/11 Budget purports to extend the expenditure trends, by proposing a R846 billion infrastructure investment plan for the FY11-13 period, R454 billion of which would be incurred by large SOEs (including R309 billion by Eskom and R49 billion by Transnet) with substantial cover in the form of government guarantees.[7] 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 growth.[8] The budget deficit and public sector borrowing requirement would fall to 6.2 percent and 11.1 percent, respectively, in 2010/11 and further to 4.1 percent and 7.1 percent, respectively, by 2012/13.

Table 1: Key Economic Indicators

	2007	2008	2009	2010	2011	2012
			(Estimates)	*(Projections)*		
Output and Prices						
Real GDP Growth	5.5	3.7	-1.8	2.3	3.2	3.6
Headline CPI (annual average) inflation	6.1	9.9	7.1	5.8	6.1	5.9
External Outlook						
Export Growth	5.9	2.4	-20.2	3.8	3.9	5.4
Import Growth	9.0	1.4	-18.3	6.8	4.9	5.6
Current account balance (% of GDP)	-7.2	-7.1	-4.3	-4.9	-5.3	-5.8
Gross official reserves (billion $)	33.0	34.1	35.8	35.8	35.8	..
- In months of next year's Good and nonfactor Services imports	3.7	4.6	4.5	4.2	3.9	..
Consolidated Govt. Finance (percent of GDP)[1/]						
Total Revenue	30.2	29.7	26.8	27.3	27.9	28.0
Total Expenditures and net lending	28.5	30.8	34.1	33.6	32.9	32.1
Overall budget deficit (excl. grants)	1.7	-1.0	-7.3	-6.2	-5.0	-4.1
National Government Debt	23.2	22.7	28.2	33.2	37.3	39.8
Borrowing Requirement of Non-Financial Public Sector	-0.3	4.0	11.8	11.1	8.8	7.1
Investment and Saving (% of GDP)						
Gross Domestic Investment	21.9	22.8	23.3	23.4	23.6	..
- Of which public fixed investment	6.2	7.5	8.4	8.7	8.9	..
- Of which private fixed investment	15.0	15.8	15.4	15.4	15.4	..
Gross national saving	14.6	15.4	16.4	16.4	16.4	..
Money and Credit						
Net Domestic assets	21.3	9.6	9.1	10.6	11.6	

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.

[7] Other areas of emphasis in the budget include employment programs, social security benefits, health, education, fighting crime, and rural development.

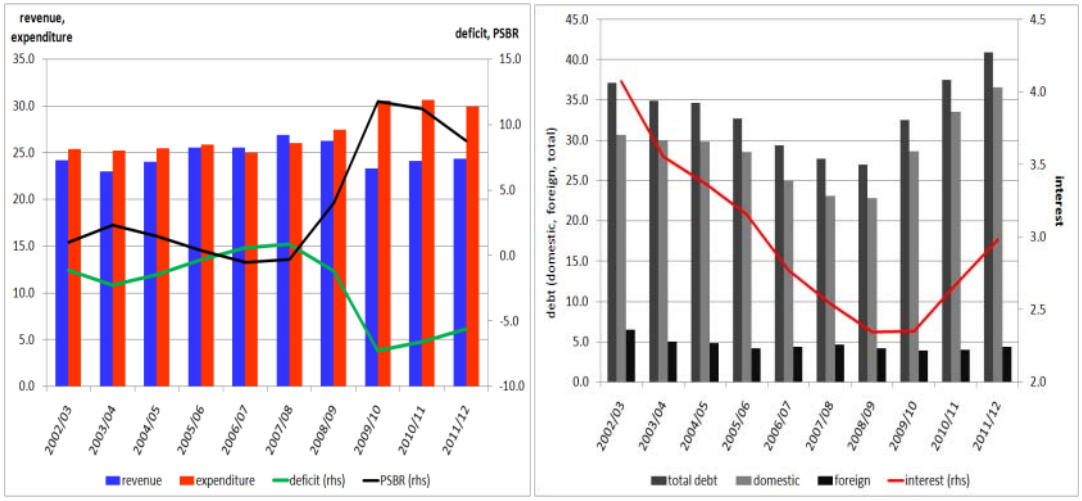
[8] Public expenditure is projected to grow at around 2 percent per year over the FY11-13 period, compared with 7.2 percent growth during FY06-09.

	2007	2008	2009	2010	2011	2012
			(Estimates)	*(Projections)*		
Broad money (incl. forex deposits)	23.6	14.8	7.9	12.6	12.5	
Repo Rate	11.0	11.5	7.5	..	..	

Source: National Treasury, South Africa, and IMF; 1/ The fiscal data under the column for year X are for fiscal year X/X+1.

10. 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.

Figure 2: Trends in Budget, Public Sector Borrowing Requirement, and Public Debt (% GDP)



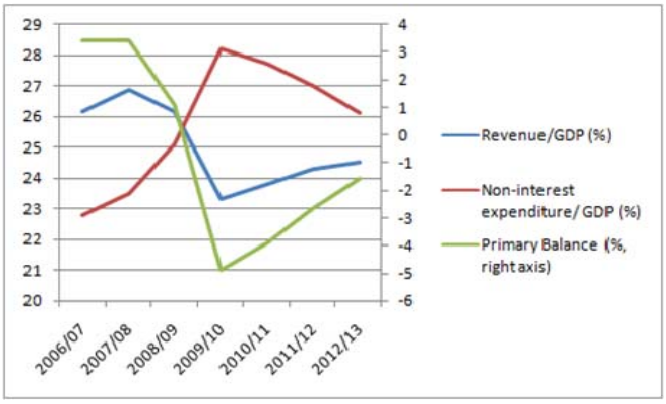
Source: National Treasury and Staff calculations.

11. Even so, the budget will remain under considerable strain over the medium term because of the high projected fiscal deficits**.** As per the latest estimates presented in the 2010 budget, the Government will need to borrow R669 billion (US$88 billion at current exchange rate) over the 2009/10-2012/13 period, which would take its debt stock to R1.3 trillion by 2012/13. Or, the government net debt stock would rise from 28 percent of GDP in 2009/10 to 40 percent of GDP in 2012/13, peak at about 44 percent of GDP in 2015/16, before stabilizing and falling gradually. This is fairly modest in comparison to Brazil (63 percent), India (77 percent) and Hungary (80 percent).[9] The debt servicing cost to the government according to these estimates would increase from R57.6 billion in 2009/10 to R104 billion in 2012/13, which would be 3.2 percent of GDP, the same as in 2007/08 and lower than in the previous years and thus within manageable limits.

12. As seen in Figure 3, the non-interest expenditure as a share of GDP peaks in FY10 and then falls by 2 percentage points by 2012/13. In the meanwhile, the fiscal revenue to GDP ratio improves by more than one percentage point between FY10-13. The net result is a 3.3 percentage point improvement in the primary budget balance, from -4.9 percent of GDP to -1.6 percent of GDP. This trajectory toward achievement of a primary surplus yields the mentioned declining trends in government debt from FY16 onward.

[9] International Institute of Finance, March 2010, "South Africa: On the path to Fiscal Sustainability."

Figure 3: Primary Budget Balance; 2006/07 – 2012/13



Source: 2010 Budget Overview, National Treasury, South Africa

13. The 2010 Budget clearly presented a fiscal pathway toward sustainability, which, as noted, has been deemed credible by independent analysts (including the International Institute of Finance and the Economist Intelligence Unit) and markets alike. The main challenge on the expenditure side is going to be holding back pressures for continued strong growth in public sector wages and increased social expenditure. The Finance Minister took a firm line on wages in his budget speech when he said that "Now that a major revision to public service remuneration is behind us, it will be necessary to moderate salary increases going forward." The revenue element of the fiscal improvement depends on the strength of the economic recovery. While the fiscal framework presented in the 2010 Budget is based on conservative GDP growth estimates, the risk from lower growth outcomes cannot be discounted. However, on this South Africa's fortunes are closely tied to that of the World economy and to its own ability to tackle the emerging electricity supply constraints, the focus of this operation. To the extent that the global recovery firms up further, as trends in the Global Economic Prospects 2010 confirm, that takes significant pressure off the fiscal situation in South Africa. Moreover, Eskom's expenditure plan, which is substantial in size with commensurate pressures on public sector finances in the medium-term, has high likely growth pay-off and would therefore improve prospects of longer term fiscal sustainability by moderating the debt to GDP ratio and bringing forward the time when the ratio begins declining. The National Treasury's quantitative analysis of fiscal sustainability is presented on pages 61 and 62 of the 2010 Budget Document. A key conclusion of its analysis is that the probability of the debt stock breaching 50 percent of GDP threshold is low – the probability peaks at 36 percent in 2017/18.

14. Total net debt plus contingent liabilities and provisions are projected to increase from 33.8 percent of GDP on March 31, 2009 to 53.6 percent by 2012/13 and peak at about 60 percent of GDP by 2015/16, the upper limit of the SADC's macroeconomic convergence target. Contingent liabilities would reach around R376 billion by end-2012/13, R176 billion of it being the guarantee to Eskom approved in February 2009. Other state guarantees include R15.2 billion for the Development Bank of South Africa (DBSA), R2.5 billion for the Land Bank, R1.5 billion for South African Airways, R1.4 billion for Autopax Passenger Services, R1.3 billion for Denel (the defense equipment manufacturer), and R1 billion for the South African Broadcasting Corporation. More details on the Government's contingent liability position are available on pages 94-96, and 98-100 of the 2010 Budget Document.

15. Prompted by the economic slowdown and improving outlook for inflation, SARB slashed the repurchase rate by 500 basis points between December 2008 and August 2009. At 7.0 percent, the repo rate is at its lowest since June 2006. CPI inflation, at 6.2 percent in January, slipped within SARB's 3-6 percent target range for the first time in 30 months in October 2009, benefiting from a strong Rand and subdued spending by the private sector. Nonetheless, SARB's Monetary Policy Committee decided against any further cut in the interest rates since August, citing looming electricity tariff

increases and double-digit wage increases earlier in the year as the downside risks. Fueled by global petroleum and food prices, and adjustments in domestic administered electricity prices, CPI inflation had reached 13.6 percent in August 2008, uncomfortably above the SARB's 3-6 percent target range. The trend has since been reversed, as global energy and food prices fell sharply from their historical peaks and monetary tightening took effect. Producer price inflation has fallen even more sharply, from a peak of 19.1 percent in August 2008 to 2.7 percent in January 2010.

16. The strong macroeconomic response by the authorities, combined with the improved global economic environment, helped end the recession in 2009Q3. The manufacturing sector, recovering from an 11.1 percent decline in Q2, led the return to positive growth in 2009Q3, with 7.6 percent growth (quarter-on-quarter, seasonally adjusted and annualized) in 2009Q3,[10] followed by construction, government services, and utilities (electricity, gas and water).[11] Construction activity grew at an annualized rate of 6.1 percent in Q3, reflecting continued strength of public sector investment in the sector, as private sector engagement in real estate and building activity remained subdued. Positive growth in general government services (4.9 percent), personal services (3.5 percent), and transport and communication (1.2 percent) offset declines in wholesale and retail trade (–1.1 percent) and finance and business services (–1.5 percent), enabling the services sector as a whole to grow at 0.8 percent (quarter-on-quarter, seasonally adjusted and annualized) in 2009Q3. Benefiting from renewed demand for commodities in China, export volumes grew by 3 percent in 2009Q3.

Table 2: Quarterly GDP Growth (percentage change in seasonally adjusted annualized rates)

	2008				2009		
	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Total GDP	**2.5**	**5.5.**	**1.3**	**-0.7**	**-7.4**	**-2.8**	**0.9**
Primary Sector	-8.7	9.3	-2.3	1.7	-23.4	6.0	-7.0
Agriculture	12.8	6.2	17.8	5.6	-3.7	-13.1	-9.8
Mining	-15.8	10.5	-9.5	0.1	-30.7	15.8	-5.8
Secondary Sector	0.2	14.0	-2.5	-12.9	-19.4	-6.9	7.0
Manufacturing	-0.1	17.4	-5.2	-17.4	-25.5	-11.1	7.6
Construction	3.7	5.4	8.6	6.3	10.7	8.7	6.1
Tertiary Sector	4.8	2.6	3.8	4.2	-0.9	-1.7	0.8
Government Services	4.4	2.5	6.2	6.2	2.1	3.1	4.9
Final Consumption Expenditure	2.9	0.6	-1.5	-2.2	-5.8	-6.1	-2.0
Households	2.9	0.6	-1.5	-2.2	-5.8	-6.1	-2.0
General Government	11.6	-2.3	10.1	3.5	6.4	0.8	7.5
Gross Fixed Capital Formation	17.5	7.9	12.4	2.8	7.4	-0.9	-4.1
Private	9.7	5.6	5.3	4.0	-16.8	-9.4	-14.1
Public Corporations	58.1	17.3	46.1	-2.1	152.3	23.4	18.7
General Government	16.3	7.9	10.0	3.4	1.6	2.0	4.4
Gross Domestic Expenditure	14.7	-2.5	0.7	-2.7	4.7	-12.1	-1.7

Source: South African Reserve Bank

17. Growth is projected in the 2010 Budget to improve gradually, from –1.8 percent in 2009, to 2.3 percent in 2010 and further to 3.6 percent by 2012. 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

[10] Recovery in manufacturing reflected strong performances by motor vehicles, electrical machinery, and food and beverages. Encouragingly, the manufacturing activity carried its positive Q3 momentum into November, when the PMI (seasonally adjusted) rose above the critical 50 index point level for the first time since April 2008. Roughly, a PMI reading of over 50 reflects expansion in the sector.

[11] Reflecting stronger manufacturing activity, electricity consumption rose 1.4 percent m/m (seasonally adjusted) in October 2009 and by 2.1 percent in the three months ended October compared with the previous three months.

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. The Government would like to see a more competitive exchange rate, although the policy mix to achieve that is not clear at the moment. Continued focus on low and stable inflation and rollback of the countercyclical fiscal measures, as indicated by the 2010 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. The growth dividend of the FIFA World Cup could be as high as 0.5 (2010 Budget) to 1.0 (EIU estimate) percentage point in 2010, benefiting from tourism and related services for the additional 500,000 tourists that are expected during the event. In the meanwhile, structural issues such as lack of skills, impairment of human development by HIV/AIDS, low savings rates, and geographical segregation of informal settlements will continue to act as restraints on growth.

18. Economic recovery remains tentative and uneven, however, particularly on account of continued weakness in domestic private sector demand.[12] Large-scale job loss (870,000 in 2009) led to a 1.1 percent decline in disposable incomes in 2009Q3 of households.[13] Private credit fell for the first time in over 40 years in October and again in November.[14] It is especially worrying that private sector confidence in the economic recovery is still to develop, causing it to shy away from fixed investment.[15] In addition, mining exports have weakened, despite record gold prices and strong recovery in platinum, due to structural issues at mines and a strong Rand. At the same time, prospects remain uncertain in the agriculture sector, where lower domestic incomes, declining producer prices and rising costs of intermediate inputs (including fertilizers) resulted in negative growth in each of the first three quarters of 2009. Manufacturing output, despite the turnaround in 2009Q3, was still down 11.2 percent year-on-year in September 2009, with each sub-sector, except food and beverages, recording lower output relative to September 2008.

19. South Africa's external and financial sectors remain robust despite the global crisis. After an initial dip, foreign portfolio investment has recovered strongly, comfortably covering South Africa's large current account deficit (7.1 percent of GDP in 2008 and an estimated 4.3 percent of GDP in 2009). Foreigners net purchased over US$10 billion worth of equity on the Johannesburg Stock Exchange in 2009, exceeding the net outflow of about US$6.3 billion in 2008. In addition, a slump in imports and a mild recovery in exports have ended a prolonged period of trade deficit, taking considerable pressure off the current account. These developments on the BOP have led to a full recovery in the value of the Rand against the major currencies: the Rand/US$ rate and the nominal effective exchange rate stand firmer today than at end August 2008, just before the onset of the global crisis.[16] Leaning against the wind to prevent excessive appreciation, SARB accumulated international reserves, taking gross reserves from $34.1 billion at end-2008 to $39.5 billion at end-January 2010.

20. South African banks remain in a sound position to weather the global financial storm, benefiting from limited exposure to foreign currency debt and more disciplined lending practices ensured by the National Credit Act of 2007. According to a recent SARB Supervision Report, local banks' capital-adequacy ratio increased from 11.8 percent to 13 percent over 2008 and liquid assets

[12] Household spending fell for the 5th consecutive quarter in 2009Q3, reaching 61 percent of GDP, the lowest since 1994Q1, as households, overburdened with debt, continue to deleverage despite lower interest rates.

[13] The ratio of household debt to disposable income stood at 79 percent in 2009Q3, down from 80.1 percent in the previous quarter.

[14] Private sector credit demand fell 1.6 percent y/y in November 2009, the sharpest annual decline in 43 years.

[15] Gross fixed capital formation by the private sector fell by 14.1 percent in 2009Q3, following declines of 16.8 percent and 9.4 percent, respectively, in Q1 and Q2 of 2009, as firms feverishly ran down inventories rather than invest in production expansion to meet demand, in an apparent lack of confidence in the durability of the recovery.

[16] Among the emerging markets, in 2009 the Rand's recovery against the US$ was second only to the Brazilian Real's.

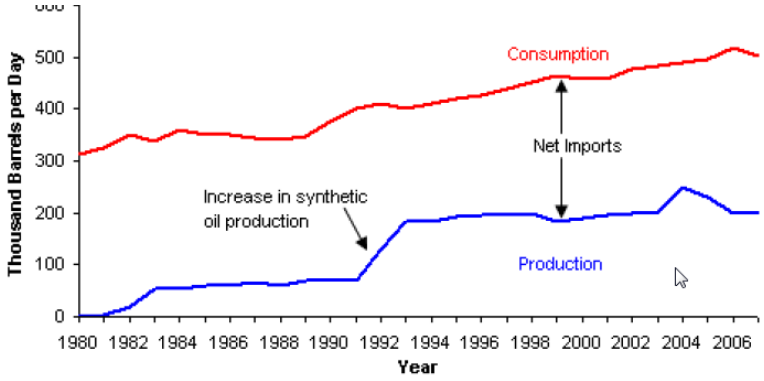
held by banks exceeded statutory requirements throughout 2008. Implementation of the Basel II process has been of high quality. The ratio of non-performing loans (NPLs) to loan advances increased from 2.8 percent in July 2008 to 5.5 percent in August 2009 as a result of the crisis, but remains manageable.

Sector Background

A. Energy Resources in South Africa

21. 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).[17] As Figure 4 shows, 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.

Figure 4: South Africa's Oil Production and Consumption, 1980-2007



Source: EIA

22. 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.

23. 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.

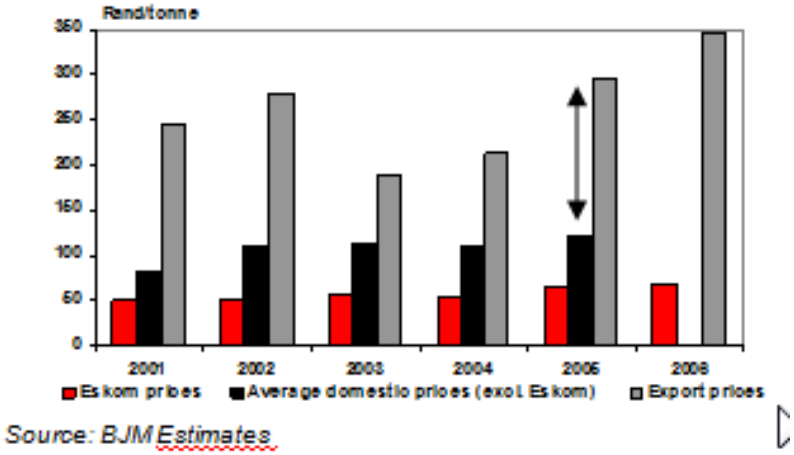
24. South Africa is the fifth largest coal producing country in the world, producing an average of 224 million tons of marketable coal annually. Twenty five percent of this production is exported internationally, making South Africa the third largest coal exporting country. The remainder of South Africa's coal production feeds the various local industries: Fifty three percent is used for electricity

[17] Energy Information Administration, Country Analysis Brief, October 2008.

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.

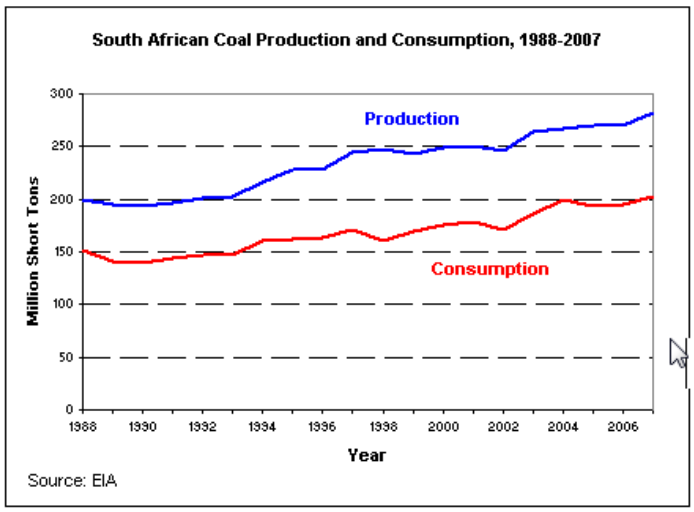
25. Typically, South African exported coal has a heating value above 23 MJ/Kg. The coal-fired power plants burn domestic coal with a heating value in the 14-20 MJ/Kg range (average: 17 MJ/Kg) and 0.6 to 2.5 percent (average: 0.8-0.9 percent) sulfur content. In the past (see Figure 6), coal was available to Eskom at very low prices (R40-80/ton), but increasing international demand for coal has increased prices substantially (up to R300/ton for spot purchases). This is the case not only for the high quality coal which is exported, but also for the lower quality coal which used to be purchased only by Eskom.[18]

Figure 5: Coal Prices



26. 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.

Figure 6: South African Coal Price and Consumption



[18] Eskom had to purchase approximately 20 percent of its coal in the spot market in 2008 considerably increasing its operating costs.

27. 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[19] 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, close to the Medupi Power Plant). 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.

28. South Africa also uranium reserves estimated at 157,853 PJ[20] 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.

29. South Africa has an attractive range of renewable resources, particularly solar. 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. As a result, 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.

30. The government has announced its target to generate 10,000 GWh from renewable sources by 2013 and is currently finalizing proposals to ensure that this target is met (the proposed Component C.2 is being developed by Eskom in support of this target). To help achieve this target, the regulator has also announced feed-in tariffs for wind power, hydropower, landfill gas and CSP. If financial support is available, about 900 MW of wind projects could be developed in the next 10 years, with a longer-term target of 4,500 MW.

31. 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

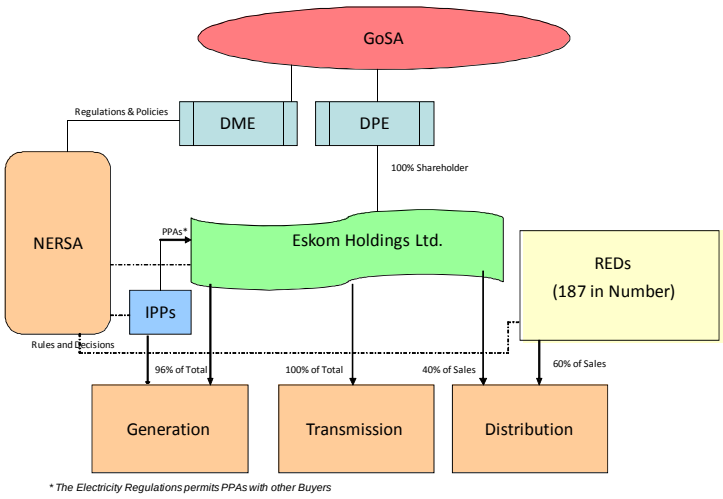
32. The principal entities in the South African electricity sector are:

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

[19] Source: South Africa/Initial National Communication to UNFCCC, October 2000
[20] Source: South Africa/Initial National Communication to UNFCCC, October 2000

amount of power consumed), with the remainder being supplied by the distribution component of Eskom.

Figure 7: Electricity Sector Structure



33. *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.[21]

34. 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 DME 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).

35. *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 had responsibilities only for the regulation of piped gas and petroleum pipelines but, in 2006, it was given regulatory responsibilities for the electricity sector (which had previously been under the jurisdiction of the National Electricity Regulator), pursuant to the Electricity Regulation Act, 2006.

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

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.

37. 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

[21] 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.

b. issuing tariff guidelines and methodologies (such as the proposed Multi-Year Price Determination methodology, known as MYPD).

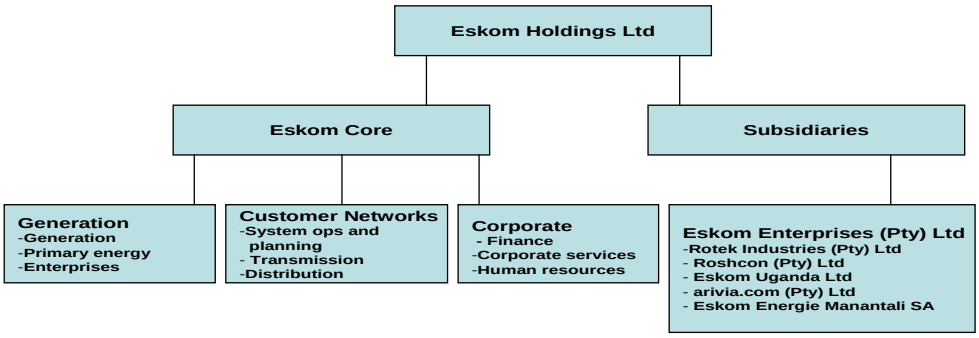
38. NERSA's other responsibilities in the sector include the regulation of Eskom and the numerous municipal and private distribution companies. The regulation of Eskom's generation, transmission and distribution services is relatively intense, as evidenced by NERSA's February 24, 2010 Decision in respect of Eskom's MYPD 2 tariff application. In contrast, a somewhat lighter form of regulation is employed in respect of the licenses and tariffs of the municipal distribution companies. (For example, NERSA approved, on December 20, 2007, a generic Municipal Tariff Guideline Increase of 12 percent, and subsequently received, reviewed and approved 163 tariff applications from municipal distributors).

39. *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[22] by NERSA, and by the National Nuclear Regulator in terms of the National Nuclear Regulatory Act (47) of 1999. The utility employs about 35,500 people (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).[23]

40. Eskom operates its business through a number of divisions and subsidiary companies. The following chart shows the current structure of the Eskom Group, including the major subsidiaries (Figure 9). 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.

41. 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 net capacity of about 38,000 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.

Figure 8: Eskom Holdings Business Structure



[22] 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).

[23] 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.

Figure 9: Eskom Subsidiaries

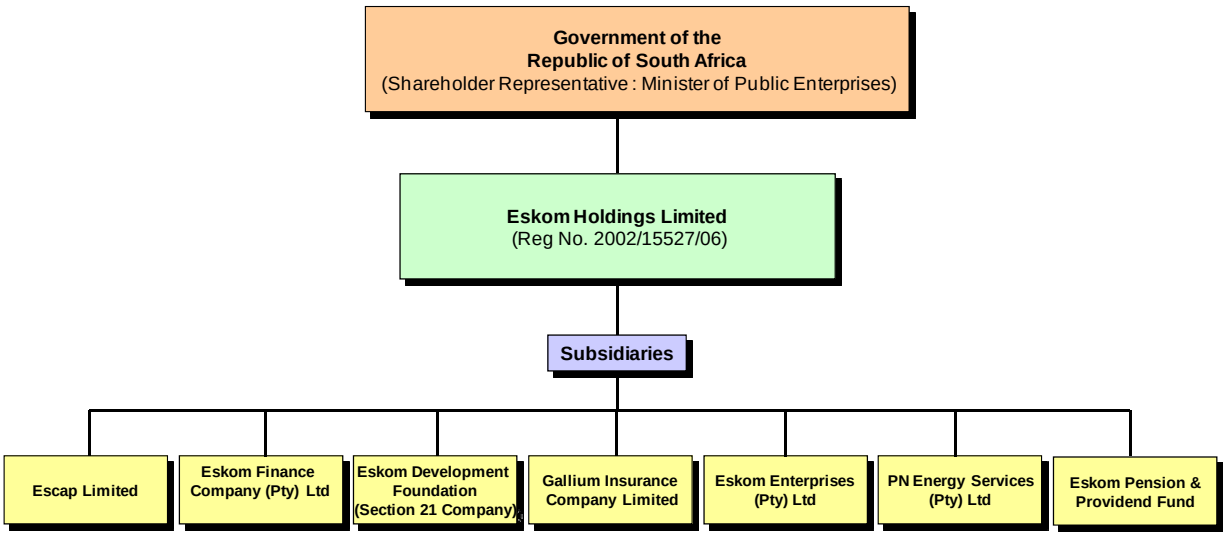


Figure 10: Eskom's International Presence

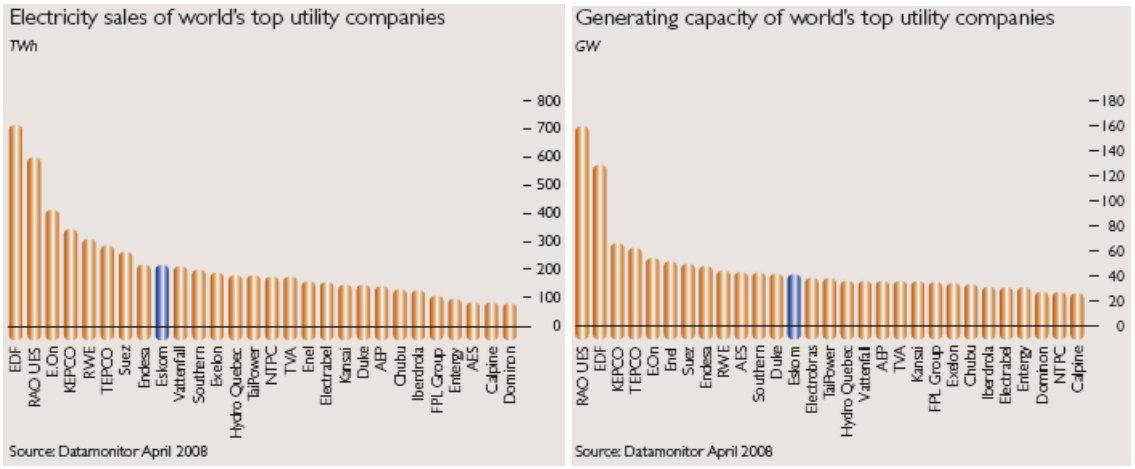
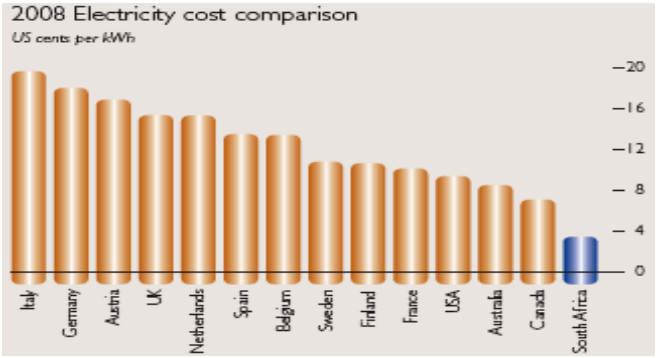


Figure 11: Operational Efficiency of Developed Utilities



42. Eskom's past and projected operational performance from the financial perspective is provided in Annex 4. Its past performance compares favorably with that of other similar utilities in large middle income countries such as Brazil and Russia, as well as some OECD countries. In terms of operating-

cost, it is the lowest cost operator as depicted in Figure 11. For many years, Eskom has been among the lowest cost electricity producers in the world. One of the reasons for this is South Africa's abundance of coal. For the past two decades it has not been necessary to invest in new power stations as supply of electricity far exceeded demand and some of the plants were mothballed. The lack of need to invest in large generating assets for a long time and a financially depreciated system enabled Eskom to keep the price of electricity down.

43. However, an electricity crisis has developed in South Africa over the past few years, first manifesting as a peak capacity problem and developing into a deeper energy crisis in early 2008. During the crisis, Eskom introduced a power conservation program to align consumption and demand with the limited supply available. This was to some extent achieved in mid-2008 when some of the mothballed capacity became operational.

44. To meet the growing needs of the economy and to mitigate the risk that the current financial crisis and possible supply shortages could further impact the success of access to electricity to date, Eskom's long-term strategy is to develop 20,000 MW of new generating capacity.[24] To this extent, Eskom plans to bring on line in the next seven years about 9,600 MW of new coal-based generating capacity. In addition 1,300 MW of peak power is expected to be generated from a pumped hydro scheme and about 200 MW from development of RE (CSP and Wind) projects.

45. *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.

46. Approximately 148 of the MEUs belong to a voluntary trade group known as the Association of Municipal Electricity Undertakings (AMEU). NERSA exercises some degree of regulatory control over the MEUs, but not all of the MEUs' tariffs are set by the regulator. For a number of years, attempts have been made to rationalize this aspect of the sector. Following a lengthy debate, the 1998 Energy White Paper endorsed the recommendation of the DME that the electrical distribution industries should be consolidated into a number of financially viable and independent Regional Electricity Distributors (REDs), and that cost-effective tariffs should be introduced. Subsequently, in 2003, the DME incorporated Electricity Distribution Industry Holdings (Pty) Ltd (EDI Holdings) for the purpose of facilitating the restructuring of the electricity distribution industry in accordance with the requirements of the 1998 Energy White Paper and subsequent Cabinet decisions. In 2006, the Cabinet decided that:

- an arrangement of six 'wall to wall' REDs would be implemented;
- the REDs would be established as public entities and be regulated according to the 1999 Public Finance Management Act and the Electricity Regulation Act, 2006;
- Eskom would become a shareholder in the respective REDs for a transitional period, reducing its shareholding over time;
- the DME, through EDI Holdings, would oversee and control the REDs;
- a roadmap would be put in place to move from the current scenario into the future industry structure;

[24] This massive expansion plan is larger than the combined undeveloped generation potential of Mozambique and Zambia, two countries that have the most feasible sources of regional supply in the medium term, and much larger than all generation projects that have been deemed feasible in the sub-region.

- a strategy would be developed to deal with capital investment requirements for the REDs;
- EDI Restructuring legislation would be introduced; and
- a National Electricity Pricing System would be developed.

47. The Electricity Regulatory Act, 2007 explicitly gives NERSA the power to regulate "reticulation," and to prescribe key performance indicators for municipal reticulation systems. Although consultations on this issue have continued, and some initiatives have been taken to move the process forward (including the preparation of draft legislation and the incorporation of a "pilot" RED), the ensuing restructuring of the distribution subsector remains unresolved. The draft legislation is being processed for parliamentary approval (see Paragraph 83 for more details regarding proposed sector restructuring).

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

48. *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.[25] 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.

49. With the exception of the Majuba power station[26] (3,843 MW), all other coal-fired power plants have been in operation for 20 to 40 years. Some of the thermal power stations had been mothballed for years, and recently returned to operation. These plants represent approximately 3,800 MW, and bringing them back to service required a total investment of R20 billion:

- Camden (8x200 MW) return to service in 2003-2008;
- Grootvlei (6x200 MW) return to service in 2005-2009; and
- Komati (4x125 MW + 5x100 MW) return to service in 2005-2010.

50. Table 3 provides an overview of the generation capacity present in the South African Electricity Sector.

Table 3: Existing Power System (as of 2009)

Type	No of Units in Service	Unit Size (MW)	Total (MW)
Coal-fired			
Camden	8	190	1520
Grootvlei	6	180	1080
Komati	9	102	918
Arnot	6	381	2286
Hendrina	10	190	1900
Duvha	6	575	3450
Kriel	6	475	2850
Kendal	6	640	3840
Matla	6	575	3450
Matimba	6	615	3690

[25] This is installed capacity; available capacity is less than installed capacity and varies from year to year.
[26] The first unit in Majuba went on load in April 1986; the fourth unit was commissioned in 1999. The fifth unit was commissioned in 2000, and the sixth in 2001.

Type	No of Units in Service	Unit Size (MW)	Total (MW)
Lethabo	6	593	3558
Tutuka	6	585	3510
Majuba Dry	3	612	1836
Majuba Wet	3	669	2007
Total Coal-fired			*35,895*
Nuclear			
Koeberg	2	900	1800
Total Nuclear			*1,800*
Hydro			
Gariep	4	90	360
VD Kloof	2	120	240
Total Hydro Capacity			*600*
Pumped Storage Hydro			
Drakensberg	4	250	1000
Palmiet	2	200	400
Total Pumped Storage			*1,400*
Gas Turbines			
Acacia	3	57	171
Port Rex	3	57	171
Ankerlig (Previously Atlantis)	9	148	1332
Gourikwa (Previously Mossel Bay)	5	148	740
Total Gas Turbines			*2,414*
Total Eskom Generating Plants			***42,109***
Coal-fired			
Kelvin A	1	25	25
Kelvin B	2	51.5	103
Rooival	3	51.5	155
Pretoria West	4	25	100
Sasol SSF	10	52	520
Total coal-fired			*902.5*
Others			
Steenbras Pumped Hydro	3	60	180
Mini Hydro	1	65	65
Total others			*245*
Total non-Eskom System			***1148***
Total System			**43,257**

51. To maintain these assets, Eskom has a well developed and comprehensive O&M strategy which also focuses on improvement in plant reliability and efficiency. As is customary with large coal fleets, the boilers, steam turbines and electrical equipment have been identified as the components causing most of the forced outages and a strategy has been developed on how to improve the reliability of these systems. In addition, condition and performance monitoring systems are being implemented.

52. *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, as discussed in paragraph 46 above. EDI Holdings is responsible for implementing the GoSA's restructuring policy. The critical next steps include the approval of enabling legislation, which is currently under consideration. Steps are also underway to rationalize the transmission and system operation functions. 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.

53. *Transmission System*: The transmission system of South Africa consists of approximately 28,000 km of high voltage lines above 132kV (see Table 4) and is owned and operated by Eskom. Table 4 shows the transmission projects for the period 2007 – 2018 (10-Year Transmission Development Plans), while Figure 12 shows the committed projects (next 5 years, up to 2013). The projected investment is R43,459 million.

Table 4: Transmission Assets, Present and Planned

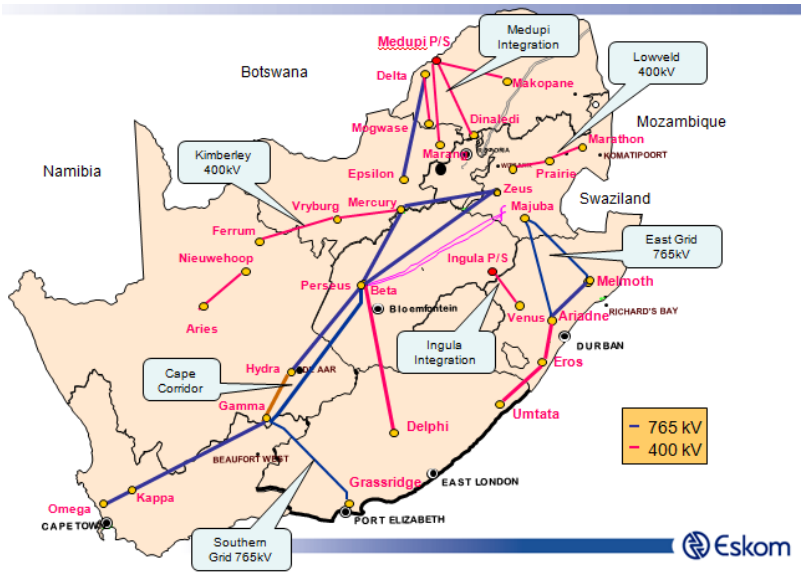
Transmission Asset	Installed capacity @ Dec 2007	Additional New Assets @ end 2018
Total kms of line	**27,817**	**14,291**
765kV Lines (km)	1153	5,770
400kV Lines (km)	16191	7,867
275kV Lines (km)	7346	654
Total installed Transformer MVA	**123,995**	**65,325**
Transformers 250MVA+	232	102
Transformers <250MVA	220	33
Reactive Power Capacity		
Capacitors	91	18
Total installed MVAr	7,540	2,186
Reactors	60	49
Total installed MVAr	7,300	12,700

Source: Eskom

54. 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:

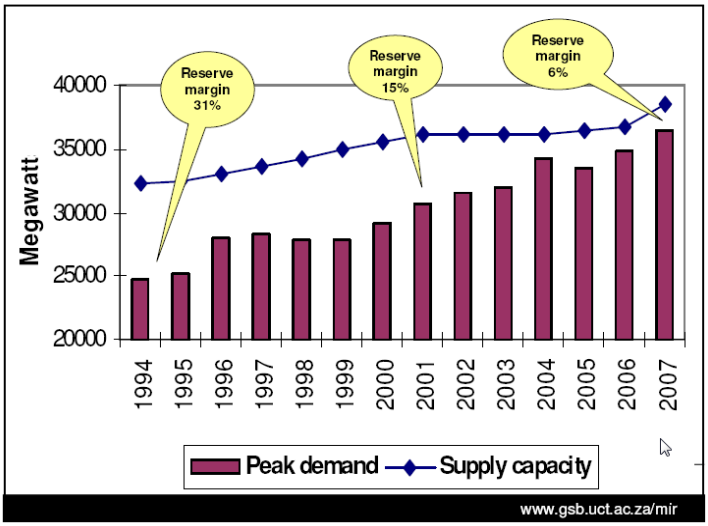
- 5 Year Supply Plan: Commitment of expenditures has already been made;
- 10 Year Transmission Development Plan: Projects in advanced planning with pending commitments; and
- 20 – 25 year Horizon View: Evaluation of alternative scenarios of future grid requirements and identification of robust strategy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

Figure 12: Transmission Strengthening Projects Planned in South Africa



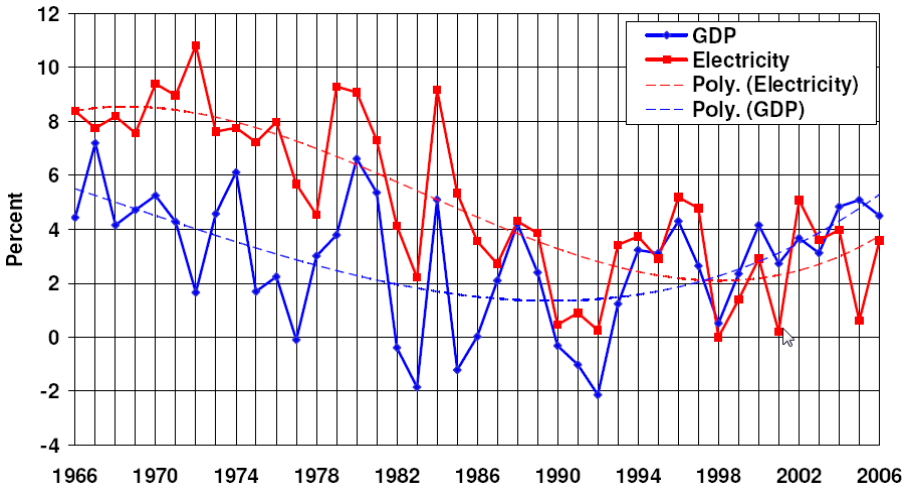
55. *Overall Demand and Supply Balance*: In 2007/2008, demand for electricity outstripped the capacity of the supply system, resulting in frequent load shedding and a few blackouts. For example, in mid-January 2008, nationwide power outages occurred and lasted approximately four weeks. The reserve margin dropped to approximately 6 percent (see Figure 13 below), which is well below safety limits (typically 15 percent). This lack of adequate power supply has affected the neighboring countries, too. The impact of the global financial crisis on the South African economy has temporarily increased the reserve margin to about 15 percent, but as the small business, industries, aluminum smelters, mines and other large industries return to normal production, supply deficits will recur until commissioning of the new power plants begins in mid 2012.

Figure 13: Demand-Supply Balance (1994-2007)



56. As Figure 14 below shows, electricity elasticity (electricity/GDP) has been well-established and electricity projections based on GDP are considered reliable.

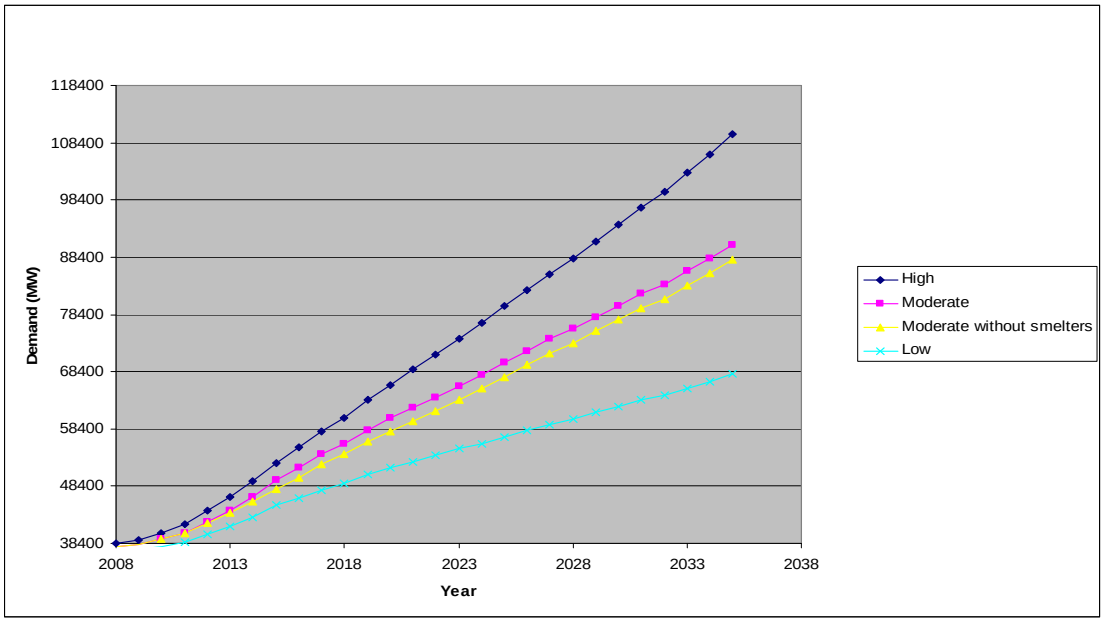
Figure 14: Relationship between GDP and Electricity Demand for South Africa



Source: www.gsb.uct.ac.za/mir

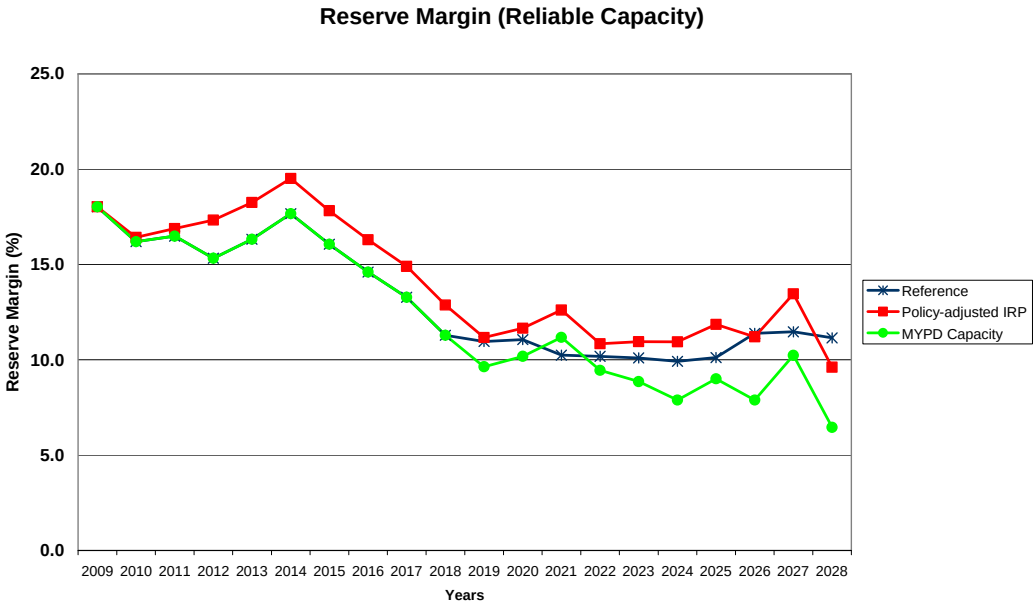
57. Figure 15 depicts various demand projections, which were the basis of Eskom's generation development process. The moderate growth is based on a moderate GDP growth forecast of 4 percent, resulting in a 2.3 percent increase in MW capacity per annum. The higher growth is based on 6 percent average GDP growth, resulting in 4 percent power demand growth.

Figure 15: Demand Projection for Power Supply



58. While the GDP and demand forecast may have to be adjusted further as the global financial and economic crisis unfolds, reserve margins are expected to remain low as shown by Figure 16 below.

Figure 16: Projected Demand and Generating Capacity Balance



D. <u>Policy Making and Integrated Resource Planning for the Electricity Subsector</u>

59. 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.

60. The DoE's Energy Policy is based on the following key objectives:

- Attaining universal access to energy by 2014;
- Accessible, affordable and reliable energy, especially for the poor;
- Diversifying primary energy sources and reducing dependency on coal;
- Good governance, which must also facilitate and encourage private-sector investments in the energy sector; and
- Environmentally responsible energy provision.

61. *Energy Expansion Planning*: The planning function for public investments in the energy sector of South Africa is very robust. The DME performs Integrated Energy Planning (IEP) to identify future energy demand and supply requirements. The National Electricity Regulator performs National Integrated Resource Planning (NIRP) to identify the future electricity demand and supply requirements. Similarly, Eskom continually assesses the projected electricity demand and supply through a process called the Integrated Strategic Electricity Plan (ISEP).[27] 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 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.

62. *The Integrated Resource Plan (2009)*: The DoE estimates that electricity demand will grow at an average of 2.4 percent over the next five years alongside an expected recovery in global and national economic performance. To meet with the anticipated electricity needs, DoE, as the policy maker for the electricity sector, commissioned in 2009 an update of the IRP for the electricity sector. This IRP is akin to generation master plans. The impacts of electricity price increases are included in this forecast, allowing for an increase in efficiency as high medium-term increases impact industrial and other consumption patterns. Demand side management programs are also expected to reduce the overall demand growth over this period.

63. The demand growth is expected to taper off to a longer-term average of 3.2 percent over the 20-year planning horizon. The spurt from the recovery is expected to dissipate after 2014, while efficiency improvements and a general switch from energy-intensive industries over time allows economic growth to continue with reduced electricity demand growth.

64. For the purposes of 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 Feed-in Tariff program (REFIT), Medium Term Power Purchase Program (MTPPP) and the open-cycle gas turbine (OCGT) independent power producer (IPP) are expected to provide additional capacity in the medium term.

65. From the demand side perspective, the IRP incorporates known demand side management programs including commercial, industrial and residential, for a total savings of 23TWh by 2019.

66. The least-cost reference expansion plan thus results in construction of coal-fired and nuclear power stations to meet the demand over the planning horizon, with OCGT power stations providing peaking energy. This outcome is not surprising given the relative low cost of coal-fired power stations and high domestic reserves of coal to meet future demand as well as low cost of coal.

67. While the reference plan indicates the least-cost alternative these costs do not include the inherent externalities involved in coal-fired electricity production, in particular growing concerns

[27] 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.

regarding greenhouse gas emissions as well as a security of supply imperative in diversifying the national energy base. However, the economic analysis (Annex 9) considers these externalities. The Long Term Mitigation Strategy provides a firm target of emissions in 2025. Scenarios were developed around these inputs, allowing for some regional shift in emissions and a potential delay in the implementation of the emission ceiling until 2025. A number of scenarios were generated to cater for emission constraints as well as the policy objective of increased private participation in the electricity generation sector. These risk-adjusted scenarios were assessed based on criteria of cost, emissions and diversity objectives, as well as discounting for additional risk to the system.

68. Other policy adjustments included allowance for additional DSM projects (such as the million solar water heater target), which brought the total DSM to the 23 TWh indicated above, a nuclear fleet strategy, the inclusion of hydro capacity from the region and the advance of the Moamba gas-fired option in Mozambique.

69. The IRP is predicated on many assumptions regarding power generation technologies. These include: early development and commercialization of renewable energy alternatives, in particular CSP, which would allow it to be used as an effective mid-merit power source; the development of a nuclear strategy to provide low emission baseload alternatives to coal-fired generation from 2020; continued investment in the maintenance and refurbishment of existing Eskom (and non-Eskom) plants to ensure generator performance at assumed levels; continued development of policies to attract IPPs in the sector; and continued private/public sector investment in DSM to improve energy efficiency, thus delaying capacity requirements.

70. The final policy-adjusted IRP (until 2030) is being developed to meet the criteria of cost, emissions, diversity and risk, and the policy requirements of the DoE. The current IRP focus is primarily on generation and does not incorporate any long-term water usage constraints for power generation. The nuclear power stations are planned to be located along the coasts, thus reducing the freshwater requirement; other sources such as CSP and coal-fired generation are intensive water users. These are being addressed through regional planning exercises and their outcome could influence the IRP results. While the IRP does not address transmission needs directly, transmission planning is carried out to complement the generation planning to ensure coordinated system development. Figure 17 provides an overview of new capacity additions by technology mix for the next 30 years. Figure 18 provides the projected energy generation from renewable energy resources in the near future.

Figure 17: New Capacity Additions Technology Mix (2009-28)

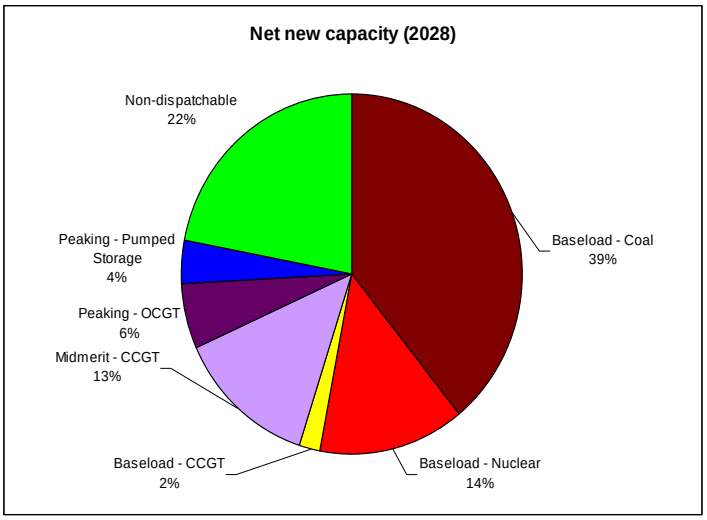
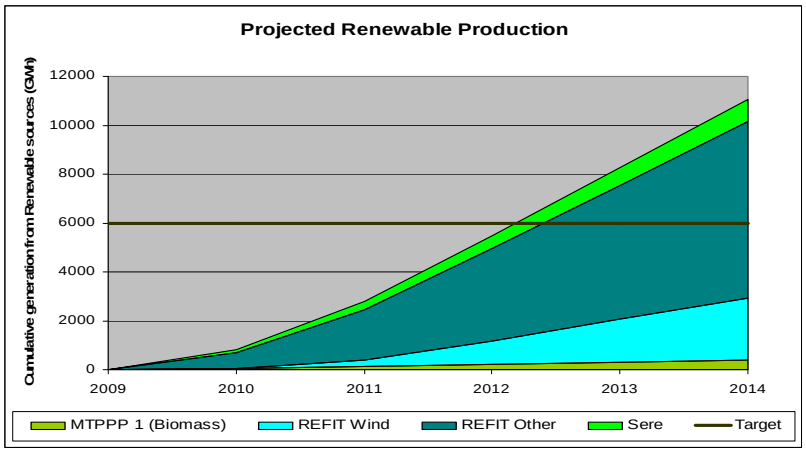


Figure 18: Projected Energy Production from New Renewable Capacity (2009-28)



71. *Regional Electricity Expansion Plans:* South Africa is part of the Southern Africa Power Pool (SAPP) which connects the power systems of all countries of the Southern Africa sub-region (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe), and those of Tanzania and DRC. The SAPP is evolving and is the framework for the Bank's power sector development strategy in the sub-region. The total combined installed capacity of the SAPP is about 51 GW; the available capacity has been only about 45.3 GW while demand has been growing (more than 45.5 GW in 2007) at about 4 to 6 percent annually. South Africa (Eskom) is the largest of the 12 SAPP members with about 80 percent capacity and about 82 percent of energy demand. Mozambique is the second largest inter-connected member with an installed capacity of about 4.4 percent of the SAPP countries. As shown in Figure 19 below many SAPP countries are already connected and these interconnections are proposed to be improved in the medium term thus laying the foundations for electricity trade.

Figure 19: SAPP Transmission Network

72. In the past, South Africa has provided electricity to many of the countries in the SAPP. However, with the recent domestic supply constraints, it started curtailing electricity exports. South

Africa today imports electricity from Cahora Bassa hydro plant (1,200 MW) in Mozambique. As a critical participant in the SAPP South Africa expects to sell and buy electricity to and from its neighboring countries in the future. However, 9 of the 12 countries in SAPP have been experiencing serious energy shortages, some more than the others. Table 5 below provides an overview of the regional SAPP demand and supply balance in 2007.

Table 5: SAPP Existing Capacity, Peak Demand and Reserve Margin in 2007

Country	Utility	Coal	Gas	Hydro	Nuclear	Total	% of Total	Avail. Capacity	Net Peak Demand	Surplus/ (Deficit)	Reserve Margin (%)
Botswana	BPC	132				**132**	0.26%	**120**	**563**	(443)	n.a.
Mozambique	EdM		64	2157		**2,221**	4.36%	**2,075**	**537**	1538	286%
Angola	ENE		275	474		**749**	1.47%	**590**	**897**	(307)	n.a.
Malawi	ESCOM			245		**245**	0.48%	**240**	**268**	(28)	n.a.
South Africa	Eskom	35,625	342	2061	1,800	**39,828**	78.26%	**36,208**	**36,720**	(512)	n.a.
Lesotho	LEC			72		**72**	0.14%	**70**	**130**	(60)	n.a.
Namibia	NamPower	108	24	240		**372**	0.73%	**370**	**474**	(104)	n.a.
Swaziland	SEB			42		**42**	0.08%	**40**	**204**	(164)	n.a.
DRC	SNEL			2442		**2,442**	4.80%	**1170**	**1,075**	95	9%
Tanzania	TANESCO		563	561		**1,124**	2.21%	**1024**	**772**	252	33%
Zambia	ZESCO		10	1752		**1,762**	3.46%	**1630**	**1,643**	(13)	n.a.
Zimbabwe	ZESA	1,155		750		**1,905**	3.74%	**1825**	**2,186**	(361)	n.a.
Total (MW)		**37,020**	**1,278**	**10,796**	**1,800**	**50,894**	**100%**	**45,362**	**45,469**	(107)	
% of Total by fuel type		72.7%	2.5%	21.2%	3.5%	100.0%					
CO2 (Mt)		219.70	1.75								

73. The supply shortages in the SAPP region were aggravated by the crisis in South Africa as:

a. *South Africa has a dominant and contagious effect on the rest of the SAPP*. South Africa is the dominant member of the SAPP and currently a net exporter to key countries (Botswana, Namibia). South Africa's troubles with generating adequate power quickly spread and affected the SAPP countries.

b. *Demand far exceeds available capacity.* With little new capacity added, demand grew and far exceeded available supply, thus eroding reserve margins. Eskom is unlikely to sustain exports to SAPP countries; over the short- to medium-term (through 2015), countries currently importing from Eskom (mainly Botswana, and also Namibia) will need to secure their sources of power to replace the declining (and soon to cease) supplies from Eskom.

c. *The rest of the SAPP is too small to handle the solutions alone.* The available capacity in the rest of the SAPP (about 9,000 MW) is not sufficient to cover large scale short-falls; the transmission system and links are not adequate or flexible to transfer large amounts of power flows. South Africa's energy crisis has thus caused ripple effects in the SAPP, especially in Botswana and Namibia.

d. *Power trade is small.* More than 95 percent of the energy in the SAPP network is consumed within the producing countries and electricity trade is relatively small. Historically, net exports (excess over imports) by Eskom were slightly over 1000 MWe (~2 percent), mostly to Botswana, Namibia, Zimbabwe, Swaziland and Lesotho, based on bilateral contracts. A further small portion of energy was traded in the short term market operated by SAPP; about 377 GWh, compared to a demand of 1,118 GWh in 2007 (as reported by SAPP).

74. Further dependence on imports and exports of power in the SAPP is key to long term self sufficiency for electricity in the sub-region. The SAPP optimal expansion plan study carried out by the

Bank (through a PPIAF grant and undertaken by Nexant of USA) indicates that about 39,000 MW of additional capacities are needed across SAPP through 2025, of which 22,000 MW (or 56 percent) is for South Africa alone (see Table 6). A part of these new additions will replace about 12,000 MW of old units, especially coal power plants. Based on this assessment, it is expected that:

a. South Africa will cease to be an energy exporter from 2012-13 onwards and instead intends to import up to 16 percent of its needs from the rest of the SAPP.
b. DRC, Mozambique and Zambia could become energy exporters to SAPP by taking the space given by South Africa.
c. Coal will remain the dominant energy resource (73 percent) and will continue to remain so, albeit with a declining proportion, through 2020. Post-2020, other options such as nuclear power in South Africa and hydropower in DRC will play a significant role, thus helping the SAPP to significantly reduce its reliance on coal power.
d. Even though DRC has the largest hydropower potential of Africa, developing this potential will require long lead times based on country issues and the long transmission lines required through multiple countries.
e. A relatively modest amount of solar and wind energy will supply SAPP's energy needs and will require significant buy-down of costs (e.g., through feed-in tariffs, CTF, etc.).

Table 6: SAPP Optimal Expansion Plan (*Cumulative MW; includes reserve margin)*

Year	SAPP	Eskom	All Others
2008	50,894	39,828	11,066
2010	54,874	43,962	10,912
2015	64,060	50,676	13,384
2020	71,621	55,479	16,142
2025	78,063	59,415	18,648

Source: Assessment of SAPP resources, Nexant 2009

75. In addition to electricity, South Africa also currently imports natural gas from Mozambique through a 537-mile gas pipeline. The pipeline has a peak capacity of 524 MMcf/d of natural gas and there are plans to double its capacity. Also, there are significant coal and coal bed methane resources in Botswana, but it is uncertain when such resources will be developed, and whether power exports from Botswana might be available. Feasibility work on development of the CBM resources is underway. While developments of the hydro potential in DRC are difficult to predict and most likely will take a long time, there are some prospects which have the potential to play a role in the intermediate and long term – medium-term developments include two hydroelectric plants: Mphanda Nkuwa (1,500 MW) in Mozambique and Kafue Gorge Lower (600 MW) in Zambia. The additions (Table 7) are based on demand forecasts for the SAPP countries (2007-25) growing at an average annual rate of about 2.9 percent, which is about equal to the historical rate of about 2.8 percent growth during 1998-2006. The SAPP expansion plan of 39,000 MW includes 28 GW of thermal power plants (coal and gas) and about 11 GW of hydropower plants, requiring about 11 new transmission interconnections.

Table 7: SAPP Expansion plan to 2025 (MW)

		Thermal	Hydro	Total
SAPP	2009-2015	15,500	6,000	21,500
	2016-2025	12,500	5,000	17,500
	2009-2025	28,000	11,000	39,000
South Africa	2009-2015	9,200	2,300	11,500
	2016-2025	9,600	1,000	10,600
	2009-2025	18,800	3,300	22,100

Source: Assessment of SAPP resources, Nexant 2009

76. *The Electricity Pricing Policies and Tariff Regime:* For the last several years, bulk electricity tariffs were based on Eskom's low depreciated asset base, valued at historical net book values and little to no requirements for investment capital. During the 1980s and 1990s, Eskom's tariff thus steadily reduced in real terms, which means that electricity prices in South Africa became far lower than in any other comparable countries and well below full "current" economic cost. The cost of building a new fossil fuel power station is six to seven times that of the average cost of the existing power station per megawatt of capacity. The South African economy is continually growing, resulting in the need for significant investments in electricity infrastructure to meet continued growth in demand. The GoSA is cognizant of the fact that this cost of new capacity (developed either by the public or the private sector) will have to be reflected in the future pricing of electricity.

77. The Government has developed a new "Energy Pricing Policy" (EPP) designed to guide the sector towards long-term financial viability. This detailed and extensive document has gone through a lengthy consultative process to ensure a broad base of stakeholder inputs, thus helping establish long-term support for this important initiative. The final version of the EPP was published in the Government Gazette on December 19, 2008. The EPP establishes the principles for electricity pricing levels, including provision of support for the poor, the process for establishing prices and the responsibilities of NERSA for the issuance of rules needed to implement the pricing principles. Given the considerable price adjustments that are expected to take place and the need to avoid problems associated with tariff shocks, the program is expected to be implemented over the next five years. Table 8 below provides an overview of bulk and retail tariffs charged by Eskom in 2008/2009 to various consumers.

Table 8: Eskom Tariffs in 2010 (Rand/kWh) prior to February 24, 2010 MYPD2[28]

		Energy Charge (c/kWh)		
Sector	**Notified Maximum Demand**	**Low Demand Season or Off-Peak**	**Standard**	**High Demand Season or On-Peak**
Residential				
Home Bulk	Multiple Housing Complexes		33.3	
Home Standard	Urban Residential Customer		39.52	
Home Light	Low Usage Urban Customers		45*	
Rural				
Ruralflex	> 25 kVA	16.45	23.63	38.74
Nightsave	> 25 kVA (three phase)	13.5		19.6
Landrate	< 100 kVA (High Voltage)		40.63	81.23
Urban				
Nightsave	> 25 kVA	12.27		17.26
Megaflex	> 1 MVA	10.56	14.9	24.01
Miniflex	25 kVA to 5 MVA	10.43	17.67	26.68
Business Rate	< 100 kVA		33.63	

** The energy rate is higher but there are no other connection, administrative or service fees.*

78. Since the establishment of NERSA, Eskom has submitted three applications for tariff increases (under the MYPD regime). On June 25, 2009 NERSA approved an average tariff increase of 31.3 percent for Eskom effective July 1, 2009. This was considered an effective FY09/10 MYPD approval with the expectation that second request would be submitted by Eskom later in 2009. In September 2009, Eskom submitted its MYPD2 application to NERSA requesting a 45 percent annual tariff

[28] Currently under finalization by Eskom

increase for the next three years during FY10-FY13, which was within the pricing cone indicated by NERSA in its approval of MYPD1. However, after extensive consultations with its stakeholders, including the government, its high voltage customers, and feedback from the public, Eskom revised its MYPD2 application and reduced its tariff increase request to 35 percent per annum for the next three years in FY11-FY13. On February 24, 2010, NERSA completed review of MYPD2 application and announced its decision to allow Eskom to raise tariffs by 24.8% in FY 2011, 25.8% in FY 2012 and 25.9% in FY 2013.

79. *Pro-poor Electricity Access and Tariff Policies*: The GoSA entered into an important electrification program as part of its post-Apartheid program designed to improve the distribution of incomes. The program started in 1993 with electrification levels of 34 percent, and reached an 81 percent level of electrification by 2007. This is an unparalleled achievement in Africa, where most countries are struggling to maintain prevailing electrification levels, and few other countries worldwide have done so well. The year on year electrification rates have decelerated in the recent past, as funding constraints have limited the sector's implementation capacity. There is a risk that the current financial crisis and possible supply shortages could further impact the success achieved. The EPP includes three important components that help ensure success of the program, including support for the poor: (a) accelerated access to electricity; (b) subsidized electricity for the poor; and (c) a pro-job strategy for economic growth supported by reliable, low cost electricity supplies.

80. Enabling recently-connected poor consumers to afford the cost of electricity consumption has been a central part of the GoSA electricity policy. In 2003, the Government launched the Free Basic Electricity (FBE) policy. The FBE program, which is targeted at the poor, envisages provision of a minimum of 50 kWh of free electricity per month. It is financed by the national government and managed by Eskom and 185 distribution companies. The local government decides within each respective municipality who qualifies for free basic services; the municipality provides the names of the customers qualifying for FBE to the distribution agency, and the agencies (including Eskom) claim back from the municipality each month the free allocations provided. The municipality in turn receives the allowable funding from the GoSA. At present, the FBE covers approximately 3 million households; 1.2 million of which are customers of Eskom (mostly in rural areas) and the remainder of which are served through municipal distribution companies. The FBE system is supplemented by cross-subsidies from large customers to households using less than 350 kWh/month. The FBE system also extends to off-grid energy systems, largely solar home systems, intended to facilitate the provision of basic lighting and media access. There are also other special reduced 'life line tariff' arrangements for customers consuming less than 350 kWh/month. In addition, various municipalities also provide additional benefits for the poor and low-income households as part of their own subsidy programs.

81. An assessment carried out by the GoSA in 2005 indicates that a reasonable to low proportion of annual incomes is spent on energy (including electricity, kerosene, fuel wood, gasoline etc.) in South Africa. People living in the poorest areas spend about 19 percent of their income on energy; those in peri-urban areas spend about 14 percent, and those in urban areas spend about 3 percent.

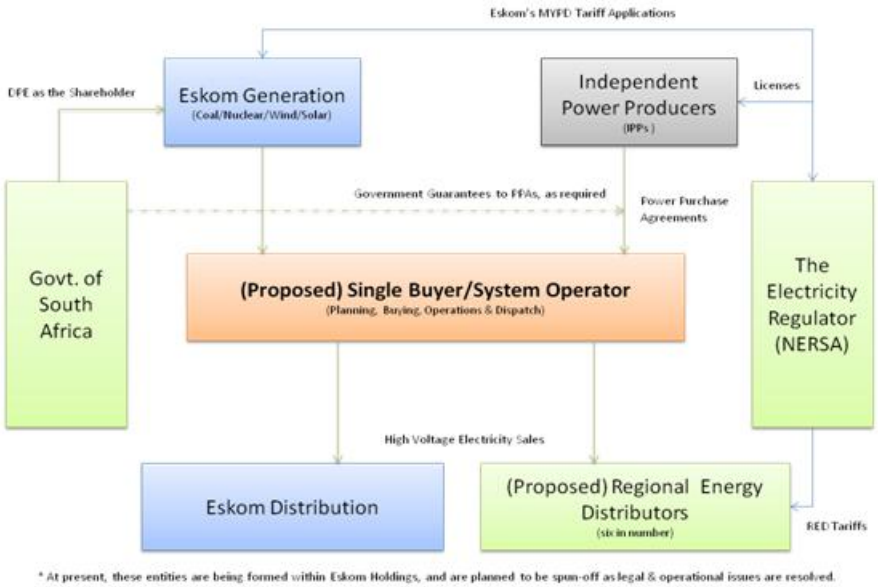
82. The most important component of the pro-poor policy associated with electricity supply is the need for electricity to support labor-intensive economic growth. South Africa's unemployment rate is estimated to be 23 percent, making it one of the largest socio-economic issues that the Government needs to address. The load-shedding in January 2008 seriously affected households, small business, industry and mines. The jobs lost associated with these closures as well as the negative impact on the balance of trade prompted the President, in his State of the Nation speech in February 2008, to re-emphasize the urgency of dealing with this problem. A National Electricity Response Team (NERT) was established with responsibility for a focused energy efficiency program in addition to actions already being taken by Eskom. The quick response to the problem limited the negative impacts to economic growth, giving short-term respite until the global economic crisis hit in late 2008.

E. Proposed Restructuring of the Electricity Sector & Role of the Private Sector:

83. Consistent with the GoSA strategy to rationalize the structure of the sector in order to increase operational efficiency, enhanced private sector participation and renewable energy development, DoE has taken a number of steps and issued enabling regulations. At the Apex level, DoE has undertaken the development of the IRP, which provides the overarching framework for the electricity sector development (see Paragraph 61). In parallel, the government is taking steps to create a single buyer and independent system operator, which are expected to be endorsed by the Cabinet in the next few months. It is expected that upon endorsement by the Cabinet, Eskom will create an independent subsidiary as an Independent System Operator & Single Buyer. It is expected that the Electricity Regulation Act will be promulgated in late 2010 before the ISO/Single Buyer can be divested as a separate entity. Figure 20 below provides an overview of the proposed sector restructuring.

84. It is expected that the ISO will be responsible for planning, procurement of IPPs, dispatch and market aggregation. In this context, the MoF will also agree to guarantee PPAs signed by the ISO, on a case by case basis as this entity is not expected to have an asset base and may not be seen as creditworthy in the near term. This proposed restructuring and creation of a Single Buyer with MoF support is expected to go a long way in giving comfort to the private sector to enter the sector and mitigate part of the resource constraints it currently faces. The new regulation also provides for cost recovery for private projects through the bulk tariff approved by NERSA. In the medium term, DoE is also considering the creation of a transmission organization and restructuring of the distribution sector (see paragraph 46).

Figure 20: Proposed Sector Reorganization



F. Electricity Sector & Climate Change

85. 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.

86. 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.

87. 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 World Bank Group's Climate Change Strategy as well as the criteria for securing support from the Clean Technology Fund (CTF).

88. 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.

89. 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[29] 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 21 shows a "Progressive" RE scenario and Figure 22 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, the Bank's proposed support and engagement with Eskom are expected to move South Africa to a progressive RE scenario.

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

Figure 21: Progressive RE Scenario Installed Capacity

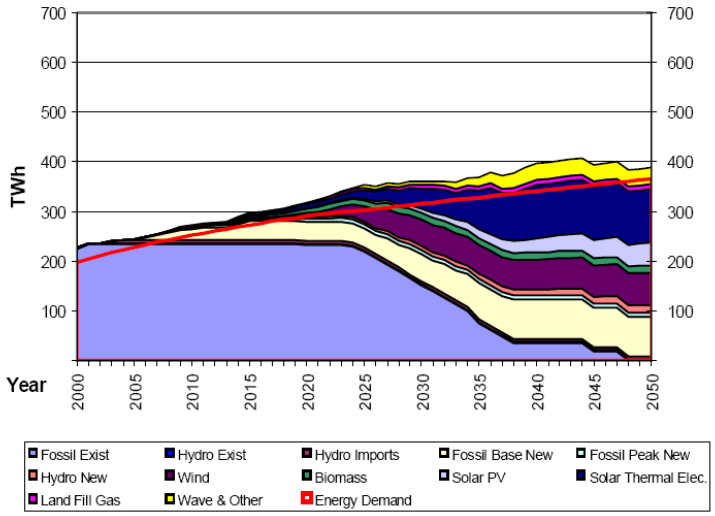
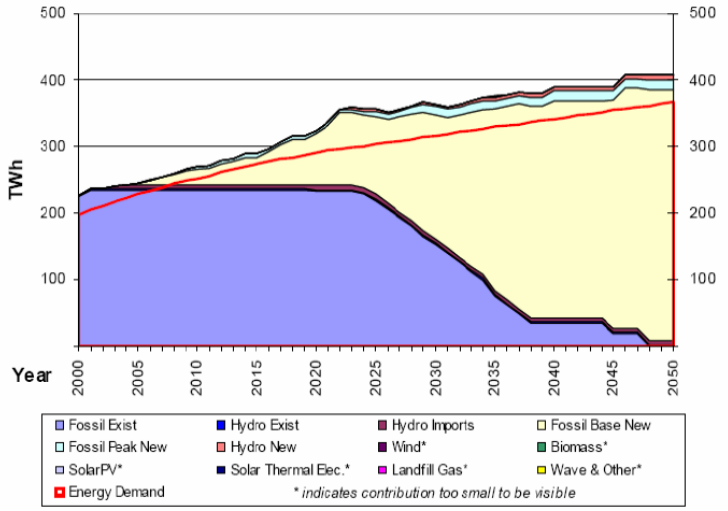


Figure 22: Business as Usual RE Scenario Installed Capacity



Source: Banks D. and Schaffler J; 2006

90. 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.

91. 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.

92. 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 program has achieved a CO_2 emissions saving of 289 tons (2006: 271 tons). 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. Eskom is committed to diversifying its energy mix, though it recognizes that South Africa will be dependent on coal for the foreseeable future. Diversification therefore 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 INVESTMENT 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)***	
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 INVESTMENT SUPPORT PROJECT

Results Framework

PDO outcomes	Project Outcome Indicators	Use of Project Outcome Information
(a) Increased reliable power generation (b) Increased renewable energy supply (c) Reduction in carbon intensity	• Installed capacity (MW) as a percentage of peak demand. • Energy supply from renewable sources. • Carbon emissions discharged per unit of electricity (kg/kWh.)	• Gauge level of energy supply security. • Determine if new investments are contributing to a reduction in carbon emissions.
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
Component A: Construct the Medupi coal-fired power plant using supercritical technology	• Capacity (MW) of conventional generation constructed.	• Gauge contribution of new capacity to energy security.
Component B: Construct renewable energy-based power plants: • B.1 - 100 MW Sere Wind Farm • B.2 - 100 MW Upington CSP	• Capacity (MW) of renewable generation constructed. • Direct GHG emissions avoided.	• Gauge increase of clean energy sources in the energy mix. • Gauge increase in private financing for renewable projects.
Component C: Supply-side Energy Efficiency and Technical Assistance: • C.1 - Convert Majuba coal transportation mode from road to rail (Majuba coal transportation mode converted from road to rail) • C.2 - Provide technical assistance for improving power plant efficiency for the Eskom Fleet and (Improved power plant efficiency for the Eskom Fleet) • C.3 - Provide technical assistance for development and implementation of domestic and cross-border renewable and energy efficiency projects	• Coal transportation cost for Majuba Power Plant. • Reduction in carbon emissions from coal transportation. • Guidance for power plant efficiency improvement. • Guidance for development of identified renewable projects. • Guidance for development of identified energy efficiency projects.	• Gauge extent to which the conversion reduces cost and carbon emissions. • Enable implementation of supply-side efficiency improvements. • Enable implementation of identified renewable projects and associated infrastructure. • Enable implementation of identified energy efficiency projects.

Arrangements for Results Monitoring

Project Outcome Indicators	Baseline	Target Values						Data Collection and Reporting		
		2010	2011	2012	2013	2014	2015	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Installed capacity (MW) as a percentage of peak demand	118%	117.7%	119.6%	121.7%	124.1%	126.8%	124.6%	Annual	Annual report	Eskom
Energy supply from renewable sources	11GWh	11GWh	11GWh	11GWh	150GWh	230GWh	520GWh	Annual	Annual report	Eskom, DoE
Carbon emissions discharged per unit of electricity (kg/kWh)	0.968	0.965	0.964	0.963	0.962	0.960	0.950	Annual	Annual report	Eskom
Intermediate Outcomes										
Capacity (MW) of conventional generation constructed	None	-	-	Unit 6 (800 MW)	Unit 5&4 (1600 MW)	Unit 2&3 (800 MW)	Unit 1 (800 MW)	Quarterly	Project report	Eskom
Capacity (MW) of renewable generation constructed	None	-	-	-	100 MW	100 MW	200 MW	Quarterly	Project report	Eskom
Direct GHG emissions avoided - x million tons of CO_2 per year at US$ y per ton	None	-	-	-	0.238 MT at US$87/ton of CO_2	0.238 MT at US$87/ton of CO_2	0.618 MT at US$97/ton of CO_2	Annual	Project report	Eskom
Majuba coal transportation cost	R93/ton	-	-	-	-	R20/ton	R20/ton	Annual	Annual report	Eskom
Reduction in Carbon emissions from coal transportation	None	-	-	-	-	40,000 ton	40,000 ton	Annual	Annual report	Eskom
Guidance for power plant efficiency improvements	None			Designs for first 3 plants		Designs for first 3 plants		Quarterly	Project report	Eskom

Project Outcome Indicators	Baseline	Target Values						Data Collection and Reporting		
		2010	2011	2012	2013	2014	2015	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Guidance for development and implementation of domestic and cross-border renewable and energy efficiency projects	None	Review of Alternatives for CSP	Local Capacity Assessment Finalization of Bidding Docs for CSP Support to develop institutional arrangements for demand side management	Review of Alternatives for Configuration of T-Lines for Renewable and Cross Border Projects	-	-	-	Quarterly	Project report	Eskom

Annex 4: Detailed Project Description

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

1. The proposed Project consists of the following three main components*:*

- Component A consists of Medupi coal-fired power plant (4,800 MW, based on supercritical technology) and is expected to cost US$12.047 billion[1], of which IBRD will provide financing of about US$3.04 billion. This loan will be provided against supply & install and civil construction contracts for (i) the power plant and (ii) associated transmission lines.
- Component B consists of investments in renewable energy (100 MW Sere Wind Power Project and 100 MW Upington Concentrating Solar Power Project). This component is estimated to cost US$1.228 billion, of which IBRD will provide financing of about US$260 million.
- Component C consists of both sector investments and technical assistance to support lowering Eskom's carbon intensity through energy efficiency and development of renewable energy. The Majuba Rail Project (shift in transportation mode from road to rail) and technical assistance for assessing the opportunities for coal-fired power plant efficiency improvements and for implementation of the Upington CSP are envisaged under this component. This component is estimated to cost US$576.07 million of which US$440.77 million will be financed by IBRD.

Detailed Project Description

Component A: Medupi Power Plant

2. *Plant Location and Layout*: The proposed Medupi Power Plant is being developed as a greenfield coal-fired baseload power plant project with a gross installed capacity of 4,800 MW, in Lephalale, a northern province of South Africa. The plant is expected to have a net capacity of 4,332 MW resulting in an annual energy generation of 3,200 GWh at an average load factor of 84.2 percent, with a planned load factor of about 90 percent in the early years of operation. The power plant terrace requires an area of approximately 700 hectares (ha) and an additional 1,000 ha is expected to be required for ancillary services, including ash service facilities. The power station structure would be approximately 130 m long and approximately 500 m wide.

3. *Technology*: The proposed project is based on a supercritical design for boilers, which are able to operate at higher temperatures and pressures than subcritical boilers, and thus operate with greater efficiency.[2] The feasibility phase of the project considered both sub- and supercritical pulverized fuel technologies for implementation and concluded that the supercritical option was the preferred technology solution. This is the first plant in the Eskom coal fleet to use supercritical design for boilers, and is consistent with the GoSA low-carbon strategy (higher efficiencies in power supply).

[1] The estimated total cost includes Interest during Construction directly related to debt that has been raised by Eskom for the Medupi Power Plant. Any Eskom funding costs for its contributions to the plant from the Balance Sheet have not been included and have been considered as Eskom equity to the project.

[2] The term "supercritical" refers to the critical transition point of water to steam at pressures over 22 MPa. Supercritical units typically refer to main steam conditions of 24 to 30 MPa and 538 to 600 ºC, with a single reheat stage at 566 to 600ºC. The supercritical boiler is a once through design which (with sliding pressure) means that heating, evaporating, and super-heating of the incoming feed water are completed within a single pass through the evaporator tubes and therefore does not require the use of a steam drum to separate and re-circulate water during normal operation. The benefits of supercritical technology include increased gross efficiencies. This technology provides improved cycle efficiency and hence improved environmental performance. This increase in efficiency results in a reduction in coal consumption of approximately 5 percent as well as a reduction in emissions in the order of 5 percent.

4. The proposed Medupi Power Plant will use the pulverized fuel (PF) technology, where coal is first pulverized, and then blown into a furnace where it is combusted at high temperatures. The resulting heat is used to raise steam, which drives a steam turbine and generator. The proposed supercritical combustion will result in the new power station's thermal efficiency being up to 37.5 percent (compared to approximately 34 percent for older power stations), resulting in a reduced environmental impact as less coal will be burnt to produce the same amount of energy. The boiler/turbine units are expected to be operated in the baseload operating regime for approximately the first 20 years of the plant life. The power station is designed to be dry-cooled, because of the limited water supply in the Lephalale area. This technology is less water intensive than power stations utilizing conventional wet-cooling systems.[3] The proposed Medupi Power Plant will be the largest dry-cooled power station in the world.

5. *Emissions Control Systems*: The proposed power station will be fitted with low turndown burners to improve the ignition and flame stability over an extended load range. The power station will be a zero liquid effluent discharge station; particulate emissions will be controlled through the use of fabric filters, and nitrogen oxides through the use of low-NOx burners. These emissions will be further diluted through construction of exhaust stacks approximately 220 m in height.

6. Due to the sulfur content of the coal (1.4 percent by weight) and the large scale of the plant, sulfur dioxide emissions could have a significant adverse environmental impact when combined with other existing and planned sources of emission to the affected airshed. Accordingly, sulfur dioxide emissions will be removed using Flue Gas Desulfurization (FGD) technology. Studies conducted by Eskom have indicated that wet FGD (a gypsum process) is the preferred sulfur abatement/reduction technology based on an assessment of life cycle costs. Eskom has identified possible sources of calcium for the proposed power station. The source of limestone has been located at Kraalhoek and Dwaalboom, some 180 kms from Lephalale. All regulated emissions will be subject to continuous in-stack monitoring and ambient air monitoring stations will be sited in affected areas in cooperation with DoEA.

7. *Coal Supply:* The power station will source coal from the coalfields located about 3 kms north of the plant. The Grootegeluk Colliery, which also services the existing Matimba Power Station, is located to the immediate west of the plant. *Situated 25 k*m from Lephalale in South Africa's Limpopo province, Grootegeluk is an open-pit mine that employs 1 800 people and produces 18,6Mtpa of thermal and semi-soft coking coal using a conventional truck and shovel operation. The mine has a 5,559 million ton of raw coal resources (4,177 million ton measured, 1,347 million ton indicated and 96 million ton of inferred), from which semi-soft coking coal, thermal coal and metallurgical coal can be produced. The mine is considered to be one of the most effective and lowest coal producers in the world.

8. Grootegeluk has the world's largest beneficiation complex where 7,600 tonnes per hour of run-of-mine coal is upgraded in six different beneficiation plants. About 15.3Mt of annual production is power station coal, transported directly to Eskom's Matimba power station on a 7 km conveyor belt in terms of the existing supply contract. An additional 1.5Mtpa of metallurgical coal is sold domestically to the metals and other industries on short-term contracts. Grootegeluk produces 2.7Mtpa of semi-soft coking coal, the bulk of which is railed directly to Mittal SA under a long-term supply agreement. Approximately 1.1Mtpa of semi-soft coking coal and thermal coal is exported through Richards Bay Coal Terminal or sold domestically.

[3] The dry cooled systems currently used in other Eskom plants utilize <0.2 l/kWh (liters of water per unit of electricity generated), which equates to approximately 3 million cubic meters of water per year for a typical 2,100 MW installed power station. In comparison, wet cooled systems currently used in some of the plants utilize approximately 1.8 l/kWh, which equates to approximately 27 million cubic meters of water per year for a typical 2,100 MW installed power station. Therefore, water usage is reduced from approximately 2.0 to approximately 0.1 – 0.2 liters per kWh of electricity generated by using non-evaporative cooling techniques.

9. On September 19, 2008, Eskom signed the Medupi Coal Supply and Off-take Agreement (CSA) with Exxaro Coal Limited (a private sector company). The expansion of the Grootegeluk beneficiation plants to supply Eskom's Medupi power station with 14.6 Mtpa of power station coal for 40 years, is progressing in line with the planned schedule to supply the first coal during the last quarter of 2011. Full production from 2014 onwards is envisaged. The beneficiation expansion investment is estimated to cost about US$1.25 billion and is in the detailed engineering design phase. The development is aligned with Eskom's request for proposals for independent power producers for base-load power stations.

10. The coal from the mine will be supplied by overland conveyors and stored in a stockyard adjacent to the terrace area of the station. The coal used by the plant is expected to have a calorific value (dry basis) of 20.5 MJ/kg, ash content (dry basis) 35 percent, volatile matter 23 percent, sulfur 1.4 percent, total moisture 8 percent, and abrasiveness of 150 Mg/Fe. Eskom is currently in discussions with Exxaro to finalize discussions regarding cost savings under the CSA. The mine is being expanded by Exxaro in full compliance with South African legislation and policies pertaining to environmental and social safeguards.

11. *Coal Conveyor Infrastructure:* Conventional conveyor systems will be used for transporting the coal from the mine to the stockyard at the plant. The length of the conveyor system is expected to be 9.6 kms. The stockyard conveyor system is expected to provide a continuous throughput capacity of 2,000 tons per hour. The system is designed to be fully automated. All maintenance parts of the coal conveying system are designed to minimize wear in order to achieve a service life of at least five years continuous operation.

12. *Ash Conveyor and Disposal Infrastructure*: Ash produced by the generating units will be disposed of on a typical dry ash dump facility. Ash will be conveyed to the dump by the ash conveying system and deposited on the dump by the stacking and spreading system. The dump facility will have a drainage system, erosion protection, dust suppression system, top soiling and rehabilitation operation and a road network. The system is being designed to be fully automated.

13. Eskom has undertaken studies for the designated ash dump site layout and has simulated future (50 year horizon) impact during construction and operation of the proposed power plant. Based on this assessment, Eskom has indicated that for the first thirty years, the identified site (farm Eenzaamheid) will be sufficient for ash disposal. Beyond the thirty year horizon, Eskom is expected to dispose of ash by ashing back into the pit at the Grootgeluk mine. Ashing in the pit would lengthen the life of the ashing facility proposed for the new proposed power station.

14. *Associated Transmission Lines*: The transmission system being developed to evacuate electricity from the Medupi Power Plant to the electricity grid includes approximately 2,244 km of 765 kV and/or 400 kV transmission lines. Currently, the plans include:

a. 3 x 400 kV power lines, i.e., 2 x 270 km power lines from the new power station to the Dinaledi substation (via Spitskop) and 1 x 270 km power line from the new power station to the Marang substation.

b. 4 x 400 kV from the new power station to a new substation (Delta).

c. 6 x 765 kV power lines from the Delta Substation to the Mercury substation (possibly initially operated at 400 kV).

d. Overall, five 400 kV substations will be needed to integrate Medupi into the national grid (including two green field substations).

15. *Associated Water Infrastructure*: Water pipelines will be required for the provision of potable and raw water. It is proposed that the potable and raw water be piped from the existing Matimba Power station (or existing water supply pipelines located close by) to the new site along the existing

ash conveyor servitude, along a section of provincial road and to the new proposed site. The proposed water pipeline is approximately 5 km in length and will traverse Eskom owned land for the majority of its length.

16. *Plant Construction Schedule:* The first unit will be commissioned by the first quarter of 2012, with the last unit scheduled for commissioning by the end of 2015.

17. *Operations and Maintenance Matters:* The power station will have only one control room. The outside plant, electrical system and units will be operated from there. The design is such that it limits the amount of on load plant inspection, with maximized data recovery through the control and instrumentation system. The control room is sized and designed to allow staff interaction during incidents and plant start-ups. Access to the panel will be limited to operating staff, with other staff capable of viewing operating parameters during critical operating periods from a separate non active screen that can be selected to view any unit and parameter.

18. The plant is being designed to facilitate efficient inspection, cleaning, maintenance and repairs. All equipment for each unit will be identical and interchangeable.

Component B: Renewable Energy Investments

19. This component consists of the following two subcomponents:

a. A 100 MW Wind Power Plant at Sere; and

b. A 100 MW Concentrating Solar Power (CSP) Energy Facility at Upington.

20. Component B.1 — Sere Wind Power Project: The scope cosists of design, procure, construct and commission 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 about forty to fifty Class 2A 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 25 percent. In addition, transmission lines and substations will be constructed to allow other renewable projects in the area (specifically under the REFIT 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 with about 100 turbines. 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.

21. 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.

22. 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 (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. In addition, investments in transmission capacity would catalyze substantial private sector investment under the REFIT program.

23. *Wind Plant Components*: The proposed site is in a remote location but has good access owing to the existing road network providing access 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.

24. 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.

25. *Wind Resource and Plant Layout*: The site has a “moderate” wind resource, and is expected to have a load factor of about 25 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.

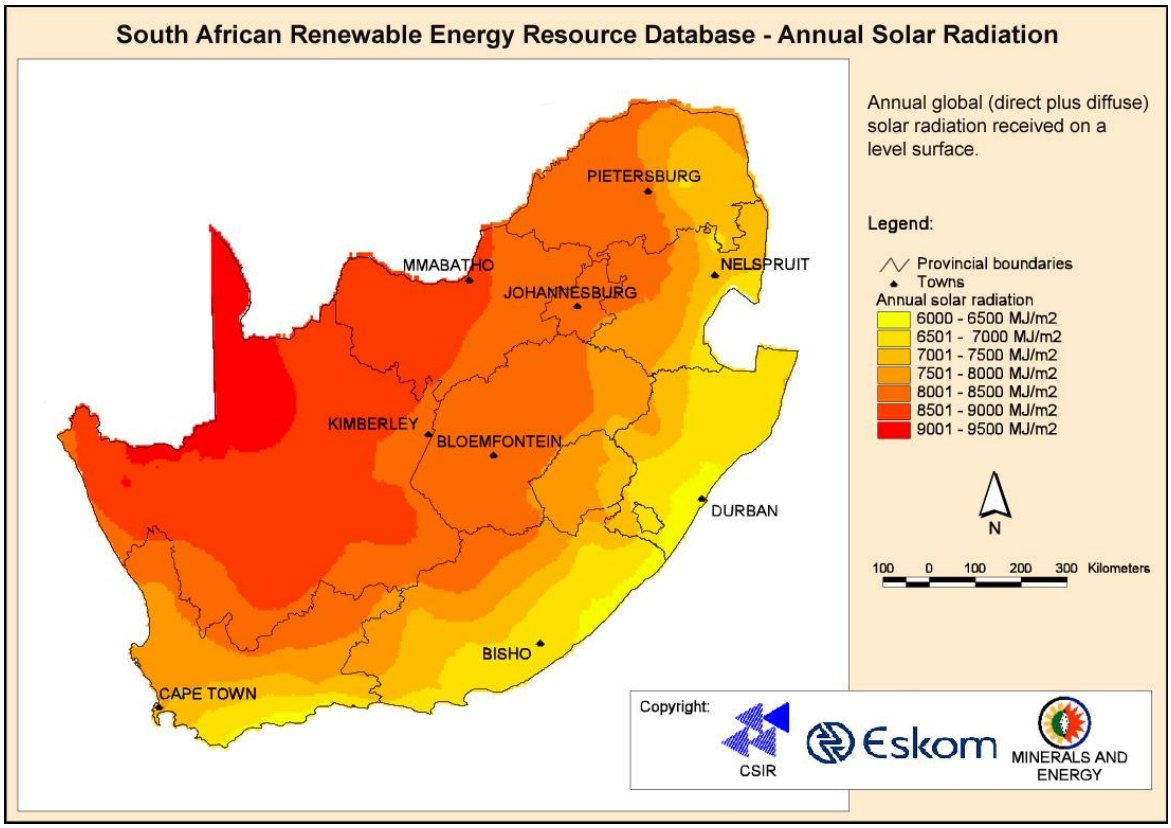
26. *Associated Transmission Lines*: The site is near a 132 kV sub-transmission line with sufficient capacity to evacuate the power. An overhead 132 kV power line will connect the substation at the wind energy site to the electricity distribution network/grid at the Juno Transmission Substation (outside Vredendal). 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.

27. Component B.2 — Upington Concentrating Solar Power (CSP) Plant: The scope of the proposed project is to design, procure, construct and commission a 100 MW CSP plant at Upington in the Northern Cape Province. When operational, it is expected to be the largest concentrating solar power 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.

28. *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 (see Figure below). The design reflects a synthesis of design elements meant to reduce risk, improve performance, maximize local content, and conform to local requirements.

Figure 1: South Africa – Distribution of Annual Solar Radiation



29. CSP is an evolving technology with a number of innovative developments taking place globally. Prior to undertaking the implementation of the CSP plant, Eskom plans to conduct a detailed review of the CSP related development work already undertaken, including the proposed technology, current design and proposed size in order to: (a) validate the proposed design; (b) optimize the plant size and design in light of the current technological developments; and (c) incorporate any new and feasible design features based on global state of the art. Based on this review, detailed deisgn of the

plant will be undertaken followed by preparation of the bidding documents for engineering, procurement, and construction of the plant. The proposed loan will also support the supervision of the CSP plant construction and technical assistance during the initial years of operation. Considering the vast solar resources in South Africa, feasibility analysis will also include an assessment of the 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.

30. 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.[4]

31. 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.

32. Even given the favorable REFIT tariffs, 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.

33. *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.

34. 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[5] 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

[4] 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.

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

approximately 100 MW, while also enabling approximately 8 hours of energy storage. The central tower will be roughly 150 m to 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).

35. 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 600°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.

36. The proposed power plant is envisioned to utilize a dry cooling technology as a result of unavailability of water in the proposed area. Dry-cooled technology reduces the total amount of water consumed at power stations when compared to conventional wet-cooling. 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.

37. *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.

Component C: Low carbon Energy Efficiency Investment and Technical Assistance:

38. This component consists of the following two subcomponents:

a. The Majuba Rail Project; and

b. Technical Assistance to support Eskom for rehabilitation of existing coal-fired power plants to improve operating efficiencies and for the development and implementation of domestic and cross border renewable and energy efficiency projects.

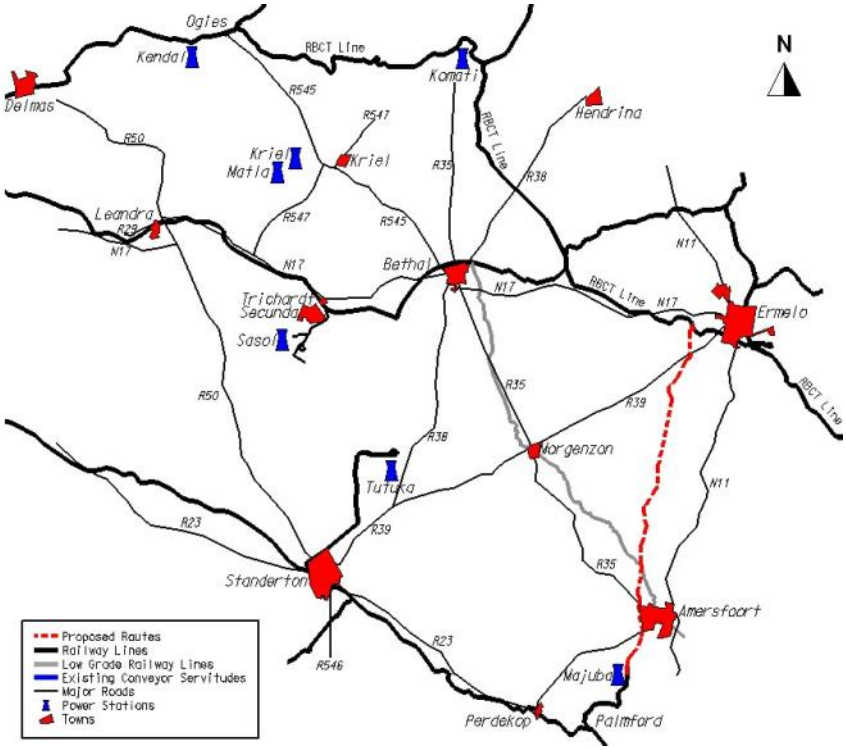
39. Component C.1 — Majuba Rail Project: This component includes the design, procurement, construction and commissioning of the Ermelo to Majuba railway line that will become the main coal transport system to the Majuba power station. The Majuba Power Station (currently operating at 85 Plant Factor) is a baseload plant. By the introduction of a heavy haul railway line at Majuba, it is anticipated that 100 percent of the Majuba Power Plant's capacity can be generated from coal supplied via this line in the future, which has not only a financial benefit (less cost to transport coal) but also multiple environmental and other strategic benefits (including freeing up capacity in the general freight railway to supply coal to Tutuka Power Station).

40. The proposed coal transport project between Ermelo and Majuba is a 68 km private siding railway link connecting a take-off point located 8 km west of Ermelo on the Transnet Freight Rail (the public transport utility of South Africa) coal export railway line to the existing Majuba Power Station rail siding and tippler (see Figure 2 below). The proposed project will also include a new rail yard layout to ensure an off-loading rate of up to 14Mtpa, and excludes modifications to the existing Majuba Coal Stockyard System.

41. The proposed railway infrastructure consists of a 26-ton/axle single track (with 2 long passing loops of 1.92 km each) designed for the operation of 100 wagon train lengths with 3kV-DC electrification and signaling compatible with the existing Transnet standards on the Transnet Freight Rail coal export railway line. The rail servitude (including 44 farm portions) has already been acquired in accordance with the land acquisition plan, has been fenced, and service access will be provided along the entire length of the rail route. Bridges (rail-over-river, road-over-rail, rail-over-road and landowner access structures), culverts and substations form part of the scope of the proposed work. The railway line will link to the existing Transnet Freight Rail coal export railway line enabling access from both directions along the line.

42. As a railway siding for Eskom's exclusive use, the capital-costs associated with the proposed design and construction forms part of the capital investment program to be funded by Eskom. Separate environmental authorizations have been obtained for the proposed project.[6] The purchase of rolling stock does not form part of the scope. The rolling stock is to be supplied by the proposed operator, Transnet Freight Rail, and the capital recovery, rolling stock maintenance and management of train operations is deemed to be part of the transport tariff. Eskom intends to sub-contract the maintenance of the servitude, the track-work, signaling, control and overhead electrification equipment to a third party.

Figure 2: South Africa – Existing and Proposed Railway Network

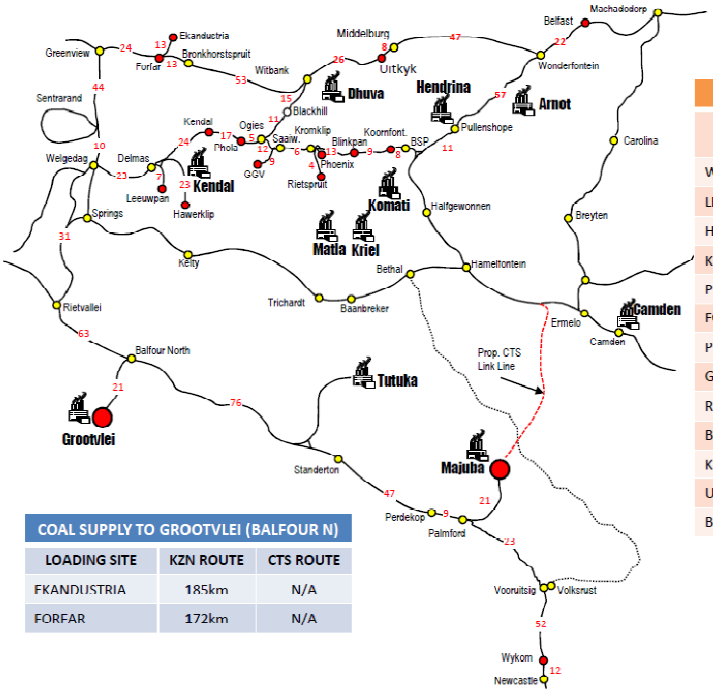


[6] Record of Decision (RoD) in terms of Section 22 (3) of the Environment Conservation Act, 1989 (Act 73 of 1989) for the construction of the Ermelo-Majuba railway line; Environmental Authorization (EA) in terms of regulation 10 (2) of the Environmental Impact Assessment Regulations, 2006 of the National Environmental Management Act, 1998 (Act 107 of 1998) for the construction of an 88kV distribution line to supply power to the Ermelo-Majuba railway line; Mining permits for the mining of sand, aggregate and gravel in terms of Section 27 of the Minerals and Petroleum Resources Development Act, 2002 (No 28 of 2002); and Water Use License in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) for (i) impeding or diverting the flow of water in the watercourse in terms of section 21 (c), and (ii) altering the bed, banks, course or characteristics of a water course in terms of section 21 (i).

43. The cost of operating Majuba Power Plant is in the mid to upper range due to expensive coal supply. Currently some 6 MT of coal per year are being railed on the General Freight Railway (GFR) over 340 km by Transnet from the Witbank coalfields to Majuba via Ogies-Springs and the Johannesburg-Durban main line (Springs-Standerton-Palmfort). Also about 8 MT of coal per year are being supplied by road trucks via the existing Mpumalanga provincial road network with a weighted average haul distance (one-way) of approximately 160 km. The importation of coal by these means was necessitated by the decommissioning of the Majuba Colliery in 1993. The Palmford–Majuba rail siding was commissioned by Eskom as an interim measure during 1996 to supply three generating units at Majuba Power Station.

44. The transportation of coal via the existing provincial road network is deemed to be a non-viable long-term solution. This method of transport is expensive by its nature and has contributed significantly to the fast deterioration of roads in southwestern Mpumalanga (at present road roughness indexes of 6 and above are common). A high truck count on these public roads (over 50 percent of daily traffic) negatively impacts on the road safety and has negative social and environmental consequences. Truck transport has severe capacity constraints due to the capacity of the existing roads and the fact that it cannot effectively source and operate sufficient transport units to meet the burn-plan.

Figure 3: Location of Collieries for the Majuba Coal-fired Power Plant



COAL SUPPLY TO GROOTVLEI (BALFOUR N)

LOADING SITE	KZN ROUTE	CTS ROUTE
EKANDUSTRIA	185km	N/A
FORFAR	172km	N/A

COAL SUPPLY TO MAJUBA

LOADING SITE	KZN ROUTE	CTS ROUTE
WYKOM	114km	N/A
LEEUWPAN	277km	261km
HAWERKLIP	293km	277km
KENDAL	294km	218km
PHOLA	311km	214km
FORFAR	325km	N/A
PHOENIX	334km	188km
GOEDGEVONDEN	337km	205km
RIETSPRUIT	338km	196km
BLINKPAN	356km	167km
KOORNFONTEIN	364km	159km
UITKYK	368km	257km
BELFAST	454km	251km

45. Majuba power plant is strategically situated on the grid and it is therefore important to improve and secure its availability to generate by providing a coal transport system to supply all of its coal requirements, and to increase its availability potential to a full 90 percent. A long term supply plan has been developed by Eskom whereby the forecast coal burn at Majuba will require 13 MT per year.

46. The potential long-term coal sources that have been identified as being available and suitable for Majuba Power Station in terms of output tonnages, coal qualities, location and cost are as shown in Figure 3 and Table 1. Currently no single coal source exists to supply Majuba's 13 MT per year full burn requirements. It is important to note that Table 1 lists different coal sources which can now

supply coal to Majuba Power Station since these have changed since the original project concept as coal sources, costs and qualities have changed over time.

Table 1: Proposed Collieries for the Majuba Power Plant

Collieries	Volume (13Mtpa) (per month)	Distance	General Freight Kms	Heavy Haul Kms
Rate (2009 - c/ntkm)			*R 0.28*	*R 0.15*
Leeupan	50,000	261	111	150
GGV	240,000	205	55	150
Hawerklip	0	277	127	150
Koorn	150,000	159	9	150
Uitkyk	50,000	257	107	150
Elders	600,000	146		146

47. The original Majuba rail project was approved by the Eskom Board of Directors in 2008, with the Ermelo Majuba rail line chosen as the best option. The base costs are estimated to be R2.7 billion. The project has been submitted to the Department of Public Enterprises for approval in line with the requirements of the Public Finance Management Act.

48. The following early preparation work has been completed:

a. financial evaluation has been prepared by Eskom Enterprises Division (CED) and updated in 2009;

b. detailed design of the rail works were completed by the design consultants, Transnet Projects and a design review conducted by third party rail specialist consultants;

c. land acquisition has been implemented, access to the servitude has been resolved and all outstanding licenses and permits received including approval of water use licenses from DWAF and borrow pit licenses from DME;

d. approval to proceed with the rail construction phase has been submitted and agreed to by the Rail Safety Regulator;

e. an advanced procurement process for the civil works was launched by Eskom in 2007. The process of calling for tenders from various suppliers for the construction of rail infrastructure was put on hold pending the completion of purchase of all portions of the servitude (Eskom eventually cancelled the enquiry as further extending the tender validity period was not possible without revising the contract rates);

f. the servitude has been fenced by an appointed fencing contractor. It is a condition of the RoD that the civil construction can proceed only if the servitude is fenced;

g. Eskom has prepared an environmental impact assessment for the railway line and the bulk power supply to traction substations and has received an Environmental Approval for the railway line and a Record of Decision (RoD) to proceed to the design and construction phase of the 88 kV distribution line to supply power to the railway line; and

h. a revised contracting strategy has been prepared which combines the original three civil contracts[7] into a single package to encourage international participation.

49. *Operational Arrangements*: Eskom has also designed with Transnet Freight Rail the tie-in between the coal export railway line and the proposed railway line. An agreement for the tie in and alterations to the railway line needs to be concluded between Eskom and Transnet Freight Rail. A logistics simulation model has been developed to ensure that the 13 MTpa of coal can be handled by the trains, the tippler and coal stockyard and associated equipment. The results of the model will be incorporated into broader transport modeling exercises being conducted by TFR to achieve its medium-term goal of 81 MTpa of export coal.

50. Eskom will construct and own the railway line infrastructure assets (classified as a siding for exclusive use by Eskom) and Transnet Freight Rail will be the rolling stock owner and operator. The commissioning of the line is expected in January 2014. Eskom will sub-contract the maintenance of the servitude, the track-work and overhead electrification equipment.

51. A Coal Transportation Agreement (CTA) is under development between Transnet (legal entity) through TFR (operator) and Eskom Holdings Ltd. The CTA will include the terms and conditions for the operation of the transportation of coal in the Ermelo-Majuba railway link using rolling stock supplied, maintained and managed by TFR. A final CTA is expected to be completed no later than six months after Board approval. Under the CTA, rolling stock is expected to be available to ensure a minimum supply of coal per month of 1.1 MT to Majuba; such traffic is already part of the strategic planning considerations of Transnet for its coal logistic operations. The CTA will define the efforts that TFR is following to secure enough locomotives and jumbo wagons so that such rolling stock will be available by 2014 considering a 30-month procurement lead-time required.

52. Eskom will ensure that before the commissioning dates of the coal transport system the necessary coal supply contracts to meet the coal demand of the power station will be signed. It is expected that these long-term coal supply contracts will be structured such that the coal will be loaded via new or existing train loading terminals that tie-in with TFR's existing export coal rail network. New rapid-loading terminals and coal yards (such as those found at Elders and GGV), while generally owned and operated by the mining houses, may also be developed by Eskom. This will depend on their feasibility as well as future negotiations with coal suppliers. The cost of these terminals is excluded from the project capital costs as the amortized capital for such is generally included in the 'free-on-rail' (FOR) purchase price of the coal.

53. As it is an Eskom-owned line, Eskom will be responsible for the maintenance of the infrastructure, including the signaling and electrification equipment. This will be done through a stand-alone contract, either with Transnet or with a third party. If done by a third party, it would need to be done to Transnet standards before they would operate services over it. Such arrangements are common in South Africa as well as on other coal railways throughout the world.

54. Component C.2 — Technical Assistance for Coal-fired Power Plant Efficiency Improvements: The proposed component will support Eskom's objectives of achieving a 1 percent reduction in the average heat rate of its current fleet of coal-fired power stations by 2012. This will correspondingly reduce the carbon dioxide (CO_2) emissions from the power plants. The strategy for these comprises O&M (0.6 percent) and engineering (0.4 percent) improvements, as explained in Figure 4 below. Table 2 shows the status and outcome of investigations carried out so far, including the estimated total capacity enhancements (efficiency improvements).

[7] A request for proposals for the main rail contract and electrical substation equipment were issued to the market in March and July 2008. These tenders were left to expire.

Figure 4: Efficiency Improvements in Average Heat Rate of Current Fleet (1%)

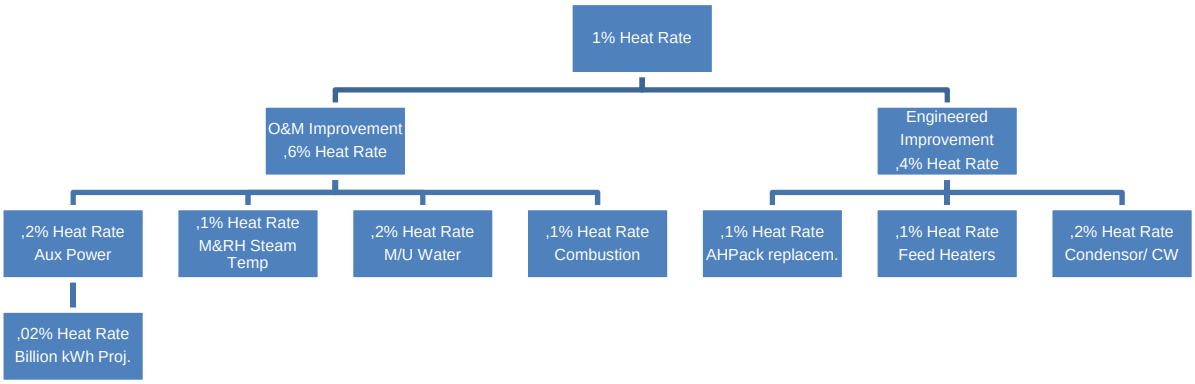


Table 2: Current Status of Investigations on Efficiency Improvements

Power Station	Feasibility Status	Capacity Enhancement			Increase in Capacity (MW)	Base Cost (Rand Million)	Capacity Cost (R/kW)
		from	*to*	*MW per unit*			
Koeberg	ERA approval outstanding	900	932	32	64	926.9	14.482
Tutuka	Phase 1 complete	609	633	24	144	1320.20	8.463
Matimba	Phase 1 complete	665	710	45	270	1660.30	6.149
Kriel	Phase 1 complete	500	524	24	144	853	5.924
Gariep	ERA approval outstanding	90	110	20	80	327	4.087
Hendrina	Phase 1 complete	200	234	34	340	1386.00	4.076
Arnot	In Execution	350	400	50	300	1182.10	3.940
Duvha	Phase 1 complete	600	645	45	270	887.5	3.287
Matla	Phase 2 complete	600	640	40	240	649.6	2.707
Lethabo	Phase 1 complete	618	650	32	192	1517	790
Kendal	Phase 1 complete	686	738	52	312	132	423
Van der Kloof	Conceptual Phase	120	140	20	40	0	0

55. Efficiency improvements can be undertaken by either increasing the capacity of transferring steam to the system or by increasing the efficiency of the system to produce electricity (from turbines, cooling systems etc.). Table 3 provides an overview of the expected capacity enhancements that are proposed to be undertaken by distinguishing between steam flow upgrades and energy enhancements.

Table 3: Steam Flow Upgrades and Efficiency Enhancements

Power Station	Maximum Continuous Rating (MCR; in MW)	Increase in Capacity (in MW)	Energy Efficiency Enhancement (in MW)	Steam Flow Capacity Enhancement (in MW)	Energy Efficiency Enhancements (in MW)	Steam Flow Capacity Enhancements (in MW)
		Per Unit			*Per Station*	
Matla	600	40	4	36	24	216
Kendal	686	52	10	42	60	222
Matimba	665	45	20	25	120	150
Lethabo	618	29	4	25	24	150
Hendrina	200	34	12,5	21,5	125	215
Duvha	600	45	4	41	24	276
Tutuka	609	26	4	22	24	132

Power Station	Maximum Continuous Rating (MCR; in MW)	Increase in Capacity (in MW)	Energy Efficiency Enhancement (in MW)	Steam Flow Capacity Enhancement (in MW)	Energy Efficiency Enhancements (in MW)	Steam Flow Capacity Enhancements (in MW)
Kriel	500	24	10	14	60	84
				Gross Capacity Contribution above MCR	461	1289
				Success Probability	80%	50%
				Net Capacity contribution above MCR	393	645
				Gross Capacity above EL1	79	911
				Success Probability	80%	50%
				Net Capacity contribution above EL1	**63**	**456**
				Total	**519**	

56. O&M improvements are ongoing internal efforts in improving practices and procedures, such as in the reduction in auxiliary power consumption by, for example, reducing redundancies; coal quality improvement where feasible; and increasing main and reheat temperatures. The proposed technical assistance component will assist Eskom with the improvements that require external engineering support (engineered improvements) to improve the net heat rate of the plants.

57. In the first instance, the proposed component will provide technical assistance to design the improvements specifically for the three power plants noted below. The proposed component will finance the cost of international experts to review the work already carried out by Eskom staff, advise Eskom on the best way forward, and prepare the associated designs, implementation plans and technical specifications for the recommended sub-projects. In particular, the consultants will, for each of the sub-projects, assess the feasibility of achieving the estimated heat rate improvements, provide advice on the proposed designs and on implementation logistics, and prepare the associated implementation plans. It is expected that the work will serve as models that can be extended to the remaining power stations.

- Hendrina Power Plant to design the replacement of the High Pressure and Low Pressure turbines (blades, rotors, inner casings);
- Matimba Power Station to design the expansion of the cooling system capacity (extend ACC or construct cooling towers); and
- Kendal Power Plant to design the expansion of the cooling system capacity.

58. The Hendrina Power Station is a ten-unit, condensing-cycle steam-electric generating power plant with installed capacity (MCR) of 2,000 MW. These 10 units, which were installed and commissioned between 1970 and 1976, are amongst the oldest in the Eskom fleet of power units. Average availability over the last 3 years has been about 89 percent. Eskom aims to improve the overall generating capacity of Hendrina Power Station by improving turbine efficiency. The overall capacity will increase by 10 x 12.5 MW (125 MW). The 12.5 MW (6.25 percent improvement) efficiency improvement benefit is envisaged for the current 100 percent steam flow conditions (with no thermal upgrade). Based on a total capacity increase of 10 X 12.5 MW, the estimated emissions reduction for the station is 670,833 tCO_2e per year if the available capacity is not utilized. Alternatively if the additional capacity is utilized then this will be available without an increase in gaseous/particulate emissions. This reduction will be realized over the remaining life of the power station (2026) with no additional fuel or water requirements.

59. The Matimba Power Station began construction in 1981. It is located in Lephalale (near the proposed Medupi Power Plant). Matimba is currently the largest direct dry cooling power station in the world, an innovation necessitated by the severe shortage of water in the area where it is situated. As a dry-cooled power station the output and performance is very dependent on the ambient conditions (specifically wind and temperature). The condenser cooling in any steam power cycle has a major

influence on the overall operating efficiency of that process. As the dry-cooled condenser cooling technology applied in the Matimba process limits the generated efficiency, there is an opportunity to expand the cooling capacity to overcome this limitation. The root cause of this adverse production limit resides in the capacity of Matimba's direct draught air cooled condenser (ACC) which was the first of its kind to be built by Eskom. The ACC at Matimba has sufficient capacity to allow the station to produce more than the rated output (665 MW) at low ambient temperatures, but insufficient capacity to produce at rated output when higher ambient temperatures occur (typically greater than 26ºC). Eskom aims to upgrade the existing air-cooled condenser to overcome the ambient temperature effects by effectively improving the cycle efficiency under the high ambient temperature condition.

60. Various options exist to expand the ACC and these include: (a) extending the existing ACC design by adding two cooling rows (fans and heat exchangers); and (b) constructing separate cooling towers to supplement the air-cooled condenser performance. Both technology options would lead to expansion of the existing dry-cooled system capacity at Matimba and a reduction in the increase in turbine backpressure during high ambient conditions. Both technology options have been used internationally and the suppliers of the technology are acknowledged specialists in the field of dry-cooling. South Africa has experience of the direct forced draught air-cooled condenser (Matimba and Majuba Power Stations) and indirect dry-cooling towers (Kendal Power Station). Eskom has specified the ACC technology on the Medupi and future power plants, which are under construction and development, respectively. Improvements in efficiency will yield notable reductions in emission contributions (especially CO_2). The estimated improvement in power station efficiency is equivalent to an average of 20 MW per unit. Based on the historic performance of the power station this summates to about 851,472 MWh for the station per year once all units have been upgraded. Applying a conversion factor of 0.91 tons of CO_2 per MWh generated then the saving in CO_2 emissions for the station is about 774,791 tons per year.

61. The Kendal Power Station is a 6-unit power station, with an MCR of 686 MW per units. The last unit was commissioned in 1993. The power station design efficiency at rated turbine MCR is 35.3 percent and its average availability is about 93 percent. The engineered plan for Kendal is to enhance the cooling capacity in order to increase power generation by about 10 MW per unit (60 MW total). This would results in CO_2 emissions saving for the station of about 387,395 tons per year.

62. Component C.3 — Technical Assistance for development and implementation of domestic and cross-border renewable energy and energy efficiency projects. The proposed component will support Eskom to further the development and implementation of domestic and cross-border renewable projects, including the Upington CSP. Eskom has completed a prefeasibility assessment of the proposed CSP project. However, there is a need to undertake a comparison of its assessment to international best practices, which is proposed to be financed by this component. Based on the recommendation of this assessment, the component will also support Eskom in undertaking the preparation of a financial review and bidding documents for the Upington CSP. In addition, this component will also provide technical, financial and legal advisory services to Eskom to develop domestic or cross-border renewable projects.

63. The proposed technical assistance would include, but not be limited to, the following activities:

a. A technical and financial review of preliminary project design;
b. Design and preparation of bidding documents;
c. An assessment of local manufacturing capability for scale up of domestic CSP manufacturing technology; and
d. An advisory panel consisting of international experts to support Eskom during the implementation of the project.

64. Technical & Financial Review: Under this activity, consultancy services will be procured to undertake a review of the current Eskom designs for the proposed Upington CSP project. Solar technology experts will be appointed; these consultants will conduct an international best practice study identifying all current and planned CSP projects and will assess these projects and compare them to the current Eskom design and choice of CSP technology. Completion of this activity will provide Eskom with a CSP road map including costs, technology, optimal plant capacities, etc.

65. Design and preparation of bidding documents: This activity will be undertaken upon the completion of the technical and financial review. Based on the recommendations of the technical and financial review and agreed design and plant configuration the consultant will assist in preparing the detailed plant design. The consultants will also support Eskom in preparation of the bidding documents for the selected design for the Upington CSP.

66. Assessment of local manufacturing capability for scaling up CSP in South Africa: This activity will support Eskom in undertaking a local manufacturing capability study to determine the feasibility of producing components of any CSP plant in South Africa. The appointed consultants will provide an assessment of which components of a CSP plant can be built for both local and international markets. For this activity, all CSP technologies will be considered. This assessment will also identify the key entities (international and domestic) of the CSP value chain and potential new entrants (automotive industry, glass industry, steel industry, etc.). In addition, the assessment will provide valuable inputs by undertaking the capacity assessment of technical skills in implementing CSP projects and will identify critical gaps, if any. To this extent, the consultants will also propose a capacity strengthening plan to overcome critical capacity gaps.

67. International Advisory Panel: This activity will support Eskom in setting up an advisory panel consisting of international experts to offer the necessary advice, guidance, etc. during the implementation phase of the Upington CSP.

68. Energy Efficiency: With respect to energy efficiency projects, the technical assistance provided to Eskom will support a scale-up of demand side management programs through Solar Water Heaters and assessing the potential for Time of Day metering. The Eskom Solar Water Heating Program is driven by government which has set a target for renewable energy to contribute 10,000 gigawatt hours (GWh) of final energy consumption by 2013. Solar water heating could contribute up to 23% of this target. Eskom is supporting this drive through the large-scale introduction of solar water heating as it is one of the most effective renewable energy sources available. The program has not been running successfully with only a few hundred transactions since its introduction about 2 years ago. The proposed technical assistance will assess the reasons for its poor performance and recommend improvements that would enable the program to be accelerated.

Annex 5: Project Costs

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

Project Component	Costs (US$s)	Financing Plan (US$ millions)		
		IBRD	CTF[128]	Eskom & Other Lenders
Component A: Medupi Power Project & Associated Transmission Lines				
IBRD Financed Future Contracts, incl. Transmission Lines	593.03	593.03		0.00
IBRD Financed Past Contracts	2,590.89	1,766.37		824.52
Non-IBRD Financed Contracts	6,053.68			6,053.68
Owners Development Costs	796.65			796.65
Contingencies	762.39	130.46		631.93
IBRD Loan related Interest During Construction	400.00	400.00		0.00
Construction (AfDB and ECAs only); excluding Eskom's Cost of Balance Sheet Financing	851.00	150.00		701.00
TOTAL - Component A	12,047.64	3,039.86	0.00	9,007.78
Component B.1: Sere Wind Power Project				
Wind Turbines & Generators, Towers and other Equipment	210.00	55.00	25.00	130.00
Civil Works – tower foundations	50.00	0.00	50.00	
O&M Building	14.00			14.00
132 kV Lines and Substations	50.60	25.00	25.00	0.60
Owners Development Costs	28.40			28.40
Contingencies @ 10% of Base Costs	32.30	30.00		2.30
Interest During Construction (IBRD, CTF and identified lenders); excluding Eskom's Cost of Balance Sheet Financing	60.13	0.00		60.13
TOTAL - Component B.1	445.43	110.00	100.00	235.43
Component B.2: Upington Concentrating Solar Power				
Turnkey EPC for CSP	600.00	150.00	250.00	200.00
Owners Development Costs	10.00			10.00
Contingencies @ 25% of Base Costs*	150.00			150.00
Interest During Construction (IBRD. CTF and indentified lenders); exluding Eskom's Cost of Balance Sheet Financing	22.68			22.68

[128] The GoSA and Eskom Holdings are currently in advanced stages of discussions with IBRD and AfDB for CTF support to the Sere Wind Power Project and the Upington CSP. A proposal to the CTF from IBRD and AfDB will be submitted after conclusion of the proposed IBRD Loan.

Project Component	Costs (US$s)	Financing Plan (US$ millions)		
		IBRD	CTF[128]	Eskom & Other Lenders
TOTAL - Component B.2	782.68	150.00	350.00	383.31
TOTAL - Component B	1228.11	260.00	350.00	618.74
Component C.1: Majuba Rail Project				
Earthworks, Civil Works, Buildings, Perway and OHLE	270.00	270.00		
Traffic Control System (Signaling)	12.93	12.55		0.38
Enabling Works	4.93			4.93
88 kV substations	37.00	37.00		
Relocation, Access and Noise Mitigation	1.87			1.87
Consultants - Project Management	11.50	11.50		
Engineering Compliance (Transnet Supervision)	8.50	8.50		
External Civil and Metallurgy Laboratory	1.00	1.00		
Owners Construction and Supervision Costs	26.67			26.67
Owners Development Costs	63.58			63.58
Contingencies @ 10% of Base Costs	79.59	70.22		9.38
Interest During Construction (IBRD only); excluding Eskom's Cost of Balance Sheet Financing	28.50	0.00		28.50
TOTAL - Component C.1	546.07	410.77	0.00	135.31
Component C.2: Technical Assistance for Efficiency Improvements of the Coal Fleet				
Assessment, Identification, & Design of Coal-fired Fleet for Efficiency Improvement Investments	20.00	20.00		
TOTAL - Component C.2	20.00	20.00	0.00	0.00
Component C.3: Technical Assistance for Renewable and Energy Efficiency Projects				
Technical Assistance for development and implementation of domestic and cross-border renewable energy and energy efficiency projects.	10.00	10.00		
TOTAL - Component C.2	10.00	10.00	0.00	0.00
TOTAL - Component C	576.07	440.77	0.00	135.31
Total Baseline cost, inc. Contingencies	12,499.51	3,200.00	350.00	8,949.51
Front End Fee (IBRD) and Management Fee (CTF)	10.00	9.375	0.625	
Interest During Construction	1362.31	550.00	0.00	812.31
Total Financing Required	**13,861.82**	**3,750.00**	**350.00**	**9,761.82**

Annex 6: Implementation Arrangements

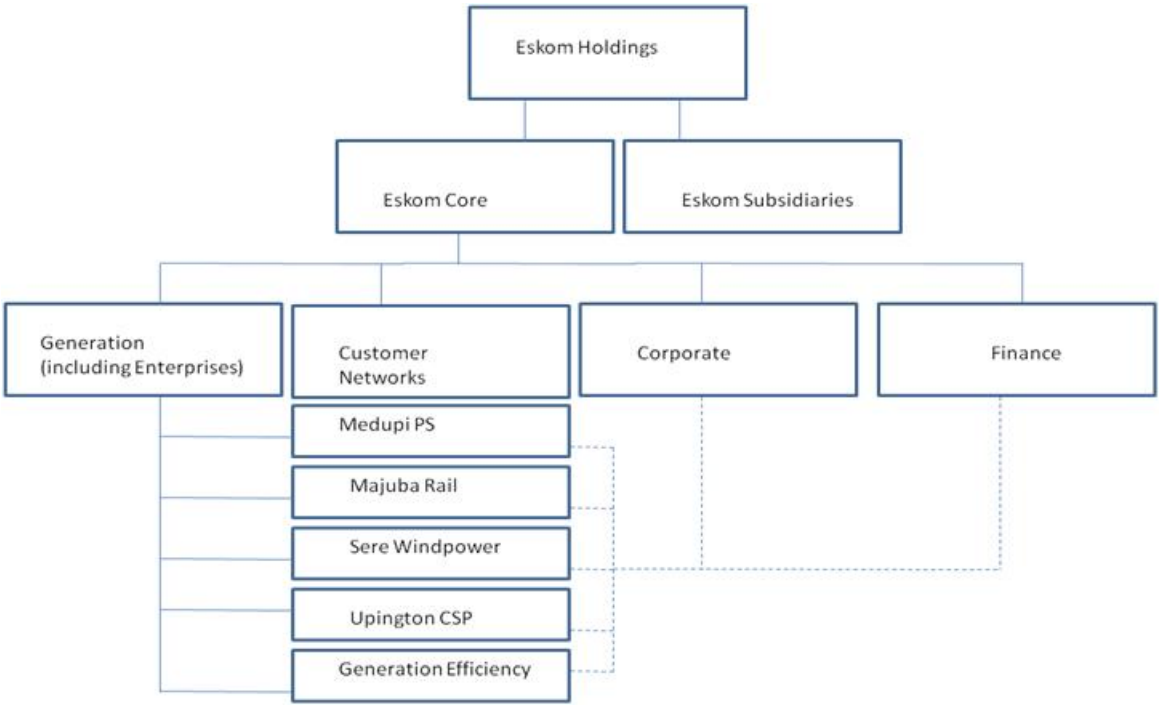
SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

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 program of this size in the 1980s and had lost some of the skills that it had then. To address this deficit the utility has been recruiting 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. The EISP comprises four large sub-projects, of which one (Medupi Power Project) is already under implementation with well established implementation arrangements under the Capital Expansion Department (CED) of the Enterprises Division Business unit. Enterprises, which reports to the Generation Business unit, will also be responsible for implementation of the other three components, with the support of other divisions as shown in Figure 1.

Figure 1: Eskom's Institutional Arrangements



Component A – The Medupi Power Project

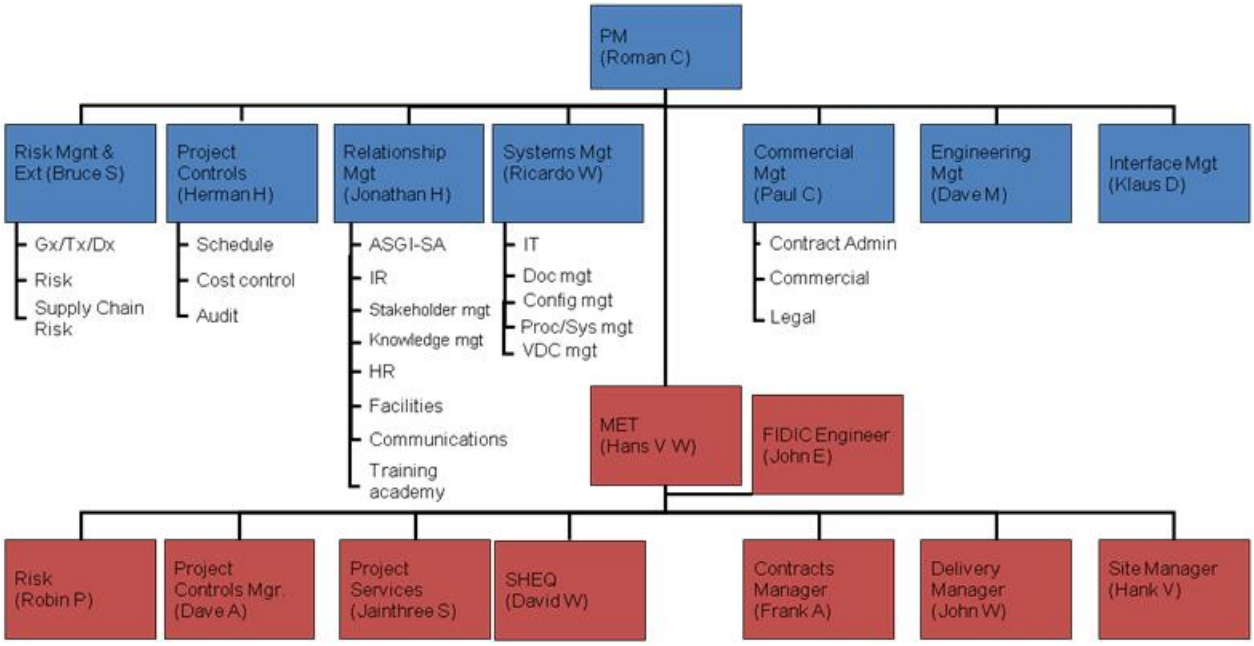
3. Eskom realized at the outset of the new build program which includes coal-fired power plants among others that a shortage of skills and knowledge existed both within Eskom and South Africa. To address this shortage Eskom appointed a few experienced engineering houses as execution partners with the necessary skills. For Medupi, the execution partner is Parsons Brinckerhoff (PB). PB leads the the execution team which comprises a mix of Eskom and PB staff, and their mandate includes the transfer of skills to the local workforce.

4. Project oversight: The oversight of the project is governed by a Medupi Leadership Committee which consists of eight senior management representatives (Chief Operating Officer / Senior General Manager / General Manager) from Eskom and PB. The PB representatives include the Chief Operating Officer (COO) of PB Africa and COO of their US arm. This committee is required to hold at least six regular meetings per annum but it currently meets on a monthly basis to discuss strategic matters and the unlocking of complex project issues. Strategic quarterly meetings are also held with representatives of all functions to provide project feedback to management as well as the Generation Division as the ultimate owner of the station. The committee has the authority to create and delegate specific tasks to the Medupi Project Team (MPT) and to other Eskom Divisions as it may determine appropriate for the discharge of its responsibilities. The results of the meetings are reported to the full Boards of Eskom and PB.

5. The Medupi Project Team and Medupi Execution Team: The overall Medupi project which includes addressing the transmission interfacing, licensing, public liaison, industrial relations and other traditional functions is the responsibility of the MPT under the management of the Medupi Executive Project Manager. The project teams are further supported by various divisions in Eskom; in particular, Finance, Treasury and Corporate Services as shown in Figure 1 above. In total, there are 38 Medupi Execution Teams (MET) for specific contracts to review vendor design, system integration and project execution. The project's implementation organogram is provided in Figure 2.

6. The Medupi Execution Team (MET) is a subset of the Medupi Project team and is composed of members provided by Eskom and PB. Upon completion of the project the team will be disbanded and its members demobilized and re-absorbed in the home divisions and/or organizations.

Figure 2: Medupi Power Project – Implementation Teams



7. The Project structure clearly distinguishes between the roles of the MET and MPT. CED fulfils its responsibilities through the role of the Medupi Project Manager. PB fulfils its obligation through the Medupi Project Execution Manager who in turn reports to the Medupi Project Manager.

8. Construction of the power plant: Most of the contracts for Medupi Power Plant have already been awarded (see Annex 8 for details related to the project's procurement arrangements). The two largest contracts for boilers and turbo-generators/tubines have been awarded. The turbine contractor has been tasked to take primary responsibility for interfacing with the other contractors. Both

contractors have wide international experience in similar projects, including execution of previous contracts with Eskom. See Annex 4 for additional details on construction related information.

9. Coal supply: Coal will be supplied from an existing independent coal mine (Grootegeluk), owned by Exxaro and transported to the power plant via a conveyor system. The mine currently supplies coal to the nearby Matimba Power Stations. A Coal Supply and Offtake Agreement has been entered into by Eskom for the supply of coal to the Medupi Power Plant. See Annex 4 for additional details on Coal Supply related information.

10. Water supply: Responsibility for the timely supply of water for Medupi rests with the Department of Water Affairs (DWAF).

11. The six units of Medupi will require about 6 million cubic meters per year to operate. In addition, the FGD proposed to be installed later by Eskom will require at least another 6 million cubic meters per year. The source for the initial 6 million cubic meters will be from the Mokolo River and dam. There is currently enough water in the Mokolo River, and Eskom has permits, to operate the first three Medupi units. To permit the next three units, and to ensure the environmental base flow, augmentation of the current Mokolo River pipelines and related infrastructure is required (Phase 1). To reach 12 million cubic meters per year required for FGD, a basin transfer system would have to be built, bringing water from the Crocodile River Basin (Phase 2, 3 and 4) - the Crocodile Water Augumentation Scheme which is being developed to meet the water requirements of Lephalale municipality. This augumentation scheme will therefore be developed irrespective of the Medupi Project.

12. Improvements to the existing Mokolo River system (Phase 1) include: (i) a weir and a short pipeline to overcome a gradient and pipe bottleneck that will increase flow through by 20 percent; and (ii) laying a new pipeline parallel to the existing pipeline from the Mokolo dam to the Medupi site. Phase 1 will add 6 million cubic meters per year to the existing capacity and will cost an estimated R1.9 Billion. The financing of Phase 1 has two options. Option 1 is for off-taker agreements to be signed with DWAF by the three major water users: Eskom, Exxaro and the Town of Lephalale and other users. An existing special purpose vehicle is expected to carry out the construction after obtaining private sector funds backed by the off-taker agreements. Option 2 is for the Development Bank of South Africa to finance the construction. In addition, the National Treasury has budgeted R900 million over five years for augmenting water supply for Lephalale. Construction time is expected about 2.5 years in time for the operation of the last three units of Medupi Power Plant.

13. The basin transfer scheme from the Crocodile River (Phase 2 - 4) includes the construction of a 100 km pipeline to carry 100 million cubic meters per year to Lephalale, at an estimated cost of R7.3 billion. Construction is expected to be completed of Phase 2 as early as mid-2015.

14. The risk of ensuring sufficient water for operating the six units (without FGD) is low. The risk of not having sufficient water to operate the FGD plant post 2015 is moderated by the GoSA undertaking in the Guarantee Agreement to supply the required amount of water (including FGD) for the Medupi Power Plant.

15. Operations of the Power plant: Upon commissioning, the power plant will be handed to Generation operations (also under Generation Business). Eskom has already identified staff that will be responsible for operation and maintenance of the power plant. In preparation for operations, arrangements have been made to provide training to the O&M staff. Consistent with best international practices, the training includes on-the-job-training by the construction contractors as well as hands-on training at similar facilities outside the country.

Component B.1 – The Sere Wind Power Project

16. 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.

17. 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 B.2 – The Upington CSP Project

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

19. 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.

Component C.1 Majuba Rail Project

20. The proposed Majuba Rail project has been well-studied for a number of years and the technical design of this component is complete. Every contract that needs to be procured will be led by a dedicated buyer (manager for overseeing individual procurements). Eskom has already established a project management unit for this component, headed by a project manager, under CED, for construction supervision and management. Transnet Freight Rail (a public entity that owns and operates most of rail transport network in South Africa; TFR) will provide the Eskom team expert advice as and when required. TFR will also be responsible for engineering compliance.

21. Eskom will construct and own the railway line infrastructure assets (classified as a siding of exclusive use by Eskom), while TFR will be the rolling stock owner and operator. A Coal Transportation Agreement (CTA) will be signed between TFR (the proposed operator) and Eskom. Eskom will sub-contract the maintenance of the servitude, the track work and overhead electrification equipment. Within Eskom, the operation of the project will be the responsibility of the Primary Energy department, also reporting to Generation Business.

Component C.2 Technical Assistance for Energy Efficiency Improvements

22. The proposed technical assistance component will be managed by a project manager within Generation Business. Eskom will follow the Bank's Consultant Guidelines and will use the Bank's Standard Request for Proposals for Consultant Contracts for Bank financed procurements.

Component C.3 Technical Assistance for Development and Implementation of Domestic and Cross-border Renewable Energy and Energy Efficiency Projects

23. The proposed technical assistance component will be managed by a project manager within the Corporate Services division of Eskom. Eskom will follow the Bank's Consultant Guidelines and will use the Bank's Standard Request for Proposals for Consultant Contracts for Bank financed procurements.

Safeguards Monitoring and Management

24. 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.

25. Eskom has already established a Health, Safety, Environment and Quality (HSEQ) system for the Medupi project, which meets international standards, under the HSEQ Manager. The system will be replicated for the other investment project components. Other responsible officers/ entities/ stakeholders for the Medupi project include:

- Environmental Control Officer – ensuring compliance with the ROD and EMP, and reporting directly to the Department of Environmental Affairs
- The MET
- Eskom Generation Environmental Management
- Eskom Corporate Services (legal, compliance, assurance)
- Environmental Monitoring Committee
- Government and Municipal Departments (DEWA, DoE, etc)
- Lephalale Fire Management

26. 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

27. 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 five project managers and between Eskom, the shareholder (DPE), DoE and NT.

28. 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 IBRD Loan.

IBRD Implementation Support

29. An IBRD implementation support strategy has been designed (see Table 1) 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. At least one implementation support mission will be undertaken before the end of FY2010, soon after the loans become effective, and two missions will be undertaken in FY2011. Missions will include safeguards and fiduciary staff. Implementation Support will be coordinated with other financiers such as AfDB (and 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.

Table 1: IBRD Implementation Support

Planned Date	Main Activities	Skills Requirement
5/2010	*Project Launch Workshop*: Review implementation plan, FMS, Disbursements, procurement and reporting	TTLs, Procurement Specialist, Safeguards Specialists, Financial Analyst, Water Specialist, Communications Specialist, M&E Specialist, Financial Management Specialist
9/2010	Review overall progress, focusing on prospective procurement, safeguards, water supply for Medupi, Medupi progress, FMS, macro, financial and sector risk reviews, and progress on CSP, Wind, Majuba Rail, TA Phase 2	TTLs, Power Engineers, Procurement Specialist, CSP & Wind Specialist, Macro Economist, Rail Specialist, HIV/ AIDS Specialist, Regulatory Specialist, Financial Management Specialist
1/2011	Review overall progress, prospective procurement and safeguards	TTLs, Financial Analyst, Procurement Specialist, Safeguards Specialists
7/2011	Review overall progress, water supply for Medupi, CSP, Wind, Majuba Rail and Eskom financial performance	TTLs, Power Engineers, Procurement Specialist, CSP & Wind Specialist, Water Specialist, Financial Analyst
12/2011	Review overall progress, focusing on prospective procurement, safeguards, water supply for Medupi, Medupi progress, macro and financial risk reviews, and progress on CSP, Wind and Majuba Rail, FMS	TTLs, Procurement Specialist, Financial Analyst, Power Engineers, Rail Specialist, Macro Economist, Financial Management Specialist
4/2012	Review overall progress, water supply for Medupi, CSP, Wind and Majuba Rail	TTLs, Power Engineers, Procurement Specialist, CSP & Wind Specialist, Water Specialist
9/2012	Review overall progress, CSP, Wind and Majuba Rail	TTLs, Procurement Specialist, Financial Analyst, Power Engineer, Rail Specialist
1/2013	*Mid-Term Review*: Review MTR report, overall progress, M&E, Eskom financial performance, macro, financial and electricity sector risks review, FMS	TTLs, Power Engineers, Procurement Specialist, CSP & Wind Specialist, Water Specialist, Macro Economist, Rail Specialist, M&E Specialist, HIV/ AIDS Specialist, Regulatory Specialist, Financial Management Specialist
9/2013	Review overall progress, CSP, Wind, Majuba Rail, Eskom financial performance, safeguards, FMS	TTLs, Procurement Specialist, Financial Analyst, Power Engineer, Rail Specialist, Safeguards Specialists, Financial Management Specialist

Planned Date	Main Activities	Skills Requirement
2/2014	Review overall progress, CSP, Wind and Majuba Rail	TTLs, Procurement Specialist, Power Engineer, Rail Specialist
10/2014	Review overall progress, CSP, Wind, Majuba Rail, Eskom financial performance, safeguards, FMS	TTLs, Procurement Specialist, Financial Analyst, Power Engineer, Rail Specialist, Financial Analyst, Safeguards Specialists, Financial Management Specialist
3/2015	Review overall progress, CSP, Wind and Majuba Rail	TTLs, Procurement Specialist, Power Engineer, Rail Specialist
11/2015	*Implementation Completion Report*: Review overall progress, including M&E, FMS, and Eskom financial performance, and prepare for ICR report.	TTLs, Power Engineers, CSP & Wind Specialists, Safeguards Specialists, Financial Analyst, Energy Economist, Rail Specialist, Financial Management Specialist

30. From the Safeguards perspective, implementation support will be provided at two levels. On the first level, the Bank will help support the monitoring the performance of project implementation using country systems. 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 with its transmission line and the Ermelo-Majuba Rail Line are 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.

31. The contracts for the Medupi Power Plant, which have already been procured, will require technical and implementation supervision which would be ensured through continuous supervision and interactions with Eskom. As recommended in the capacity assessment of Eskom, post review of procurement contracts will be carried out once a year.

32. Based on the above Implementation Support plan, the Bank's estimated implementation supports budget (see Table 2) from FY10 to FY16 is estimated below for a Total Cumulative spending of about US$ 3 million:

Table 2: IBRD Implementation Support

IBRD Fiscal Year	FY10	FY11	FY12	FY13	FY14	FY15	FY16
Amount of Resources Required (US$,000s)	200	400	400	450	450	500	500

33. The following measures are proposed to ensure more effective implementation and monitoring of outputs and results.

(i) Continuous engagement through country based staff.

(ii) Building on the experience and learning from other large value, complex infrastructure projects such as the Nam Theun II and Bujagali Power Project in terms of risk assessment and mitigations, anticipation and proactive attention to risk issues, particularly on safeguards. Consistent with learning from such projects, focus on developing strong relationships with Eskom implementation teams, mutual learning and capacity building initiatives/events and joint supervision of project activities, including interactions with stakeholders.

(iii) Staff exchange between the Bank and Eskom to develop mutual understandings, enable knowledge transfer and strengthen capacity.

(iv) Maintain proactive communications and consultations with project stakeholders and civil society.

(v) Enhance opportunities for regional energy transactions.

(vi) Strengthen donor/partner alliances to share information and implementation support.

Annex 7: Financial Management and Disbursement Arrangements

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

1. The proposed project will consist of 3 components which are presented in Section II.C of PAD.

2. 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 agency 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 at Eskom, and completion of FM assessment questionnaire by some officials of the agency, was to ensure that acceptable financial management arrangements are in place for the implementation of the project.

3. 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.

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

5. 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.

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 Table 1 below). Eskom's 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 its parastatals as well as the implementation of the FM actions as noted below. The overall conclusion of the assessment is that the proposed FM arrangements meet the Bank's minimum requirements under OP 10.02 Financial Management.

Country issues

7. The South African public expenditure management system has undergone substantial reform since the mid-1990s. While the early reforms have shaped macroeconomic stability and strengthened public spending, the more recent emphasis of the reform program has been on efficient resource allocation and effective service delivery. The highlights of the reform program have been the roll out of a new intergovernmental system that requires all the three levels of government to formulate and approve their own budgets; the introduction of 3-year rolling spending plans for all national and provincial departments under the Medium Term Expenditure Framework (MTEF); new formats for budget documentation that include a strong focus on service delivery information; the enactment of

new financial legislation; and substantial improvements in financial reporting and auditing arrangements.

8. A Public Expenditure Financial Accountability (PEFA) Framework Assessment was conducted between June and September 2008. The assessment found that South Africa scored well in the following six critical dimension areas of Public finance Management (scored A in the first three, B+ in second two and B on the last one):

i. Credibility of the budget,
ii. Comprehensiveness and transparency,
iii. Predictability and control in budget execution,
iv. Accounting, recording and reporting;
v. External scrutiny and audit, and
vi. Policy based budget.

9. The assessment, based on the PEFA Performance Report indicates that the fiduciary aspects are satisfactory.

Project Implementation Arrangements

10. Annex 6 provides a complete overview of the project implementation arrangements. All of the project components will be implemented by Eskom, under the Enterprises Division in the Generation Business Unit. Overall coordination and interaction with the IBRD will be through a project coordinator in the Finance Directorate. All project components will have a project manager, under who there will be a team consisting of engineering, financial, safeguards and commercial expertise. Institutional support in these areas will also be provided from the respective departments.

11. Oversight of the project will be provided by an ad-hoc committee comprising Eskom senior management, at the levels of Chief Operating Officer, Senior General Manager and General Manager.

12. For the FM implementation of the project, Eskom will use its existing SAP-based FM system with appropriate oversight by DPE and the Board.

13. Table 1 provides an overview of the identified FM risks and the proposed mitigating measures.

Table 1: 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. The position and office of the Auditor General meet all the standards of independence set by International Organization of Supreme Audit Institutions (INTOSAI).	L	N
Entity Level Eskom is not familiar with and therefore has limited knowledge of the Bank's FM and Disbursement policies and procedures.	M	• The Bank will conduct comprehensive training on the Bank's FM and Disbursement policies and procedures by effectiveness of the loan agreement. Staff of the Eskom Enterprise and the Internal Audit units will be encouraged to participate in the Bank's periodic training program in FM and disbursement, and in courses organized by Bank recognized training institutions. • 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.	L	N

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)**
Project Level Non-Availability of other funds to finance the build program may impact on successful implementation of the project.	M	• Eskom is engaging the shareholder and is actively raising funds in the debt market on the strength of the government support through guarantees of R176 billion for the successful implementation of the project. • The government has made R60 billion subordinated loan payable over three years available for the build program. • Eskom has secured the loan from AfDB to fund the project.	L	N
Control Risk Budgeting: due to the nature of the project and 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 under taken 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
Accounting No identified risk. Eskom prepares monthly financial statements that are presented through the governance committees. Eskom uses SAP accounting software, which is capable of producing the required financial reports. The Eskom Enterprise unit is staffed with professionally qualified accountants.	NA		NA	NA
Internal Control No identified risk. Eskom has an effective Internal Audit Unit. The Internal Audit General Manager has unrestricted access to the Chairman of the Audit Committee. The Audit Committee oversees Eskom's internal control systems and their effectiveness.	NA		NA	NA
Funds Flow There is a risk that funds may be co mingled with other funds complicating accountability for the Loan proceeds.	L	• Eskom will maintain a separate bank account for the funds received from the IBRD Loan for the implementation of the Bank financed components of the project. The project will be configured in SAP to track expenditure by sources of funding.	L	N
Financial Reporting No identified risk. Eskom produces quarterly financial reports for submission to DPE. The submission is regulated by the PFMA and Eskom has complied with the submission dates. Eskom will also be able to produce quarterly IFRs for the project from their SAP accounting system.	N/A		N/A	N/A

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)
Auditing No specific audit risk. As a schedule 2 entity the PFMA requires Eskom to produce annual audited financial statements within five months after financial year end.	NA		NA	NA
Overall FM Risk Rating	**M**		**L**	

Eskom as the Implementing Agency

14. Eskom Holdings Limited ("Eskom" or the "Company") is South Africa's national, vertically integrated electricity utility and is wholly owned by the South African government (GoSA). Details on Eskom financial and operational performance are provided in Annex 1 and Annex 10.

15. Eskom operates its business through its divisions (Generations, Corporate and Customer networks) and its subsidiary companies (Eskom Enterprises, Escap, Eskom Finance). Eskom is managed by its Board of Directors. The Board of Directors is vested with the power and authority to lead, control, manage and conduct the business of Eskom Holdings Limited. The Board has power and authority to delegate the responsibility to ensure that the Company remains a sustainable and viable business of global stature. The Board consists of individuals with wide ranging experience from the Utilities sector to Social Welfare & Development providing Eskom with depth of skills and expertise.

16. The Board Committees include the following:

(i) Audit Committee, which comprises five independent non-executive directors. The committee ensures that internal audit function is in place and that the roles and functions of the external audit and the internal audit are sufficiently clarified and coordinated to provide an objective overview of the operational effectiveness of the Company's systems of internal control, risk management, governance and reporting. The committee also reviews the accuracy, reliability and credibility of statutory financial reporting. In the 2009 financial year ten committee meetings were held.

(ii) HR, Remuneration and Ethic which comprise three independent non executive directors and an external member. The committee makes recommendations on remuneration and other human resource related policies.

(iii) Investment and Finance which comprises four independent non executive directors. The committee reviews the investment strategy and makes recommendations to the Board. It evaluates and approves business cases for new ventures or projects, approves criteria and guidelines for investments and approves investments within delegated authority. In the 2009 financial year eight committee meetings were held.

(iv) Tender which assists the Board with procurement decisions, tenders and contracts within its delegated authority and approves procurement policies. It ensures that Eskom's procurement system is equitable, transparent, competitive and cost effective. This is a five member committee and has held twelve meetings in the 2009 financial year.

(v) Risk Management, which ensures that the Company's risk management strategies and processes are aligned with best practices. The chairman of the audit committee is a member of this committee for synergy between the committee and audit committee. The committee has four independent non executive members and has held four meetings in the 2009 financial year.

(vi) Sustainability, which comprises four independent non executive directors and an external committee member. This committee deals with integrated sustainability issues and makes recommendations on policies, strategies and guidelines, particularly related to safety, health, environment, quality and nuclear issues.

(vii) Executive Management that assists the Chief Executive in guiding the overall direction of the business and exercising executive control. Its task is to assist with the effective management of the day to day operations of the business. Twenty meetings were held in 2009.

(viii) Ad-hoc committee/coordination committee. The Project Coordinator from Eskom Treasury will be responsible for coordination and monitoring of progress of the overall project. The Project Coordinator will also facilitate coordination between the five project managers and between Eskom, the shareholder (DPE), DoE and NT.

17. The key indicators are to be monitored and used in assessing the project progress and evaluation of outcomes. 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 from effectiveness of the loan.

18. 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.

19. However, Eskom has not been involved in the implementation of Bank financed projects for over two decades and thus does not understand the Bank procedures well. To this extent, the Bank's FM specialists will deliver workshops on the Bank's financial management and disbursement, policies and procedures, including reporting requirements during project launch and on a continuing basis. Eskom's Corporate Finance unit staff will also be encouraged to attend training programs offered by Bank accredited training institutions.

20. Table 2 provides the list of key FM actions that need to be taken by Eskom for the project.

Table 2: FM Action Plan

Action	Effective date	Responsibility
1. Conduct training of Eskom accounting staff in Bank disbursement procedures	After Effectiveness	Eskom and Bank FM Specialist and LOA Finance Officer

21. Budgeting. Details regarding the financing plan for the project and financing provided by the GoSA to Eskom are provided in Annex 5 and Annex 9. Eskom's Corporate division management accounting and systems department 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 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).

22. Accounting. Eskom Holdings finance group is headed by the Chief Financial Officer, a professionally qualified chartered accountant, and consists of two divisions (Generations and Corporate divisions) and three subsidiaries (Eskom Enterprises, Escap Limited and Eskom Finance Company (Pty) Ltd).These divisions and subsidiaries are headed by highly qualified senior managers,

most are professionally qualified chartered accountants. Eskom uses the SAP accounting software and the financial statements are prepared in accordance with the International Financial Reporting Standards (IFRS).

23. Eskom Enterprises division is responsible for budgeting of the entire capital expenditure program. This division is headed by the General Manager who is supported by senior managers and qualified chartered accountants. The Enterprises Division plays an important role in the New Build Program, and also offers strategic and commercial life-cycle services to Eskom's line divisions.

24. Staffing. Eskom Corporate Finance has a staff compliment in excess of 2000 staff.

25. Internal control. Management is charged with the responsibility of establishing an effective internal control environment, including adequate internal financial controls. In addition, operational control systems are 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. These controls are contained in organizational policies and procedures, structures and approval frameworks, and they provide direction, establish accountability and ensure adequate segregation of duties and each contain self-monitoring mechanisms. The Board ensures that an effective internal control framework has been established. The Assurance and Forensic department assumes the internal audit function, monitors the operation of the internal control systems and report findings and recommends improvement to management and the Audit Committee. The Audit Committee monitors and evaluates the duties and responsibilities of the management and of internal and external audit to ensure that all major issues reported have been satisfactorily resolved.

26. Internal audit. During the period under assessment, the corporate departments of audit, technical audit, technical investigations as well as forensic and anti-corruption were integrated into the Assurance and Forensic Department (AF). 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 to 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.

27. 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.

28. Eskom Enterprises division has its own Audit Committee which meets quarterly to review amongst other things internal audit reports. The project will be covered in the annual audit plan of this division.

29. In February 2009, KPMG was engaged to perform Quality Assurance on Eskom Internal Audit Department. The review indicated that overall, Eskom's internal audit meets the "General Conform" Section IIA of international auditing standards.

30. Financial reporting**.** Eskom's accounting system is capable of producing the quarterly reports. Eskom produces monthly financial statements that provide information on the entity's performance highlights. The monthly reports feed into quarterly reports that are submitted to the DPE 31 days after the end of the quarter. The format and contents of the unaudited quarterly financial reports have been discussed with Eskom and will be agreed at negotiation.

31. Eskom will produce and submit interim unaudited financial reports (IFRs) to the Bank on a quarterly basis. These reports are designed to provide sufficiently detailed and timely information to the project management, and the coordination committee, and will include:

(i) A narrative summary of the project implementation highlights;
(ii) Sources and Uses of Funds by disbursement categories;
(iii) Uses of Funds by project component/activity- both actual and cumulative;
(iv) The Designated Account activity statement;
(v) Summary of payments made for contracts subject to the Bank's prior review; and
(vi) Expenditure Report specific to the IBRD loan.

32. The quarterly Sources and Uses of Funds report will reflect contributions from all the financiers and utilization of the funds, while the reports listed in (iv) to (vi) will reflect Bank-eligible expenditures only.

Funds Flow and Disbursement Arrangements

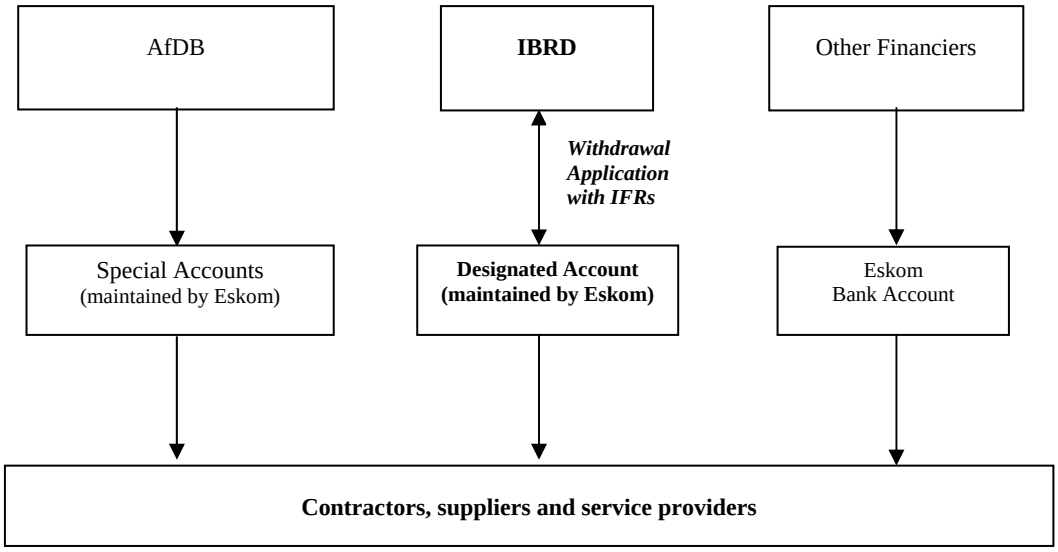
33. Flow of funds. Upon the signing of the Loan Agreement, the Bank will open an IBRD Loan Account in its books, in the name of Eskom. Funds will flow from the Bank (Loan Accounts) into Designated Account (DA), maintained by Eskom for each currency in which the loan is disbursed.

34. Disbursement arrangements. Eskom will maintain a US$ denominated segregated Designated Account (DA) in a commercial bank for the implementation of Bank-financed components of the project. Disbursements by the Bank into this account will be based on the quarterly Interim Unaudited Financial Report (IFR) and withdrawal applications prepared and submitted by Eskom to the Bank. The submission will be required within 45 days of the end of each reporting period. Upon effectiveness of the loan agreement and submission of a withdrawal application, the Bank will initially disburse an amount equivalent to six months estimated project expenditures into the DA. Subsequent disbursements to the DA will be based on six- monthly estimated expenditure, taking into account the balance in the DA at the end of each quarterly reporting period and reporting on the use of the advances previously made. 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 that have a value above the Minimum Application Size (US$75 million equivalent); (ii) the Reimbursement disbursement method, whereby Eskom will be reimbursed for expenditures which it has prefinanced from its own resources and submits withdrawal application for reimbursement above the Minimum Application Size (US$75 million equivalent); and (iii) 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 above the Minimum Application Size (US$75 million equivalent).

35. Other financiers' flow of funds and disbursement arrangements. Amounts proposed to be financed by different financiers for the different project components are detailed in Annex 5. AfDB will advance their funds directly into Special Accounts. It is also 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.

36. Retroactive financing. A retroactive financing arrangement of up to 10.67% of loan amount (up to US$400.00 million) will be provided to cover payments made prior to the signing of the Loan Agreement but on or after January 1, 2007, for all eligible expenditures financed by the Bank loan.

Figure 1: Flow of Funds



37. Use of Loan Proceeds. The following tables show the allocation of the proceeds of the IBRD Loan. Use of Proceeds for project costs is provided in Annex 5.

Table 3: Allocation of IBRD Loan Proceeds

Category	Amount of the Loan Allocated (expressed in USD)	Percentage of Expenditures to be financed (inclusive of Taxes)
(1) Goods and works (including supply and installation) for Part A.1(a) of the Project	1,766,370, 000	100%
(2) Goods, works (including supply and installation) and non-consulting services for Part A.1(b) of the Project	593,030,000	100%
(3) Goods, works and non-consulting services for Part B.1of the Project	80,000,000	100%
(4) Goods, works and non-consulting services for Part B.2 of the Project	150,000,000	100%
(5) Goods and works for Part C.1 of the Project	319,550,000	100%
(6) Consultants' services for Part C.1, C.2 and C.3, and non-consulting services for Part C.1 of the Project	51,000,000	100%
(7) IBRD Interest During Construction	400,000,000	100%
(8) Other Lender Interest During Construction	150,000,000	-
(9) Unallocated	230,675,000	-
(10) Front-end Fee	9,375,000	Amount payable pursuant to Section 2.03 of the IBRD Loan Agreement in accordance with Section 2.07 (b) of the General Conditions
(11) Premia for Interest Rate Caps and Collars	0	Amount payable pursuant to Section 2.07(c) of the IBRD Loan Agreement
TOTAL AMOUNT	**3,750,000,000**	

Auditing arrangements

38. 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 together with the audit reports are included in the annual report.

39. Eskom has an unqualified audit report for year ended March 31, 2009 and is audited by KPMG Inc and Sizwe Ntsaluba vsp. The statutory auditors for the forthcoming year are appointed at the annual general meeting.

40. 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 FS.

41. 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. Eskom will prepare the audit terms of reference in consultation with the Bank to ensure adequate coverage of the project in the scope of the audit. The quarterly interim financial reports (project specific) need not be audited on a quarterly basis; however, the process and controls to produce these quarterly IFRs will be reviewed to ensure that its data is derived from SAP and, on a test basis at year-end, the IFRs will be agreed to SAP. The audited annual financial statements will also reflect all the withdrawals from the loan account during the period with assertion that the loan proceeds have been used for the intended purposes and in accordance with the bank legal agreements. The Designated Accounts, into which loan proceeds are first received and then used for financing of agreed project expenditures, will be included in the scope of the audit of transactions, accounting, bank reconciliation, financial assets and reporting.

42. 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 4: 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 quarter, interim unaudited financial reports for the project on a cash basis covering the quarter, 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; and

Supervision plan

43. Based on the project's "Low" FM risk rating, the Bank will carry out the onsite FM supervision of the project at least once 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

44. 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.

45. 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

46. 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 INVESTMENT SUPPORT PROJECT

Project Components

1. Section II.C of PAD provides further details on Project Components.

Implementing Agency

2. Procurement activities will be carried out by Eskom Holdings 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., Medupi, Majuba Rail, 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
- Preferential Procurement Policy Framework Act No. 5 of 2000
- 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. 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.

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

Procurement under Component A (Medupi Power Plant)

8. The component consists of : (a) contracts for the Medupi Power Plant procurement which has been completed or is close to completion; and (b) contracts for the Medupi Power Plant associated Transmission lines which are yet to be procured.

9. The procurement action for the Medupi Power Plant was initiated in late 2005. At that time Eskom and the Government expected Eskom to fund the program through a combination of internal cash generation and commercial debt, which Eskom could normally have raised on the market with its strong credit rating and GoSA support. They had no intention of seeking financing from the World Bank or other multilateral agencies, and therefore had no reason to follow procurement guidelines and procedures other than their own. The situation changed when a combination of a slower than expected tariff progression and the global financial crises resulted in major funding shortfalls. The GoSA and Eskom approached AfDB[129], IBRD, and bilaterals among others, to help bridge the financing gap that emerged after Eskom initiated the contracting for the Medupi Power Plant. Contracts comprising about 80 percent of the plant value have been awarded and the remaining contracts are expected to be awarded during the first half of 2010.

10. The Medupi Power Plant comprises various supply & install and construction contracts that are being undertaken by Eskom as the Employer for a cumulative value of US$9.35 billion, including about US$765 million of contingencies. Bank financing in an amount of US$2.489 billion (including contingencies, but excluding any related IDC) is proposed for contracts related to the Medupi Power Plant (Component A).

11. Eskom has completed the full procurement process — bids have been evaluated and contracts have been awarded for about US$7.5 billion of Medupi related contracts. Of such contracts, Bank financing is being considered for US$1,383.72 million. Table 1 provides an overview of the contracts that have already been awarded.

Table 1: Medupi Power Plant – Supply & Install and Construction Contracts Already Awarded, excluding additional Contingencies

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing (US $ Millions)
Proposed to be Financed by IBRD, of which	**1,383.72**	**1,383.72**
Coal Overland Conveyor	28.88	28.88
LP Services	155.93	155.93
Water Treatment plant	105.47	105.47
Chimney & Silos	118.02	118.02
Main Civils	599.24	599.24
Electrical Power Installation	127.18	127.18
Medium Voltage Switch Gear	39.61	39.61

[129] AfDB's Board approved the loan of US$2.63 billion equivalent on November 25, 2009. The AfDB loan will finance some of the already committed and procured contracts for the Medupi Power Plant, specifically the Boiler and Turbine contracts.

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing (US $ Millions)
Coal Stockyard Equipment	130.90	130.90
Dust Handling and Conditioning	78.49	78.49
Other Contracts not financed by IBRD	**6,053.68**	-
Total	**7,437.40**	**1,383.72**

12. The procurement for the other contracts that have begun procurement is estimated to be US$382.65 million (or about 3.8 percent of the total value of the construction costs), all of which will be financed by the Bank. For such contracts, bids have been received; most of them have been evaluated and are in the process of being finalized for award. Table 2 below provides an overview of these contracts.

Table 2: Medupi Power Plant – Supply & Install and Construction Contracts in Advanced Stages of Procurement, excluding additional Contingencies

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing
Proposed to be Financed by IBRD, of which		
Low Voltage Switch Gear	80.95	80.95
Ash Dump Equipment and Ash Overland	115.72	115.72
Terrace Coal and Ash System	138.11	138.11
Uninterrupted Power Supply	20.49	20.49
Water Reservoirs	27.38	27.38
Total	**382.65**	**382.65**

Bank's Due Diligence to establish eligibility of procured Medupi Power Plant contracts for Bank financing

13. As the GoSA and Eskom have requested the Bank to finance contracts which have already been awarded using Eskom procedures (not procured using Bank's Procurement Guidelines), independent reviews at the aggregate level and the due diligence at contract level have been undertaken to establish that (a) the overall procurement meets global industry standards and cost parameters; (b) all contracts proposed to be financed by the Bank fully comply with Eskom procedures; and (c) there are no sanctioned firms involved in the Medupi Power Plant contracts proposed to be financed by the Bank (see details below for the assessments):

a. *Aggregate Level*: Benchmarking of the outcome of the procurement for Medupi with similar projects procured at the same time in other parts of the world, to establish economy and efficiency as per industry standards. The benchmarking of costs of the plant (at an aggregate level) for similar-size supercritical coal-fired power plants to establish that procurement was economic and efficient.

b. *Contract Level*: Due diligence to ensure that the process undertaken for these contracts has followed Eskom/GoSA policies and procedures and to identify key deviations from Bank Guidelines. An independent review to ensure that procurement of the packages has met general principles of industry-wide standards, economy, efficiency and transparency for this scale and timing of procurement at the time it was carried out.[130]

[130] As per the requirements of 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.

14. Review at the Aggregate Level: The review has been carried out by Nexant Inc. of USA, a San Francisco-based engineering consultancy firm commissioned to establish whether the overall procurement process for the Medupi Power Plant met general principles of industry-wide standards of economy, efficiency and transparency for this scale and timing of procurement. In so doing, the Consultant has also been requested to benchmark the costs of the Plant for similar size supercritical coal-fired power plants in the world. The following paragraphs summarize the consultants' findings:

15. *Opinion on the design*: The design basis for the Medupi plant is specified in Eskom's User Requirement Specifications (URS) document. Eskom prepared the URS document to provide design specifics pertaining to all major equipment and systems with the lowest possible life-cycle cost for the plant, while meeting the reliability and performance goals. Nexant reviewed the URS document including design parameters, unit load factor, unit capacity factors, station thermal efficiency, net output, plant equipment redundancy, etc. The URS meets or exceeds performance, reliability and availability requirements of similar coal-fired plants in operation or being constructed today. Eskom's overall plant design, steam cycle optimization, and plant layout are consistent with the current engineering design practices for coal-fired power plants and the plant design performance is in line with similar supercritical plants in operation or being built. Current international standards in most countries require that coal-fired power plants use best available control technology to control SOx, NOx, and particulate emissions. The URS specifies utilizing low NOx burners for NOx control, bag-house filters for the particulate control, and FGD at a later date for SOx control, when additional water will be available at the Medupi site.

16. *Opinion on procurement*: Eskom decided to execute the Medupi project under a multi-contract strategy. For the Medupi project, Eskom's Enterprises Division divided EPC work into 38 separate EPC contracts. Since boiler and turbine procurement constitute over 50 percent of the overall Medupi project costs, and will have significant influence on the plant performance and life-cycle costs, Nexant evaluated Eskom's efforts in procuring boilers and steam turbines for the 6 Medupi units. Although Eskom made significant efforts to receive bids from as many credible vendors as possible, in the end only two major manufacturers met the technical requirements and submitted qualifying bids meeting large sized power plant requirements, local content in country skills development, and desired project schedule.

17. Eskom's Tendering experience for the supply of the six boilers and steam turbine generator units for Medupi project underscores the very competitive world-wide power plant equipment and components market that existed from 2005 through 2008. In 2006, during Eskom's Tendering period, the international market for 800 MWe boilers was essentially sold-out. As an example of the world market conditions, Texas Utilities (TXU) in the United States awarded on June 8, 2006 the supply of eight (8) identical supercritical coal-fired boilers of 858 MWe capacities to Babcock & Wilcox Company for delivery from 2007 through 2010. This award committed all of B&W's 800 MWe boiler production from their US and China manufacturing plants for the subsequent four years.

18. In addition, Eskom's location at the tip of Africa, along with the fact it had not been active in the international market for large power plant equipment since 1989, meant that it was not the most attractive market for the suppliers. This notion is also corroborated by procurement carried out under Bank financed projects in Africa over the last few years, where energy projects have not generated substantial participation from international suppliers because of commitments in developed parts of the world, which is a preferred market for suppliers.

19. Nexant's observation of large power plant development during 2005-2008, when Eskom was planning the Medupi project, can be summarized as follows:

a. The global demand for power plant components was confirmed to be very high and implementing agencies were facing significant bottlenecks.
b. Production capacity was globally under pressure.

c. Availability of specific commodities such as specific types of high-strength steel was under pressure; long lead times for components were negatively affected as well.
d. Skilled manpower was in short supply, including disciplines such as labor, commercial, financial and technical (engineering).

20. In Nexant's opinion, Eskom's overall procurement process, although drawn out, in the end proved to be fair, transparent, and in compliance with the existing laws of South Africa.

21. *Opinion on project cost benchmarking*: Since no large coal-fired power plant has been built in recent years in Africa, Nexant does not have benchmark costs for Africa. The benchmarking effort was based on available and published data for the North America, EU, and South East Asia markets. Nexant excluded the Chinese power market from benchmarking due to limited information available, and the lack of export projects with Chinese supercritical equipment in 2005-2007.

22. Nexant has opined that the total base project cost for the Medupi Power Plant is comparable to US market and is on the low end of the EU market (without the FGD). However, Eskom's costs are higher[131] when compared to plants being constructed in India and China – largely based on East Asian and Indian suppliers.[132] The latter are not representative of the international markets as cost data are only available for domestic plants and virtually no export orders were concluded by the Chinese manufacturers for similar equipment at the time.

23. The worldwide competition for power plant design and construction resources, commodities and equipment was driven mainly by huge demand for power plants in China and India, by a rapidly increasing demand for power plants and pollution control modifications in the United States required to meet SO_2 and NO_x emissions standards, and by the competition for resources from the petroleum refining industry.

24. In Nexant's opinion, Eskom has assembled a capable team to execute the construction of the Medupi project and is executing the project well.

25. Review at the Contract Level: The Bank commissioned an independent retiree consultant (ex-chair of the OPRC) to support Bank Procurement Specialists in carrying out due diligence and to ensure that the procurement process undertaken for each of the contracts proposed to be financed by the Bank has followed Eskom/GoSA policies and procedures. Due diligence for the contracts which have been signed has been completed. Eskom will submit the documentation of the remaining contracts as soon as they are signed, and their eligibility for financing will be subject to the same due diligence.

26. The review of the procurement processes (largely completed) has concluded that the procurement process followed by Eskom, although not having full compliance with the Bank's guidelines, was transparent, focused on economy and efficiency, gave the same opportunity to several bidders from developed and developing countries, and included procedures to encourage development of domestic contractors (as well as minorities, like black persons and women).

27. The review of the procurement processes revealed areas of divergence between the Bank's procurement procedures and Eskom's procedures. Some of the key deviations include: (a) Eskom uses own bidding documents with modified FIDIC conditions of contract, which do not have fraud and

[131] Estimated by up to 40 percent on some contracts.
[132] Increases in construction costs, particularly during the 2004-2008 time period, were experienced by coal-fired power plants. This was in large part due to a significant increase in the worldwide demand for power-plant design and construction resources, commodities and equipment. The limited capacity of EPC firms and equipment manufacturers also contributed to high construction costs. This also meant fewer bidders were at available, higher prices and front loaded payment schedules were quoted with longer delivery times. The demand for and cost of both on-site construction labor and skilled manufacturing labor have also escalated significantly in recent years.

corruption and right to audit clauses as required by the Bank; (b) bids are opened in public, prices are not read out; (c) negotiations conducted with the lowest evaluated bidder; (d) merit point system is used to evaluate bids for works; (e) Accelerated Shared Growth Initiative of South Africa (ASGI-SA) and Competitive Supplier Development Program (CSDP) are taken into consideration in the evaluation of bids; (g) use of registration of bidders grading firms based on the capability criteria as a condition of prequalification and contract award; and (h) parent company guarantees are required.

28. The analysis of the deviations from Bank procedures as observed in Eskom procedures concluded that these procedures were well established and transparent, and entailed economy and efficiency. The following provides a summary of the analysis carried out:

a. Considering that the company had not carried out large-size procurement (similar to the size of Medupi) for many years and thus had limited knowledge of the contractors' and suppliers' market, for the purposes of Medupi procurement, Eskom created possibility of competition by either advertising bidding opportunities or directly inviting a wide representation of potential bidders.

b. The due diligence of contracts proposed for Bank financing revealed that the outcome of the evaluation of bids would be the same if such bids were evaluated using the criteria following the Bank's Guidelines.

c. While the GoSA's law requires bidders' registration and application of the national preferential policies, the Bank is not aware of any complaint against such registration. Due diligence has identified that in the procurement processes for boilers and turbines contracts that Sumitomo and Doosan Heavy Industry declined to submit a tender for either package because they indicated their inability to comply with South African National Industrial Participation Program (NIPP) and Black Economic Empowerment (BEE) requirements included in the tender documents.

d. Negotiations were carried out within the scope authorized by Eskom's management and included clarifications of the bids.

e. Eskom requires bidders to submit a parent company guarantee in addition to the performance security. Such guarantees are also considered to establish bidders' financial credibility by Eskom. The Bank's Guidelines require bidders to provide evidence of their financial capability on their own account without relying on the parent companies.

Box 1: South Africa's preferential policies that support those previously disadvantaged and develop competitive ancillary suppliers

A. ASGI -SA (Accelerated Share Growth Initiative)

ASGI-SA is an initiative and policy of the GoSA, initiated in 2004, to accelerate economic growth by 6 percent and to halve poverty and unemployment by 2014. ASGI-SA is fully aligned with GoSA's growth, poverty eradication and job creation strategy. Public Agencies are required to set local content for black economic empowerment (BEE, BWO and SME) and skills development targets as key evaluation criteria in tenders that it awards.

BEE (Black Economic Empowerment)

Black Economic Empowerment has been a major policy initiative of the South African Government since 1994 and has now been formalized in legislation. BEE was introduced to promote access to mainstream businesses by Black suppliers, enhance entrepreneurship and maximize the purchase from previously disadvantaged persons. Suppliers are assessed on a set of criteria – either BEE, SME (Small Medium Enterprises) or BWO (Black Women Owned). In 2007 Eskom amended its BEE policy to be in line with BBBEE Codes discussed below.

BBBEE (Broad Based Black Economic Empowerment)

GoSA's policy to promote black business and the economic upliftment of black South Africans is enacted into law through the Broad Based Black Economic Empowerment Act 53 of 2003. The aim of this Act is to promote the achievement of the constitutional right of equality, and increase broad based and effective participation of black people in the economy. The BBBEE Act does not set penalties for non-compliance but requires that BBBEE is considered by all organs of state such as Eskom in taking procurement decisions. Since 2007, under the BBBEE Codes seven criteria including ownership, management, employment equity, preferential procurement, and CSI are used to measure BBBEE within a company or organization.

B. CSDP (Competitive Supplier Development Programme)

CSDP is an initiative and policy of the South African Government aimed at developing sustainable local industry in South Africa. CSDP was introduced in 2007 by the Department of Public Enterprises (DPE) with the objectives to: (a) stimulate local industries to exploit the opportunities arising from global shortages of certain components; (b) develop new local industries; (c) increase the capacity and capabilities of existing local industries; (d) increase the competitiveness of local industries; and (e) develop export capabilities and export opportunities for local industries. This is an alternative means to achieve the goals of the NIPP (see below). Eskom has chosen to implement the CSDP instead of the provisions of NIPP directly.

NIPP (National Industrial Participation Programme)

The National Industrial Participation Program is an initiative and policy of the South African Government initiated in 1997. The objectives of the program are to establish new trading partners and foreign investment in South Africa. State owned enterprises may however elect in certain circumstances to implement CSDP as an alternative to the NIPP. Under the NIPP, Government and State Owned Enterprise awarded contracts with an imported content equal to or exceeding US$10 million (or the equivalent thereof) are subject to an Industrial Participation Obligation. The obligation is 30 percent of the imported value of the contract to be invested in local economy.

29. Due Diligence on Fraud and Corruption (F&C) and Audit Rights: The contractual clauses in the modified FIDIC documents that Eskom is using for Medupi procurement do not provide the Bank exactly the same rights with respect to Fraud and Corruption as the Standard Bidding Documents (SBDs) of the Bank. To this extent, Eskom has agreed to incorporate such rights (for the Bank) in the contracts awarded[133] for the Medupi Power Plant. Eskom has begun the process of including these clauses (consistent with Bank requirements on Fraud and Corruption and Audit Rights) in the contracts already awarded or currently being finalized. The Bank will not finance any contracts which do not include its Fraud and Corruption related clauses. In case the Bank's determines an occurrence of any violation of the Bank's fraud and corruption provisions, Eskom will promptly inform the affected contractor(s).

30. It is not possible to obtain Audit Rights for the bidders who were not selected as they do not have any obligations to Eskom. The Bank, therefore, will not have Audit Rights on such bidders. [134] To this extent, the Bank has reviewed the legal framework for F&C in South Africa and is comfortable

[133] These include only those contracts that are proposed to be financed by the Bank.

[134] These Audit Rights to permit the Bank to inspect their accounts and other records relating to the bid submission arise out of provisions in the Standard Bidding Documents. Also refer to Paragraph 1.14(e) of Procurement Guidelines.

that Eskom and the GoSA have rights to pursue any F&C allegations or procurement-related complaints.[135] [136] However, as a measure of abundant caution, the Bank has also received an assurance from the GoSA and Eskom to cooperate with the Bank, based on South African law, in case the Bank is required to pursue F&C allegations or suspicion with regard to the procurement process of any of the contracts proposed for Bank financing. GoSA and Eskom have committed themselves to ensuring their full support to the Bank to investigate any issues as and if they arise. A legal covenant to this effect has been negotiated in the IBRD Guarantee and the IBRD Loan Agreement. Moreover, in the event the Bank finds any misrepresentation of information from Eskom it would have the right to cancel the loan disbursed for the contract.

31. Eskom has provided the Bank with a list of Contractors and Subcontractors for the contracts already awarded and are proposed for IBRD financing. The Bank will ensure that the firm chosen is not and was not at time of award or contract signing on: (a) the Bank's Debarred List of firms; or (b) Temporarily Suspended List of firms. Contracts awarded to firms debarred or suspended by the Bank or not including debarred or temporarily suspended subcontractors/subsuppliers will not be eligible for the Bank financing.

32. For the purposes of implementation of contracts, Eskom has established a procedure of checking new subcontractors/subsuppliers that may be proposed by the contractors after the date of the lists already delivered to the Bank to ensure that Eskom does not approve a debarred or temporarily suspended firm as a new subcontractor or subsupplier.

33. Conclusion: Based on the satisfactory completion of the above-mentioned review and due diligence including the benchmarking and compliance check to ensure that procurement of the contracts has met general principles of industry-wide standards of economy, efficiency and transparency for this scale and timing of procurement, and the incorporation of F&C and Audit Rights provisions in the contracts, Board approval is sought to finance the contracts for the Medupi Power Plant already awarded by Eskom under Component A using Eskom/GoSA procedures which are not fully consistent with Bank's Procurement Guidelines. The one-time exception is being sought for application of the Bank's Procurement Guidelines (not Consultant Guidelines) only for the Medupi Power Plant contracts (excluding Medupi future contracts) under Component A of the proposed project.

34. The alternative would be to seek rebidding of the identified and already procured contracts, which is not feasible; any rebidding of such contracts would result in major contractual consequences (penalties etc.) and lead to unacceptable delays. Rebidding of contracts which are yet to be awarded has serious consequences as well. Despite major contracts being awarded, the plant would not be able to reach commissioning without the goods and equipment yet to be awarded and therefore rebidding would result in a delay of at least 2 to 3 years in the commissioning schedule for the project. The Medupi Power Plant's generating capacity when commissioned will account for nearly 12.5 percent of the current generation capacity in South Africa. If the commissioning of the plant which is expected in August 2015 (all units) is delayed to 2018, it will have serious impacts on the South African economy and that of the subregion.

Remaining Procurements under Components A (Medupi Power Plant contracts and related Transmission Lines), Component B and Component C of the Project

35. Procurement for the supply&install and construction contracts for the Power Plant and associated transmission under Component A, as well as procurement for Components B and C, would

[135] Eskom does not register procurement process related complaints and provides such complaints to other GoSA agencies for further action.
[136] In this connection, a legal option from Eskom's independent counsel is a condition of effectiveness of the IBRD Loan.

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

36. Eskom will carry out procurement using the Bank's Standard Bidding Documents for all ICB and the Bank's Standard Request for Proposals for selection of consultants. For procurement of non-consulting services Eskom will use the Bank's sample Bidding Documents unless agreed otherwise.

37. 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.

38. Short lists of consultants for services estimated to cost less than US$500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

39. 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).

40. The CIDB registration process, which is independent from the bidding process is acceptable with the implementation of the agreed following 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; and (d) full and complete registration is neither a bid qualification criterion nor part of evaluation criteria for bids.

41. Eskom will inform potential bidders about the registration requirement in the General Procurement Notice (GPN) so that they can undertake registration much in advance of the specific procurement process.

42. 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.

43. Accelerated Shared Growth Initiative of South Africa (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[137] for advancement of previously disadvantaged persons or categories of persons. One of the objectives is to advance Black Economic Empowerment (BEE, BWO, LBS and SBE).[138] It is in this context that public agencies, including Eskom as a wholly state-owned enterprise, 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.

44. General Procurement Notice and the bidding documents would inform bidders to propose the local content with participation of BWO, LBS and/or SBE. Furthermore, the entire ASGI-SA framework and benchmarks, as well as the score-sheets for benchmarking, would all be designed ex ante in the bidding documents (based on Bank SBDs). Participation in ASGI-SA would not be a criterion for qualification or evaluation. The proposed solution put forward would offer bidders wishing to participate in the ASGI-SA initiative the following two incentives that would only apply post award: (a) marginally modified payments terms to release 5% of the Contract Price at an earlier stage; and (b) a lower percentage of the Performance Security at 5% of the contract price instead of the usual 10%. In this context, it is important to note that the experience of Eskom and GoSA with ASGI-SA is that ASGI-SA entails additional costs to bidders; these incentives (which are considered to be small) were originally introduced to cover these additional costs, e.g., the cost of skills development (which is one of the ASGI-SA elements) and equivalent to training provided within the scope of a contract.

45. The Bank has reviewed a set of bidding documents for supply and install single responsibility contract prepared by Eskom at the Bank's request which included the above methodology and based on the Bank's SBDs with changes as permitted by the Procurement Guidelines (paragraph 2.12). However, a change in contract terms post-award that provides an incentive through availability of more favorable contract payment terms, which would not be taken into account in the evaluation, but which potentially could affect equal opportunity of some bidders (local or foreign) is not contemplated in the Bank's Procurement Guidelines. However, it is the Bank's assessment that the risk of occurrence of such a scenario is low for the type (highly specialized engineering equipment) and size (US$ 20-50 million each) of contract packages, which the future procurement would comprise.

46. During project implementation, the Bank will exercise due diligence and monitor the agreed procedure to implement the scheme under Bank-financed contracts to ensure that it does not bias the procurement process in terms of pricing and participation of foreign bidders vis-à-vis local bidders, joint-ventures, and established foreign companies in South Africa.

47. Based on the above and the country-specific considerations noted previously, Board approval is being sought for the inclusion of the ASGI-SA related provisions as proposed by Eskom. The approved solution would be used in the procurement of goods, works, and supply & installation contracts.

48. Eskom also requires its bidders to disclose their level of BEE.

49. Remaining Procurements under Component A – Medupi Supply&Install and Associated Transmission Lines. Procurement for the remaining contracts (including associated transmission lines)

[137] With consideration of key values of fair, equitable, transparent, economic and cost-effective procurement system mandated by the South African Constitution, the Constitution provides for the public entities to use categories of preference, and protection or advancement of persons disadvantaged by unfair discrimination. This builds on the principles laid down in the preamble to recognize injustice of the past, honor those who suffered for justice and to make South Africa for all united in their diversity. This builds foundation for South African legislation on preferential policy allowing implementation of the preferential policy for the previously discriminated persons.

[138] BEE - black economic empowerment, BWO - Black Woman Owned Enterprises, LBS - Large Black Suppliers, SBE - Small Black Enterprises

under Component A is estimated to cost US593.03 million (excluding contingencies). There shall be multiple contracts procured using a one-stage procedure and the Bank's S&I SBDs.

Table 3: Medupi Power Plant – Supply & Install and Construction Contracts, where Procurement Process has not begun, excluding additional contingencies

Name of the Contract	Amount (US$ Millions)	Amount of proposed IBRD financing
Proposed to be Financed by IBRD, of which		
Ash Dump and Dams	221.61	221.61
Buildings	129.33	129.33
Associated Transmission Lines	242.09	242.09
Total	**593.03**	**593.03**

50. Component B.1 – Sere Wind Power Project. While there is adequate procurement capacity in Eskom for this sub-project, the technical team was earlier disbanded; and will be re-established soon. 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.

51. Component B.2 – Upington CSP Project. While there is adequate procurement capacity in Eskom for this sub-project, the technical team was earlier disbanded; and will be re-established soon. Unlike Sere, where the technology is better understood, Eskom has initiated a review of its CSP design in the context of global developments so as to ensure that optimal designs are used. Upon the completion of this review by international consultants, Eskom proposes to begin the procurement process for the project. Therefore, a detailed Procurement Plan for this sub-project has not been prepared. It is expected to be prepared in the second half of 2010 and agreed with the Bank. Given the innovative technology, Eskom may consider to procure the plant through the EPC or DBOT contract using a two-stage procedure.

52. Component C.1 – Majuba Rail Project. There is adequate capacity both for procurement and technical implementation of the project. The Majuba Rail Team has prepared the cost estimate with a detailed cost breakdown and the Procurement Plan. Procurement will include mostly works contracts and some S&I contracts which may use the S&I SBD either for the Plant and Equipment or for the Information Systems, whichever is deemed more appropriate. Procurement also includes contracts for non-consulting services which will be procured through ICB.

53. Component C.2 – Technical Assistance for Efficiency Improvements of the Coal Fleet. The technical assistance for coal-fired power plant efficiency improvements includes only consultancy contracts. One contract to be procured within the first 18 months of project implementation is included in the Procurement Plan. Future contracts will be planned and included in the revision of the Plan in due course.

54. Component C.3 – Technical Assistance for Implementation of the Upington CSP and for domestic and cross-border renewable energy projects. The technical assistance proposed in this subcomponent includes only consultancy contracts. Three contracts are to be procured within the first 18 months of Project implementation and are included in the Procurement Plan. Future contracts will be planned and included in the revision of the Plan in due course.

Procurement Risk Assessment

55. The key risk concerning the procurement already carried out is the Reputational risk emerging from a complaint from firm(s), which learn about Bank financing of the Medupi Power Plant contracts, and which may allege fraud and/or corruption or other issues not known to the Bank during its due diligence.

56. The procurement already carried out was subject to GoSA/Eskom procurement policies and procedures. In the event of a complaint as stated above for such contracts, any consequent misinterpretation of facts by Eskom, and/or establishment of fraud, corruption, etc., the Bank has the right not to finance the concerned contract(s) and cancel the amount allocated for such contract from the loan. If the amount would have already been disbursed, its reimbursement shall be requested. A legal covenant to this effect has been negotiated in the Loan Agreement.

57. 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 no 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) Delays may occur in commencing procurement and implementation of the Wind Farm and CSP projects due to delays in establishing the technical teams for the projects.

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) One set of the Bidding Documents has been submitted by Eskom to the Bank. These Bidding Documents, including the proposed provisions related to ASGI-SA have been reviewed and commented on by the Bank; and will be agreed with Eskom and shall serve as model documents for the remaining procurement.

(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) The Bank will conduct the Project Launch Workshop dedicated to the specific Project requirements and will advise Eskom on procurement (excluding its participation in the evaluation process).

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

(vi) 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.

58. The overall project risk for procurement is **Substantial** and the residual risk after consideration of the corrective measures is **Substantial**. The Bank will continue to closely monitor the implementation of the corrective measures, which will mitigate the identified risks, and the residual risk may be adjusted during Project implementation.

Procurement Plan

59. Eskom has developed an appropriate Procurement Plan for project implementation which provides the basis for the procurement methods. For each contract to be financed by IBRD loan, the different procurement methods or consultant selection 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.

60. The Procurement Plan will cover 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.

Procurement Methods

61. 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 consultants services

1	Goods	For contracts estimated to cost
a	International Competetive Bidding [ICB]	All
2	Works and Supply & Install	For contracts estimated to cost
a	International Competitive Bidding [ICB]	All
3	Non-consultants services	For contracts estimated to cost
a	International Competitive Bidding [ICB]	All

Contracts for consultants services:

4	Firms	For contracts estimated to cost
a	CQ	Less than US$100,000
b	Other methods	US$100,000 or more
No employment of individual consultants is envisaged		

62. Domestic preference shall be used in procurement of Goods contracts.

Prior review

63. For Component A – the Medupi Power Plant: The Bank carried out its due diligence to establish the eligibility of the contracts for Bank financing as concluded in Paragraph 31 above. However, the procurement process has not yet been completed for all contracts proposed for Bank financing and their eligibility for financing will be subject to the same due diligence.

64. For Component A Associated transmission lines, Components B and C: All contracts above the prior review thresholds noted below will be subject to the Bank's prior review as per Appendix 1 of the Bank'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

Prior review thresholds for contracts for consultants services:

5	Firms	Contracts estimated to cost US$1 million or more
6	Single source	All

65. 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.

66. 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

67. 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 will issue 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 INVESTMENT 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, albeit 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. In the short to medium- term, South Africa needs to deliver adequate power supply to continue meeting its poverty alleviation goals and economic development objectives. This assessment finds that it cannot meet national electricity use needs without addition of baseload capacity in the short-term, and that the most economically viable option is the development of the Medupi coal-fired project. Over the next 20 years, according to the LTMS, South Africa's GHG emissions are expected to increase by 500 million tons, and Medupi would account for 6.8 percent of this growth in CO2 emissions. Consistent with South Africa's objective of reducing the rate of growth, the project will adopt supercritical technology as an initial step in reducing the carbon intensity of the power sector.

3. In line with South Africa and Eskom's commitment to reduce GHG emissions, this operation also supports investments in two other components: (a) Renewable Power Plants - 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 LTMS; and (b) the Majuba Rail Project, which would not only reduce GHG emissions as a result of traffic transferring to the more fuel-efficient rail system, but also result in operating-cost savings for the traffic diverted to the new line. These projects would help South Africa start to reduce growth in emissions immediately and is also expected to play a catalytic role for the larger scale development of these technologies in the future.

4. The economic analysis has been carried out for all the three components separately, and for the project as a whole. The economic assessment for the Project covers the following main aspects:

- Assessment of whether additional baseload power is required and whether Medupi currently represents the least cost option to deliver the required power. If so, assessment of Medupi's economic net present value.

- Assessment 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).

- Assessment as to whether the Majuba railway project is economically viable (principally using analysis of economic rates of return from the project and economic net present value).

5. 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 present (subsidized) tariff, and just approved tariff with increases of 24.8% in FY11; 25.8% in FY12; and 25.9% in FY13. Tariff increases required in FY14-FY19 in order for the ERR to

equal the hurdle rate have also been calculated. Assessment of benefits at the tariff provides an estimate of the lower bound of WTP.[139]

6. If Medupi were a small project, and supplied only the first few kWh of this total expected increase in demand, then in an idealised 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 since Medupi is a large project, accounting for more than half the expected growth in demand, and since 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, use of the average WTP is appropriate and ensures a conservative result.

7. Based on the household electricity survey of rural South Africa,[140] average monthly household expenditure on electricity substitutes is 44 Rand/month.[141] According to the study, typical consumption of rural households once electrified is 85kWh/HH/month.[142] 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 17.54 US cents/kWh.

8. 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. DME used 11 percent in their 2003 integrated energy plan, but in the Long Term Mitigation Studies (LTMS) prepared for DME, 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 DME's 10 percent was appropriate for calculating levelized costs for the FIT").

9. 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 Medupi, this value is added as a cost of generating power. For each of the renewable energy projects and the railway project, this value is represented by the *avoided* cost due to displacement of CO_2 emissions (i.e. it is added as an economic benefit).

10. The economic value of CO_2 emissions: This analysis uses a figure of \$29/ton CO_2 which is based on the Stern review[143] (See Box presented later in the Annex). 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

[139] 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.
[140] Scottish Power PLC, Community Electricity in Rural South Africa: Renewable Energy Grid Assessment, 2005.
[141] 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.
[142] 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.
[143] Stern, Nicholas. 2007. *The economics of climate change: The Stern review.* Cambridge: Cambridge University Press.

from the Stern review[144], 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"[145].

Component A – Medupi Coal-fired Project

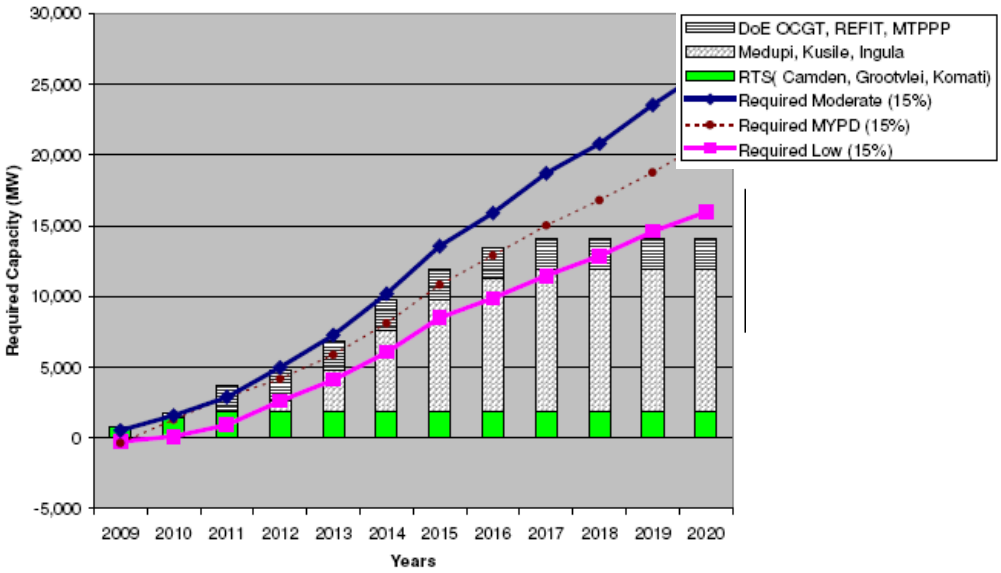
11. For the World Bank to support a conventional power generation project, two conditions must be fulfilled. First, the project must be shown to be in the least cost expansion plan. Second, the economic returns must exceed the opportunity cost of capital - such that the net present value (NPV) evaluated at the opportunity cost of capital is positive.

The Immediate Need for Baseload Power

12. South Africa and Eskom are committed to a long-term strategy that will begin to reduce GHG emissions after 2025 once a maturing nuclear program and increased reliance on renewables can account for a larger share of the generation mix. However, in the short and medium term, South Africa cannot afford not to expand its power supply if its poverty alleviation and economic development objectives are to be achieved, although it will seek to identify lower carbon options for doing so.

13. A first question is whether an expansion of baseload capacity could be avoided by DSM and improved energy efficiency for which there is considerable potential in South Africa. The load forecasting accordingly includes assumptions for a continuation of the downward trend in electricity intensity and an aggressive DSM program that by 2019 reduces the load by 15,562 GWh and 3,225 MW. However, the results of the economic analysis show that over the next decade there is no alternative to meet South Africa's power needs than to proceed with major additions to baseload capacity (see Figure 1). Even under the low demand forecast, about 15 GW of capacity is required. The expansion of baseload capacity cannot be avoided.

Figure 1: Medupi and load growth



Source: Department of Energy, IRP, November 2009.

[144] Stern, Nicholas. 2007. *The economics of climate change: The Stern review.* Cambridge: Cambridge University Press.
[145] 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".

Costing the Generation Alternatives to Medupi

14. The next question is which is the economically the cheapest source of baseload power. The Medupi Power Plant and the following options have been considered in the economic analysis as potentially suitable to provide baseload capacity to Eskom. These alternatives and their expected costs are discussed in detail from Paragraph 46 to Paragraph 66 later in this Annex.

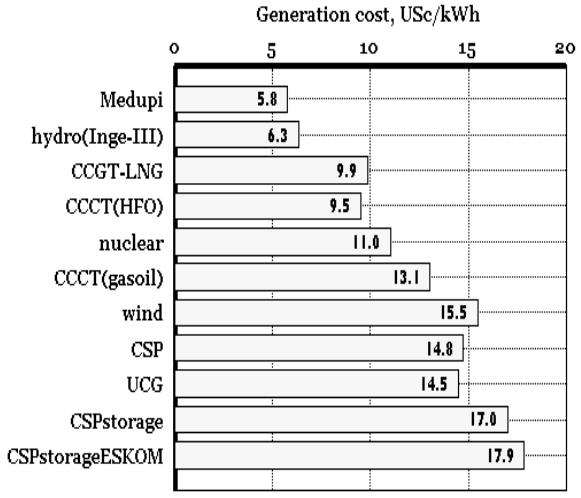
- Nuclear, sited on the coast in the Port Elizabeth and Capetown areas;
- Wind, sited on the West and East Coast areas;
- Open cycle combustion turbine (sited at load centres and therefore without transmission penalty);
- Combined cycle fuelled by imported LNG (coastal location); Combined cycle fuelled by HFO; Coastal combined cycle fuelled by gasoil;
- CSP, sited in the Northern Cape and Northwest. Two variants of this technology are considered, namely with and without molten salt storage;
- Underground coal gasification projects; and
- Large hydro, for which the only project of sufficient scale to be considered as even a (partial) alternative is the Inga -III project in the Democratic Republic of Congo (DRC).

15. Comparison of Alternatives: Three main attributes that require consideration in the assessment of alternatives to Medupi are:

- the economic cost, expressed as $/kWh or as the NPV of lifetime costs to supply the energy provided by Medupi;
- the total financing requirement, in $US billion; and
- the undiscounted lifetime GHG emissions, in million tons over the assumed 30-year economic life.

16. Figure 2 compares the economic production cost of Medupi (5.8 cents/kWh) with its alternatives, which range from 6.3 UScents/kWh (Inga-III) to 17.9 UScents/kWh (CSP with Storage). It is clear that Medupi is the least cost generation option for Eskom. Inga III is the second best alternative; although the delivered cost appears competitive, the uncertainties – geopolitical, financial and technical – are formidable, and even under optimistic conditions the time frame for significant power flows to be available to Eskom is 2022 at the earliest.

Figure 2: Levelized Economic Costs of Energy



Incorporating Carbon Shadow Prices in Economic Least Cost Analysis

17. The trade-off between Medupi and its alternatives can also be captured by calculation of the carbon shadow prices. This is the value of CO_2 that would make the alternatives equal based on total economic costs.

18. Table 1 provides an overview of the carbon shadow prices for specific alternatives. The table shows that the carbon shadow prices for the Medupi alternatives are high i.e. a high carbon price would be required in order for the alternatives to exhibit the same level of viability as Medupi (far in excess of current carbon market prices[146]). The only exception is Inga-III hydropower plant in DRC. As an illustration, in 2008, the average carbon price was $16.8/ton in the primary CDM market, and $29.7/ton in the EUETS:[147] these values have fallen since then to around $12-15/ton.

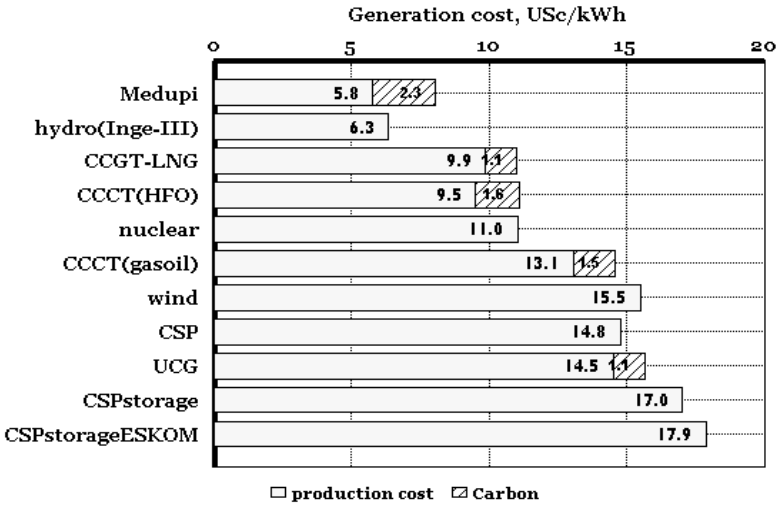
Table 1: Carbon Shadow Prices, US$/ton

Alternative Projects	**Production Cost** *[US cents/kWh]*	**Carbon Shadow Price** *$/ton$CO_2$*	**Lifetime CO_2 Emissions** *[millionTonsCO2]*	**Capital Costs** *$/kW*
Medupi	5.8	0	769	2,253
Hydro (Inga-III)	6.3	7	0	2,621
CCCT(HFO)	9.9	156	534	1,218
CCGT-LNG	9.5	105	387	965
Nuclear	11.0	67	0	4,996
CCCT(gasoil)	13.1	275	511	850
UCG	14.5	223	508	2,370
CSP, 25% LF	14.8	115	0	2,225
Wind	15.5	124	0	1,777
CSP storage, 40% LF	17.0	143	0	4,100
CSP storage (Upington)[148]	17.9	155	0	6,466

19. Figure 3 shows the production costs plus the cost of CO_2 valued at $29/ton.[149] Only Inga-III (6.3UScents/kWh) has a total cost lower than Medupi (8.9 UScents/kWh).

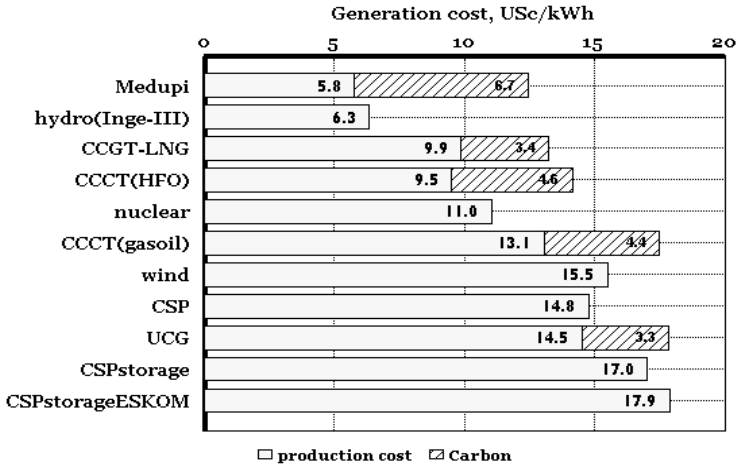
[146] By way of comparison, the carbon shadow prices for the CSP alternatives examined in the Botswana Morupule B project are $112/$CO_2$ for CSP with no storage, and $69/ton$CO_2$ with storage.
[147] Source: World Bank, State and Trends of the Carbon Market, reports for 2006, 2007, 2008 and 2009.
[148] These assumptions are for a full scale commercial project, as given in the Eskom ISEP-12 database for a 1000 MW project. This has lower costs than the CSP project component described below. The assumptions for CSP (25 percent load factor) and CSP (40 percent load factor) are based on the international literature, as described above.
[149] $29/ton is the lower end of the range of the estimate of the social cost of carbon in the Stern Review. These are discussed in Section 5 (and see Box 2 for a brief review of the literature on this subject).

Figure 3: Economic production costs plus $29/ton



20. Figure 4 draws a similar comparison, but with a social cost of CO_2 valued at US$85/ton (which is the upper end of the damage valuation in the Stern Review). Only nuclear (and Inga-III) has lower costs than Medupi, thus clearly denoting that the proposed Medupi Power Plant is the least cost alternative available to South Africa for development.

Figure 4: Economic Production Costs plus $85/ton CO_2



21. Incremental Carbon Financing Requirements: While the carbon shadow price conveys a relative measure of GHG efficiency of the alternatives, a more practical measure of the incremental costs of GHG emission-free alternatives is the amount of finance required to cover the additional up-front investment (through carbon financing or any other means of subsidized funding). Table 2 shows these requirements for alternatives when compared to the Medupi Power Plant.

Table 2: Incremental Finance Requirements
(project scaled in size to deliver the same energy output as Medupi)

	Total Estimated Financial Cost *US$ billion*	**Incremental Finance Requirement** *US$ billion*
Combined Cycle Gas Turbine (CCGT) LNG	5.5	-9.3
CCCT (gasoil)	5.5	-9.3
CCCT (HFO)	6.4	-8.5
Hydro(Inga-III)	10.1	-4.7
Underground Coal Gasification	13.0	-1.9
Medupi	**14.8**	
Nuclear	34.4	19.6
Wind	***35.4***	***20.5***
CSP	***40.2***	***25.4***
CSP storage (Eskom proposed)	48.7	33.9

Conclusions from Economic Assessment

22. Renewable energy alternatives to Medupi score best on the GHG emission attribute, but have significantly higher financing requirements, which far exceed what can reasonably be expected from the presently available carbon financing sources[150].

23. Fossil energy alternatives such as LNG and liquid fuelled CCCTs have lower financing requirements, and somewhat lower GHG emissions, but have significantly higher fuel costs. South Africa's coal reserves of the low quality proposed for powering Medupi have a low economic cost – and the use of imported fossil fuels incurs large economic penalties for South Africa.

24. The baseline economic rate of return (ERR) of the Medupi coal project is 24.0 percent, with an NPV (at 10 percent discount rate) of US$15.72 billion.

25. The ERR at the existing average tariff (4 UScents/kWh) is negative, which points to the importance of raising electricity tariffs. Under the tariff increases just approved by the regulator (24.8% in FY11; 25.8% in FY12; and 25.9% in FY13 (nominal) - and no increases in real terms thereafter), the ERR increases to 2.47%. Based on a tariff scenario which assumes a 12.5% increase in FY14 and FY15, and one percent above inflation thereafter, ERR increases to 8.13% (at which point the tariff is 8.9 UScents/kWh). This result is the lower bound of economic returns given the consideration that the consumer group with the lowest WTP is large industry (which in the absence of the power provided by Medupi would use captive generation based on fueloil), and which has a WTP of around 12 .7 UScents/kWh, thus demonstrating that this is the lower bound. The switching value of the tariff increase required in FY14-FY19 is 5.4% (excluding inflation) per annum.

26. Incorporating GHG emission damage costs: Once Medupi is at full output, its gross GHG emissions are some 33.8 million tons per year. Over the next 20 years, South Africa's GHG emissions

[150] Wind and CSP would require about US$20-25 billion of additional carbon finance, 30-40 times the financing provided by CTF and IBRD for the wind and CSP components of the proposed project. This level of carbon finance is simply not available to South Africa in the current financial markets. Whether a wind farm (or farms) of the size envisaged is a realistic proposition in this time frame is unclear. As of December 2008, the total global installed capacity was 104,100 MW, with 2008 additions of 23,766 MW (Global Wind Energy Council, Global Wind 2008 Report) of which the largest country share was the USA, with 8,358 MW, followed by China with 6,300 MW. The largest wind farm in the world is reported to be the 732 MW Horse Hollow wind farm in Texas, spread across 47,000 acres of Taylor and Nolan counties.

are expected to increase from around 500 million tons CO_2 to 1,000 million tons, an increase of 500million tons.[151] Medupi will thus account for 6.8 percent of this growth in CO_2 emissions.

27. However, if Medupi were not constructed, it does not follow that emissions would be 30 million tons per year less. Two counterfactuals could be hypothesized. The first, consistent with the methodology for estimating WTP, is that in the absence of grid-connected electricity consumers would use diesel self generation (in the non-domestic sectors), and candles, kerosene and dry cells for the domestic sector. These alternatives are not free of GHG emissions. Indeed, generation in diesels have typical emission coefficients of 710-740 gm/kWh for gasoil, and 650-700gm/kWh for larger captive units using heavy fuels. Emissions from coal combustion at a highly efficient supercritical plant are on the order of 900gm/kWh (gross), resulting in *net* GHG emissions of 12.8 million tons/year(at full output).[152]

28. In this scenario, the ERR decreases from 24 percent to 21.9 percent when the net increase in GHG emissions is taken into consideration, and when CO_2 is valued at US\$29/tonCO_2 (based on the Stern Review, and also equal to the 2008 EU ETS price). However, US\$29/tonCO_2 is significantly higher than the 2008 CDM market price (US\$16.8/ton in the primary CDM market), though lower than the Stern Review upper estimate of US\$85/ton CO_2.

29. In the second counterfactual, Medupi would simply be replaced by the next best alternative, which is LNG in combined cycle. This would reduce the GHG emissions of the counterfactual to around 0.5 kg CO_2 /kWh associated with high efficiency gas combined cycle plant – in which case the net CO_2 emissions increase to 16.7 million tons/year at full output. This reduces the ERR to a somewhat lower 21.5 percent.[153]

30. If the US\$ 29/ton CO_2 were levied as a tax on *gross* emissions, and recovered by Eskom as a consumer surcharge, the average consumer tariff would increase 36 percent. If the tax were levied only on net emissions (i.e. less the tax as might be imposed on petroleum products used in the absence of grid electricity), then the consumer tariff increase is only 10 percent.[154]

[151] Source: Thapelo Letete, Mondli Guma and Andrew Marquard, *Information on Climate Change in South Africa: Greenhouse gas emissions and Mitigation Options*, Energy Research Centre, University of Capetown.

[152] When one takes into account T&D losses (which are avoided in captive self-generation), the emissions from coal would be 10 percent higher.

[153] The detailed analysis has also assessed Medupi's gross Nitrous oxide (N_2O) emissions. Though emitted in small amounts as a combustion product, N_2O is of concern because of its high global warming potential of 310. The calculations show that the CO_2 equivalent is only 0.4 percent of the CO_2 emissions from combustion: N_2O emissions have therefore been ignored in the assessment of GHG impacts.

[154] This calculation does not take into account the price elasticity of demand – a subject recently examined by the University of Pretoria in connection with a proposed levy of 2 Rand Cents/kWh as a way of funding the REFIT (Reyno Seymore *et al*. *The impact of an electricity generation tax on the economy of South Africa*, University of Pretoria Economics Department Working paper, August 2009.) A 10 percent increase in electricity price was found to reduce total electricity demand by 10 percent, accompanied by a GDP contraction of 0.28 percent.

Box 1: The Social Cost of Carbon

The research on the social cost of carbon is large and growing; with a large range 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, [155] 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.[156]

The $29/ton CO_2 used in this analysis of Medupi is based on the Stern Review, 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*"

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 exceeds $50/ton of Carbon (US$14 ton CO_2) and are likely to be substantially lower than that*"

31. CO_2 Emissions – Medupi v/s the GoSA's DSM and REFIT Programs: The net GHG emissions of Medupi must be placed in the context of the Government's overall program to achieve a lower-carbon expansion path. Analysis was conducted to compare the net emissions of the DSM program, the Renewable energy target under the REFIT program, and Medupi power project. To carry out a conservative assessment, it is assumed that the 10,000 GWh RE target is reached four years later – in 2017 and that the Medupi is replacing gas-fired (LNG) generation. As shown in Table 3, CO_2 emission savings from the GoSA DSM program and the REFIT renewable energy program exceed the incremental emissions from the Medupi Power Plant for life of the Coal-fired Power Plant.

Table 3: CO_2 Emissions – Medupi Power Plant v/s GoSA REFIT & DSM Programs

	DSM program		**Renewable energy program (REFIT)**			**Medupi**	**Net impact [5]-[6]**
	energy	*avoided CO_2 emissons*	*energy*	*avoided CO_2 emissions*	*total [2]+[4]*	*netCO_2 emissions*	*netCO_2 emissions*
	(GWh)	(mtpy)	(GWh)	(mtpy)	(mtpy)	(mtpy)	(mtpy)
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
2009	428	0.4	0	0.00	0.4		0.4
2010	662	0.7	500	0.52	1.2		1.2
2011	1,156	1.2	1,000	1.03	2.2		2.2
2012	3,058	3.1	2,000	2.06	5.2	2.4	2.8
2013	5,291	5.4	4,000	4.12	9.6	7.2	2.4
2014	7,140	7.4	6,000	6.18	13.5	11.5	2.0
2015	8,782	9.0	8,000	8.24	17.3	15.6	1.7
2016	10,477	10.8	9,000	9.27	20.1	16.7	3.3
2017	12,172	12.5	10,000	10.30	22.8	16.7	6.1
2018	13,867	14.3	10,000	10.30	24.6	16.7	7.9
2019	15,562	16.0	10,000	10.30	26.3	16.7	9.6

32. Incorporating GHG emission damage costs: When life cycle (non-combustion) GHG emissions form Medupi are taken into account the ERR falls slightly. As discussed in the detailed economic analysis report, life cycle emissions add 40.6 grams/kWh to the gross emissions of Medupi: in consequence, the ERR decreases from 21.5% to 21.3% (see Table 4).

Table 4: Impact of Life-cycle Emissions on ERR

	ERR
Baseline ERR	24.0%
adjusted for combustion GHG emissions at $28/ton CO_2	21.5%
adjusted for life cycle emissions at $29/ton CO_2	21.3%

[155] R. Tol, "The marginal damage costs of carbon dioxide emissions: An Assessment of the Uncertainties," *Energy Policy*, 33, 2064-2074.
[156] R. Tol, "The social cost of carbon: trends, outliers and Catastrophes," *Economics e-Journal*, 2008-25.

33. However, there are some significant differences in carbon shadow prices when life-cycle emissions are included, as shown in Table 5. Where the additional non-combustion emissions of Medupi coal are greater than those of the alternative (e.g. for wind), the shadow price decreases; where they are less than the alternative (as for LNG), the shadow price increases. Indeed, the biggest change is for the LNG alternative, with an increase from 105$/ton CO_2 to 135$/ton CO_2.

Table 5: Impact of Life-cycle Emissions on Carbon Shadow prices, US$/ton of CO_2

	Combustion only	Life-cycle	Change
Hydro(Inge-III)	7	6	-1
CCCT(HFO)	156	150	-10
CCGT-LNG	105	135	+30
Nuclear	67	63	-4
CCCT(gasoil)	275	274	-1
UCG	223	223	0
CSP	115	109	-6
Wind	124	118	-6
CSP storage	143	136	-7
CSP storage (Upington)	155	147	-7

34. Risk Assessment and Sensitivity/Scenario Analysis: The main risk factors for the Medupi project are as follows:

- Construction cost increases (whether due to cost overruns and construction problems, or an escalation of costs due to increasing world commodity prices or to full order books of equipment manufacturers).
- Increases in the relative price of coal to oil (as might be the case if strong demand for coal in the South African economy increases the local price to above the netback cost based on international prices).
- A decrease in the world oil price (which would decrease consumer's willingness to pay which is based on the cost of petroleum products for self generation, or for household use of kerosene for lighting).
- Less than expected demand for electricity (though Medupi will be one of Eskom's most efficient plants, lower electricity demand may cause it to be dispatched less than expected).
- Lower than expected plant performance (lower heat rate than expected, higher O&M costs).
- Shorter plant life than expected (currently at least 50 years, with several major refurbishments planned at regular intervals).
- Much higher opportunity cost of consumptive water use.
- A higher carbon price than the $29/ton CO_2 assumed in the baseline estimate.

35. Each of these risk factors has been evaluated in a detailed sensitivity analysis, the results of which are summarized in Table 6.

Table 6: Summary of Switching Values

Risk factor	Units	Baseline Assumption	Switching Value at which NVP = 0	Assessment of Risk
Construction cost increase	$/kW	2,203	6,131	very low
World oil price (no change in Medupi coal price)	$US/bbl	75	17	very low
Consumer WTP	UScents/kWh	17.5	10	low

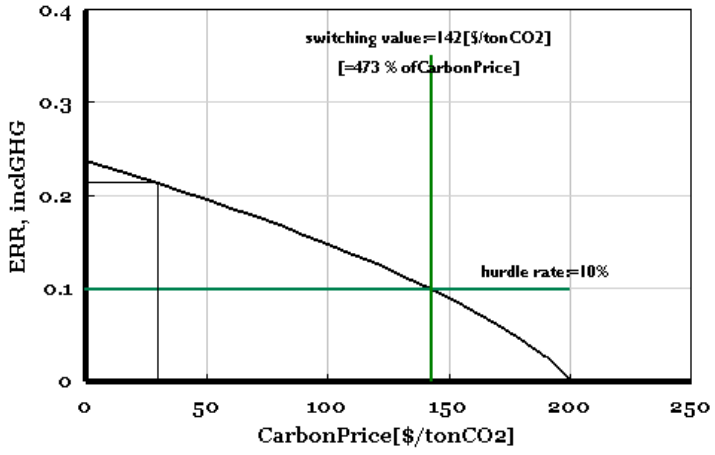
Risk factor	Units	Baseline Assumption	Switching Value at which NVP = 0	Assessment of Risk
Value of Medupi coal	US$/ton	31.9	155	extremely low
Lower than expected plant efficiency (net)	[%]	37.5%	0.08	extremely low
Average annual plant factor (first year)	[%]	90%	39%	extremely low
Opportunity cost of water	Rand/m3	20	>200	extremely low
Plant life	years	50	5	extremely low

36. The main conclusions of the sensitivity analysis are as follows:

- *Opportunity cost of water*: Water is a resource in critical supply in South Africa, and clearly the present financial price (less than 1 Rand/1000 litres) does not reflect the opportunity cost. Even the expected increase to 20 Rand/1000litres may not reflect the economic value. Even a ten-fold increase in the economic value little affects the economic returns – which is the reason Eskom's decision to use dry cooling for its power stations is well regarded.
- *Plant life*: The hurdle rate is achieved after five years of operation, and 20 percent return is reached by 2022. Thereafter the returns increase only very slowly, and any extension of plant life beyond 30 years has little further impact on the ERR.
- *Fuel (Coal) prices for the Power Plant:* At constant world oil prices (and hence the level of benefits constant), and allowing the Medupi coal price to vary, the switching value is calculated at US$ 155/ton, which is 5 times the baseline value of US$ 31.9/ton. While such very high coal prices were observed at the peak of the commodities boom in 2008, they were accompanied by a corresponding increase in the world oil price, and hence in the consumer WTP. This level of coal price in South Africa, without a corresponding surge in oil price (and indeed of related fuels such as LNG, were the alternative to Medupi cast as LNG-fuelled CCGT), is not expected.
- *Plant efficiency*: Including the damage cost of carbon at the high estimate in the Stern Review ($ 85/tonCO_2), the switching value of 15 percent plant efficiency is still low. Lower than expected plant efficiency in no way threatens the economic returns, even at high valuations of GHG damage costs.

37. Sensitivity to the carbon price: When GHG damage costs are included in the analysis, the sensitivity analysis of economic returns against the carbon price reveals the carbon shadow price at US$ 142/ton, as shown in Figure 5. This is almost twice the higher estimate in the Stern Review of $85/to CO_2.

Figure 5: Sensitivity of Economic Returns of Medupi Power Project to Carbon Prices



38. Scenario assessment: While the sensitivity analysis and switching values reveal the sensitivity of individual assumptions on the economic returns, the robustness of the choice of the Medupi Power Plant is further illustrated by a scenario analysis, in which alternatives to the baseline assumptions above have been identified with the intent of examining combinations of outcomes that lead to both more, and less favorable outcomes for the project investments. In the pessimistic scenario assumptions have been made that tend to lower economic returns, to answer the question of whether the Medupi coal project is still warranted under worst case conditions. Table 7 summarizes key assumptions for each of the scenarios. The drivers of the two scenarios are as follows:

- *Optimistic scenario*: robust global economic growth leading to increasing world oil and commodity prices, and hence higher costs of coal (and also a higher WTP as oil prices increase). Construction cost overruns are also likely in this scenario as equipment prices increase in a seller's market when order books are full, and steel and copper prices are high.
- *Pessimistic scenario*: lower economic growth, high damage costs to South Africa from climate change leading to less than expected electricity demand growth, and increasing water shortages. This is coupled with disappointing project performance – less than expected efficiency, construction cost overruns.

Table 7: Assumptions for Scenario Analysis

Assumptions	Units	Pessimistic Scenrio	Baseline	Optimistic Scenario
		(High damage costs of climate change to South Africa)		(High World Economic Growth)
World Oil Price	$/bbl	50	75	125
Coal Price (fob Newcastle, relative to world oil price on a BTU basis)	[ ]	.25	.25	.35
Construction costs		10% cost overrun	baseline	15% cost increase
Carbon price	$/ton	60	29	20
Average willingness-to-pay	US cents/kWh	14.0	17.5	24.0
Plant efficiency (net)	[ ]	0.35	0.375	0.375
Opportunity cost of consumptive water use	Rand/m3	60	20	60
Plant factor	[%]	80% falling to 70%	90% falling to 80%	90% falling to 80%

39. When the world oil price surges, experience shows that not only does the coal price also rise; its relative price rises as well. Thus, during the oil price boom of 2007-2008, the relative coal price increased from its long-term average of about 25 percent of the oil price to over 35 percent.

40. Average consumer willingness to pay is correlated with the world oil price: when that is low ($50/bbl), diesel oil prices also fall and hence the decrease from 17.5 US cents/kWh to 14 US cents/kWh.

41. Construction costs increase in both the pessimistic and optimistic cases. In the former case, the increase would be attributable to project implementation problems and delays. In the optimistic case, which hypothesizes a resumption of strong world economic growth over the next two decades, the

construction cost increase is attributable to escalating world steel (and commodity prices), and full order books for global equipment manufacturers leading to a seller's market for power generation equipment (much as occurred in 2005-2007 prior to the global financial crisis).

42. In the case of the opportunity cost of water, it is assumed that in a booming world and South African economy, water demands will increase, and thus a tripling of the opportunity cost is assumed. Such an increase is equally likely in a pessimistic scenario, where we hypothesizes high damage costs from major climate change, which will doubtless include further pressure on water resources.

43. Similarly, in the pessimistic scenario, electricity demand assumed to fall, with a lesser probability of high levels of dispatch at Medupi.

44. The results of this scenario analysis are shown in Table 8. As expected, the downside risk exceeds the upside risk. However, even under the worst case scenario (low world oil price, construction cost overruns, and low consumer willingness to pay), the ERR falls from 23.9 percent to 16.0 percent, and when higher GHG damages are included in the pessimistic case, the ERR falls to 10.6 percent; slightly above the 10 percent hurdle/discount rate.

Table 8: Medupi Power Plant: Economics – Scenario Analysis

	Pessimistic	**Baseline**	**Optimistic scenario**
ERR	16.0%	24.0%	25.8%
ERR including GHG damage costs	10.6%	21.5%	23.9%

45. Based on the above analysis, it is concluded that Medupi Power plant is economically viable, and has high economic returns and that the returns are robust to wide ranges of uncertainty in assumptions. As explained above, the hydro and nuclear options are also part of Eskom's expansion plans, and are complements rather than substitutes for Medupi.

Costing Assumptions used in the Economic Assessment for the Medupi Power Plant and Alternatives

46. The following summarizes the main assumptions for the baseline evaluation of Medupi:

- *Installed capacity:* 6 x 795 MW gross, 6 x 764 MW net. Auxiliary consumption 3.9 percent. Auxiliary consumption increases to 5.4 percent once the FGD units are in place, with corresponding reduction in net output.
- *FGD system*: Cost based on 150$/kW. First unit commences in mid 2008 and completed in 6 months: subsequent units at 6 monthly intervals.
- *Phasing of construction costs*: Consistent with the phasing used in the financial analysis, 32 percent, 51 percent, 12 percent and 5 percent in 2010, 2011, 2012 and 2013, respectively.
- *Plant factor*: The average plant factor in the Eskom fleet is 85 percent. The first year plant factor is assumed at 90 percent, declining to 80 percent over the plant lifetime. As a supercritical plant, Medupi will be at the top of the merit order, and likely to be dispatched to the maximum availability.
- *Consumptive water use:* With the FGD units in place, water consumption is 12 million m^3 per year.
- *Value of water*: the present (financial) price is 30Randcents/ m^3. The full cost of water once the new scheme is completed is expected to rise to 20 Rand/m^3, which is taken as the economic cost for the entire planning horizon.

47. Large Hydro (Inga III): The only hydro project conceivably of a scale to be considered as a near-term alternative to Medupi is the 4,350 MW Inga III project in the DRC. This is a further

development of the hydro development of the lower Congo river: Inga I (351 MW, commissioned in 1972), and Inga II (1,424 MW, commissioned in 1983).[157] The Inga III project has many variants, particularly with regard to the allocation of its output to other countries in the region. Total project costs have been estimated at $6.2 billion or $8.7 billion when financial costs and IDC are included. In addition, extensive HVDC infrastructure will be required to bring power to South Africa. Several proposed corridors have been proposed for this, the final choice being dependent upon the extent of off-take by other countries en route.

48. If one allocates costs to South Africa on the basis of gross MW, then its 2,350 MW share would account for 57 percent of the generating plant cost, $3.5billion ($6.2billion x 0.57= $3.5 billion). WESTCOR's[158] share of the transmission system capital expenditure has been estimated at $2.66 billion, so the total capital expenditure (before financial costs), allocable to South Africa, is taken as $6.16 billion. Given the very long distances involved (3,000 km), transmission losses will be high: the total expected overnight capital-cost/kW (net) is $3,277/kW.

49. The annual capacity factor will be high because of the downstream location of Inga-III, with large flows available even during the dry season. The annual energy estimated is 30,152GWh/year for the 16 x 270 MW=4,320 MW variant, equivalent to 80 percent. Assuming WESTCOR's share of generation at 57 percent of the total, the net delivery at the Eskom connection point would be 13,749GWh/year, so on a net received basis (1,880 MW net) the annual plant factor is 83 percent. This is less than 50 percent of the energy delivered by Medupi.

50. Though the delivered cost appears competitive based on these assumptions, the uncertainties - geopolitical, financial and technical - are formidable, and even under optimistic conditions the time frame for significant power flows to be available to Eskom is 2022 at the earliest.

51. Liquefied Natural Gas (LNG): Combined-cycle fuelled by LNG is the obvious fossil generation alternative to Medupi coal, since it has both lower capital investment cost for power generation, and lower GHG emission per net kWh due to its high thermal efficiency. However, there is a significant capital investment cost associated with the required LNG terminal/regasification facility. Of necessity, such an alternative would require a coastal location, since there are significant cost penalties if the power plant is not adjacent to the regasification facility. A coastal location would also avoid any costs of consumptive freshwater use for the steam cycle.

52. LNG terminals are expensive, though the scale of LNG imports for a 5,160 MW project brings the necessary throughput to exploit scale economies: at 75 percent load factor, the LNG project would require imports of 4.86 million tons per annum (mtpa). While the costs of terminal and regasification facilities has declined somewhat over the past decade, recent studies of LNG terminal costs for Singapore (with an expected 2018 throughput of 6 mtpa) are in excess of $US1 billion.[159] For 4.86 mtpa we assume a capital-cost of $900 million.

53. The assumption for capital-cost of CCCT is 11,377 Rand/kW, or $1,422/kW (net) in Eskom generation plan (ISEP 12) and the DoE's IRP. This is somewhat higher than some other recent estimates for CCGT in the Asia-Pacific area: the average of four recent estimates is $961/kW (gross, ISO).[160] At the expected average annual ambient operating temperature for South African coastal

[157] There is also the possibility of a 43,000 MW "Grand Inga" project, but its realization is almost certainly not possible before 2030, and faces even greater geopolitical hurdles (with a northern offtake to reach Cairo) than Inga-III.
[158] WESTCOR is a joint venture that will build, own and operate the infrastructure of the western transmission corridor.
[159] Singapore Energy Market Authority, *Initial Findings and views on the import of LNG into Singapore*, October 2005.
[160] KEMA, *LRMC of CCGT generation in Singapore for technical parameters used for setting the vesting price for the period 1 January 2009 – 31 December 2010*, Report of the Energy Market Authority of Singapore, June 2009 estimates 969$/kW(n); Vietnam: Institute of Energy, Hanoi, *India for Non Trach 1 is 902$/kW(n), for Non Trach II, 1008/kW(n);* URS, *Study of Equipment Prices in the Energy Sector*, Report to the World Bank, 2008 estimates 1212$/kW(n).

locations of 20^0C, the capacity reduction relative to ISO conditions is only 2 percent, so assuming 4 percent auxiliary consumption, $961/kW (ISO) converts to $1,023/kW (net).

54. CCCT using heavy fuel oil: CCCTs running on heavy fuel oil may be unusual, but with heavy fuel oil costing significantly less than auto diesel,[161] the fuel costs outweigh the operating-cost penalties associated with the need to frequently wash the turbine blades. With a forced outage rate of 8 percent, the maximum availability is 76.6 percent. This alternative can be assumed to operate as a baseload project with 75 percent annual load factor.

55. Nuclear: The capital-cost assumptions of Eskom's ISEP-12 study are between 4,966$/kw and 6,797$/kW (overnight costs), and $6,625-10,518/kW for completed financial cost. Such wide variation in capital-cost estimates reflects similar ranges in the international literature. The 2009 update to the MIT nuclear study[162] estimates overnight costs at $4,000/kW, but when interest during construction (IDC) is added, the cost increases to $5,600. Late 2008 cost estimates for US utilities are $4,924/kW (Duke Energy, overnight) to TVA Bellafonte ($7,833/kW, including financial costs).[163] Reported costs for Chinese nuclear plants are much lower, in the range of $1,400-1,800/kW for overnight costs for the nuclear EPC (i.e. without site costs, cooling system etc).

56. No less uncertain are the costs of design concepts (small unit size reactors in the 250-500 MW size range, advanced breeder reactors, etc.) under development in many countries, but none of which are yet commercially available. The track record of capital-cost overruns in the nuclear industry is very poor, in part because of lengthy construction delays (notably in the US).

57. Wind: Wind sites have been categorized by DME into 7 classes,[164] with wind speeds ranging from 5.5-6.0 m/s (class 7), with load factors of 17 percent, to Class 1 sites with average annual wind speeds in excess of 8.5 m/s and estimated achievable load factors of 38 percent (Table 9). However, although the resource potential is large (in excess of 64,000 GWh), none are financially feasible without additional financial support,[165] and even the Class 1 wind sites only enter into the aggregate supply curve in the last 1,000 GWh of the 10,000 GWh total renewable energy target set for REMT.

Table 9: Wind Power Survey Results

	Wind speed (m/s)	Expected Annual Load Factor	GWh	R/kWh	MW
Class 1	>8.5	0.37	63	0.38	19
Class 2	8.0-8.5	0.35	78	0.40	25
Class 3	7.5-8.0	0.31	167	0.45	61
Class 4	7.0-7.5	0.27	5,109	0.51	2,160
Class 5	6.5-7.0	0.24	24,841	0.58	11,816
Class 6	6.0-6.5	0.2	31,139	0.70	17,773
Class 7	5.5-6.0	0.17	2,705	0.82	1,816
Total			**64,102**		

Source: REMT, *op.cit*. Table 4.19

58. In order to produce the same annual net energy as Medupi, 32,676 GWh (at an 85 percent annual average load factor) most of the available energy would be in class 5 sites, where load factors are 24 percent: with 0.5 percent own use, the wind farm would need to produce gross energy of

[161] At 75$/bbl for crude oil, HFO is 60$/bbl, while auto diesel (gasoil) is $90/bbl.
[162] MIT, *2009 Update of the 2003 Report Future of Nuclear Power*, Cambridge, Mass., 2009
[163] World Nuclear Association, *The Economics of Nuclear Power*, November 2008.
[164] Department of Minerals and Energy, 2002. White Paper on the Promotion of Renewable Energy and Clean Energy Development.
[165] On March 31 2009, South Africa introduced a feed-in tariff for wind projects, 1.25 Rand/kWh, or 15.6UScents /kWh.

32,840GWh, requiring an installed capacity of 15,310 MW at an average annual load factor of 24.5 percent

59. According to the 2008 annual survey in *Wind Power Monthly*, in 2008 the average investment cost for wind projects was 1300-1700 Euro/kW.[166] The average equipment price is reported as 1100 Euro/kW, and balance of project costs are 200-600 Euro/kW. Assuming South African site costs at 300 Euro/kW, capital-costs are taken as 1400Euro/kW, or $2,030/kW. Assuming own use of 0.5percent, the (overnight) capital-cost is $2,050/kW (net).

60. A major issue for wind projects is the extent to which they generate capacity benefits. Being non-dispatchable, and with extended periods when wind speeds are below minimum cut-in speeds, wind must be supplemented with standby capacity to cover these intervals in order to be considered equivalent to a fossil-fueled baseload plant. If one sets the capacity credit equal to the annual load factor (divided by the annual load factor of dispatchable baseload plants), a 1,000 MW wind farm at the 24 percent annual load factor has a capacity credit of about 320 MW, implying that an additional 680 MW of open cycle combustion turbine capacity must be available to the system. This technology has the lowest cost per MW, and is generally used as a proxy for the pure cost of capacity. Therefore, assuming an OCCT cost of $500/kW, every kW of wind capacity requires a further 0.68 KW of open cycle capacity, or 0.68 x 500 = $340/kW, for a total capacity cost of wind power of $2,370/kW.

61. Concentrating solar power (CSP): The Northern Cape area of South Africa (together with neighbouring areas in Namibia and Botswana) has one of the highest solar energy potentials in the world: the Uppington CSP site has radiation levels equivalent to 8.17kWh/m2/day (2,980kWh /m2/year). By way of comparison, North Africa has potential of 1,825-2,550 kWh/m2/day, and the White river valley, Nevada (USA) 2,300-2,700 kWh/m2/year.

62. Reliable cost estimates for CSP are scarce, and span wide ranges of costs and capacity factor assumptions. The Bank's Clean Technology Fund concept note for CSP scale up in North Africa estimates capital-costs between $4,000 and $6,000 per kW for a typical capacity factor of 22-24 percent (without storage),[167],[168] An earlier ESMAP assessment (with costs at 2004 price levels) estimates a 54 percent capacity factor for CSP with storage at $4,780/kW, or $2,450/kW for a 20 percent capacity factor without storage; in other words the addition of storage doubles the capital-cost.[169] Eskom and DoE IRP overnight capital-cost estimate for a 1,000 MW CSP is Rand 51,731/kW, or $6,466/kW, with an estimated capacity factor of 60 percent (46-73 percent); the 100 MW(e) Upington CSP project will use molten salt storage and costs US$600 million, or 6000$/kW (excluding contingencies). The widely cited study by Ummel and Wheeler assumes a 250 MW CSP with no storage (and a capacity factor of 26 percent) to cost $2,924-3,096/kW, and $5,388-5,704/kW for CSP with storage to achieve a capacity factor of 60 percent.[170]

63. The ability to store energy is critical to the economics of CSP, and with typical 6 hour storage, the CSP becomes equivalent to a daily cycling plant running for 12-14 hours a day. This configuration with 6-hour storage is the basis for a number of proposed CSP projects in North America, based on

[166] *Wind power Monthly*, January 2009, pp 51-55.
[167] Clean Technology Fund, *Concept note for a Concentrating Solar Power Scale-up Program in the Middle East and North Africa Region*, 27 April 2009 (CTF/ TFC 3/7).
[168] Botswana: *Morupule B Generation and Transmission Project*, Project Appraisal Document, 49183-BW, dated October 2, 2009.
[169] ESMAP, *Technical and Economic Assessment: Off Grid, Mini-Grid and Grid Electrification Technologies*, Summary Report, November 2005: Table 5.1
[170] K. Ummel and D. Wheeler, *Desert Power: the Economics of Solar Thermal Electricity for Europe, North Africa and the Middle East*, Working Paper 16, Centre for Global Development, Washington, DC., 2008.

work at the US National Renewable Energy Laboratory (NREL) and the California Public Utilities Commission.[171]

64. While Eskom's capital-cost estimate is not unreasonable for a CSP of such a high capacity factor, whether such high capacity factors can actually be achieved is still unclear in light of the lack of actual commercial operating experience of such a technology. Consequently we assess three CSP variants:

- Eskom assumptions ($6,466/kW). These assumptions are based on a full scale 1000 MW commercial CSP project as examined in Eskom's ISEP-12 studies.
- Assumptions in the US literature based on the various studies by NREL and US West Coast utility commissions; 6-hour storage; costs as estimated for the Nevada White River Valley scheme for a 2015 commissioning.($4,100/kW)
- No storage, 26 percent capacity factor, with a capital-cost ratio to the storage project as in Ummel and Wheeler (55 percent).($2225/kW)

65. Underground Coal gasification: The extent to which underground coal gasification (UCG) can be viewed as a realistic alternative to Medupi is doubtful. In January 2007 Eskom commissioned a 6 MW pilot plant (using open cycle gas turbines), which is to be followed by a 40 MW demonstration plant and then a 2100 MW commercial scale project.

66. There are several advantages to this technology: GHG emissions are expected to be some 25 percent lower than conventional coal combustion, and there is no requirement for waste disposal. Most importantly, this permits utilization of coal resources that are not economically extractable – low quality, deep depths of 300-600m, and in thin fragmented seams. Consequently in the economic analysis, the opportunity cost of this coal resource is zero: the fuel costs are simply those involved in gasification. Eskom's ISEP-12 assumptions for UCG estimate an overnight capital-cost of $1,777/kW.

Component B – Renewable Energy Projects – Sere Wind Power Project and Upington CSP

67. Economic Rationale: The catalytic role of the proposed renewable projects is the driving force behind development of the proposed Sere Wind and Upington CSP projects. Assessing these projects as a source of incremental power alone would fail to capture the full benefits of these investments. 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 gross emissions from 2030 onwards.

68. 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 set of feed-in tariffs

[171] See e.g., California Public Utilities Commission, *New Concentrating Solar Power (CSP) Generation Resource, Cost, and Performance Assumptions,* October 2007.

specific to these technologies[172], the Government has acknowledged the importance of each of these technologies to South Africa's future commitments on low carbon growth.

69. 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. 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 future projects. The project will include investment in transmission which will reduce costs for future projects. In terms of reducing risks, the project will test out the institutional/regulatory conditions and will help reduce uncertainty with borrowing terms relating to bankable power purchase agreements and the operation of the Renewable Energy Feed-in Tariff. 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 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 REFIT program.

70. 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.

71. 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 the largest commercial CSP plant of its design in operation. 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[173]. The IEA finds a similar learning rate[174] 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.

72. 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.

[172] We note that 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).

[173] IIASA Policy Brief: Expanding solar energy in North Africa to achieve climate targets, #7, December 2009.

[174] 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.

- 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. 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[175] stored in the Project File.

73. 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 14.1 percent and an NPV of $54.0m assuming an annual load factor of 25 percent and including the benefits of displaced CO2 emissions. Therefore, even without consideration of catalytic benefits due to this project, it is found to be economically viable.

74. Even though it is intended to design the plant for a load factor of 60-65 percent, because of the limited long-term experience with the technology, the economic analysis is based on a conservative load factor of 40 percent. 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 4.0 percent and an NPV of -$205.8 million assuming an annual load factor of 40 percent and including the benefits of CO_2 emissions. The proposed design of the CSP may allow the plant to achieve an annual load factor of at least 60 percent and at this higher level, the ERR increases to 9.0 percent and the ENPV to -$37.0 million. South Africa does not have "green" tariffs and therefore it is impossible to directly observe consumer willingness-to-pay for power from these technologies. It can be expected, though, that Government policy seeks to reflect longer term population preferences. On this basis, if the feed-in tariff for CSP (about USc 28.0/kWh) were taken as a proxy for higher national willingness-to-pay for power from initial CSP projects (for the reasons linked to South Africa's low carbon growth aspirations described earlier), then the project ERR at 40 percent load factor would rise to 9.6 percent and ENPV to US$ 15.2 million. For a CSP project with 60 percent load factor, the ERR would rise to 15.7 percent and ENPV to US$ 248.9 million.

75. 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.

[175] Vol 2. (Proposed Establishment of a Concentrating Solar Power Plant and Related Infrastructure in the Northern Cape Province).

Table 10: 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%*		*25%*		*32%*	
WTP@17.5USc/kWh	10.3%	+3.8m	14.1%	+54.0m	18.9%	+124.1m
Capital cost overrun by 10%	9.0%	-13.3m	12.6%	+36.8m	17.1%	+107.0m
Capital cost overrun by 20%	7.9%	-30.5m	11.3%	+19.7m	15.6%	+89.8m
1 year delay in entire project	9.8%	-1.9m	13.2%	+39.9m	17.7%	+107.4m
2 year delay in entire project	9.4%	-7.2m	12.2%	+27.2m	16.6%	+92.3m

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	*40%*		*60%*		*68%*	
WTP @28.0USc/kWh	9.6%	-15.8m	15.7%	+248.9m	17.8%	+355.7m
WTP@17.5USc/kWh	4.0%	-205.8m	9.0%	-37.0m	10.8%	+31.2m
Capital cost overrun by 10%	3.1%	-256.0m	7.9%	-87.2m	9.6%	-19.0m
Capital cost overrun by 20%	2.2%	-306.2m	6.9%	-137.4m	8.5%	-69.2m
1 year delay in entire project	3.9%	-203.0m	8.7%	-49.5m	10.3%	12.5m
2 year delay in entire project	3.8%	-200.4m	8.3%	-60.9m	9.9%	-4.5m

76. 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 155); 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 is based on overnight capital-cost of US$2,050/kW(net); 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; average hours of operation per day are assumed to be 6 (25 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$ 600 million (excluding any contingencies as well); construction period is 3 years 2011-13 inclusive although minor amounts of 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; 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 9.6 (load factor 40 percent) in the base case with additional assessment for load factors of 60 percent and 68 percent; and plant operating life is assumed to be 20 years.

Component C.1 – Majuba Rail Project

77. Economic Rationale: The railway line under consideration is a new 69 km route from a start point west of Ermelo (i.e., the start of the coal export line between the Witbank coal field and Richards Bay) and the Majuba power station. The construction of the new rail line will provide sufficient line capacity for the entire burn (estimated at around 13 MTpa for the medium-term) of the power station to be transported by rail. The trains will be considerably larger than via the existing rail route as they will be able to take advantage of the higher axle-load (26 versus 20 tons on the rest of the mainline network) which, combined with the shorter rail distances, will reduce rail operating-costs by nearly 75 percent compared to existing rail operations. Heavy-haul unit rail operating-costs are also about 80 percent cheaper than the comparable unit road haulage costs.

78. The traffic forecast for the Ermelo – Majuba line assumes that all the coal burnt by Majuba is carried on the new line. Coal burnt in the future is expected to be of slightly better quality than at present. The total burn is thus expected to decrease to 13 million tons, as against the 14 million tons consumed at present. Majuba is a very efficient coal-fired station but its location means that it is currently one of Eskom's higher-cost stations due to the cost of transporting the coal from the mines. Nevertheless, because of the current shortage of generating capacity in South Africa, 85 percent of the Majuba generating capacity is currently being used and Majuba is designated to remain a baseload station for at least the medium-term. This role will be strengthened by the construction of the new rail line which will reduce substantially the coal transport cost (by R60 to 100 per ton depending on the origin). In the longer-term, the new generation of power stations currently being planned will come on-stream and Majuba is expected to gradually slip down Eskom's power plants merit order, with a corresponding reduction in its generation capacity usage rate (plant factor). The economic evaluation assumes that Majuba will operate at a load factor of 65 percent by the end of the evaluation period (2043/44), with the annual coal burn reducing to 10 MTpa.

79. Little or no general freight is expected on the new line, which will be formally classified as a private siding belonging to Eskom on which Transnet operate under contract. Table 11 summarizes the 2014/15 flows assumed in the analysis for both the 'Without-project' and 'With-project' cases. These have been assumed to decline pro rata to an annual total of 10 MTpa by the end of the economic impact evaluation period in 2043/44[176].

Table 11: Forecast Coal Flows (MTpa) in 2014/15

Mine	W/o Project		With Project
	Existing Rail	Road	New Rail
Groengoeverden	2.880	-	2.880
Leeuwpan	0.600	-	0.600
Koornfontein	-	1.800	1.800
Uitkyk	0.600	-	0.600
Elders	3.600	3.600	7.200
Total	**7.680**	**5.400**	**13.080**

80. Project Costs: The estimated cost of the project infrastructure is R2.986 billion ($US398 million) at 2009 prices, excluding value added taxes of which about R189 million has already been

[176] Majuba should still have 10 years of operational life remaining at that stage.

spent by Eskom. This sum is treated as sunk cost for the purposes of the economic analysis and thus only R2.797 billion (US$ 373 million) is considered for calculation purposes. Likewise, in the economic analysis, all input costs are assumed to be adjusted to market prices and no shadow price factors have been used.

81. There is no project-specific investment in rollingstock; the trains will be operated by TFR using its own rolling stock.[177] Accordingly, the cost of the rolling stock has been included in the train operating-costs. An allowance of R160 million has been included in the economic evaluation to cover investment required by TFR to provide sufficient capacity for the additional traffic in the feeder network.

82. Project Benefits: The benefits of the new construction of the line fall into three main categories: (a) Operating Cost Savings; (b) Freeing up capacity in the Welgedag area; and (c) Wider economic, social and environmental benefits.

83. *Operating cost savings:* The project will result in a major reduction in operating-cost savings for the traffic diverted to the new line, both for the traffic previously carried by conventional rail (which will have the benefit of the more efficient heavy-haul operations combined with a much shorter distance) and for traffic previously carried by truck (which will be carried by rail at around 20 to 25 percent of the actual road cost). These benefits have been derived from the estimated rail and road operating-costs from each mine to Majuba, with and without the project.

84. Within TFR, there are three main groups of traffic: (a) the export coal movements, mostly from the Witbank area, through Ermelo to Richards Bay (32 percent of the total traffic); (b) the export iron ore movements from Sishen to Saldanha in the Northern Cape (29 percent of the total traffic); and (c) general freight movements over the rest of the network (39 percent of the total traffic). These three groups have quite different operating characteristics and unit operating-costs which is reflected in their average tariffs (in 2009 which ranged from R0.05/ntkm for the export iron ore through R0.12/ntkm for the export coal to R0.28/ntkm for the general freight). The export coal and iron ore movements are generally considered to cover their costs, whilst the general freight business is loss-making. As the project involves coal movements migrating from the general freight operations to operations similar to the export coal, separate operating-cost estimates were developed for each of the three groups of operations.[178] Aggregate costs were then estimated for each of the three freight transport groups, together with unit costs (e.g. locomotive maintenance costs per loco-kilometer). Rolling stock capital-costs were derived using replacement costs and typical utilization rates for electrified coal rail lines.

85. These estimates were then used to estimate TFR's operating-costs for: (i) the current coal movements to Majuba operated by conventional 20 ton axle-load freight services (these trains are block trains which are about 25 percent more technically efficient than the typical general freight train); and (ii) the proposed coal movements using heavy-haul trains (with heavier axle loads of 26 versus 20 tons, larger wagons with 80 versus 60 tons carrying capacity, longer trains with 100 wagons compared to 58 and more streamlined operations) when the project line is opened.

86. In both cases the costing assumed that rail achieves a real productivity increase of 1 percent p.a. throughout the evaluation period. Electricity prices were also assumed to increase by 50 percent in real terms by 2014/15 but to remain constant thereafter. The end result was a reduction in the unit cost of coal haulage (excluding the fixed component of rail infrastructure and any return on investment) from R0.26/ntkm today on a general freight service to R0.11/ntkm for heavy coal service. In addition, the new line will save an average of about 180 kilometers in transport distances to Majuba compared

[177] It is estimated that TFR will require around 18 locomotives and up to 350 wagons to operate the service. These will be drawn from TFR's pool of rolling stock serving the export coal movements.

[178] This was done by analyzing TFR published 2008 accounts, together with estimates of the physical resources (locomotive-km, wagon-km, gross tonne-kilometers etc.) required by each of the three groups as well as by holding direct talks with TFR management.

to the current circuitous rail routing. This will translate into a further decline in the cost of supplying the plant with coal which will reach in 2014 R20/ton versus R93/ton (again excluding the fixed cost of infrastructure and any return on investment).

87. The new distance by rail will average about 40 kilometers longer than the comparable road distance but this is more than compensated for by the much lower unit operating-costs on rail. Eskom currently has a large number of road coal transport contracts which are based on the reported average costs of the South African Road Transport Association. These were analyzed for the routes serving Majuba and adjusted to economic costs by eliminating insurance (as accidents are dealt with directly in the evaluation) and the fuel duty and accident fund component of the cost of diesel (approximately 22 percent of the total fuel price). No allowance was made in the base evaluation for the shadow price of labour, as there is a flourishing road transport sector and the number of drivers involved (about 1,500 is very small compared to total employment in the sector (in excess of 700,000). This potential negative economic externality of road to rail transfer was instead addressed as a sensitivity test.

88. The road usage-related costs were cross-checked against those used by South Africa National Road Agency (SANRAL) for its highway evaluation procedures, using route-specific road characteristics (roughness, grade etc). The resulting economic road operating-costs averaged R78/ton. In the medium-term, road operating-costs associated with Majuba transport services are likely to decrease as more efficient vehicles are introduced, roads are repaired and upgraded and management practices among road haulage companies are improved. The 2014/15 vehicle operating-costs have been assumed to be 85 percent of their current level and to decline by 1 percent in real terms afterwards.

89. The operating-cost savings for traffic which would otherwise travel by existing road and rail routes were then derived by comparison with the future rail operating-costs once the Majuba line becomes operational in 2014.

90. *Freeing-up capacity*: Transferring the Majuba coal operations to the new line will provide additional capacity for rail freight services in the Welgedag area. One development is likely to be that the Tutuka power station, North of Majuba, can be supplied by rail instead of by road (as it is at present) until 2018/19, when a new direct rail route to Tutuka will be in place. The rail capacity will then be available to other general freight traffic. Given the uncertainties associated with these long-term developments and many external factors impacting these developments, and to be conservative in the assessment, no explicit benefit for either of these possibilities has been included in the economic evaluation.

91. *Wider economic and environmental benefits*: The external benefits included in the economic impact analysis include a reduction in road accidents and congestion, reductions in road maintenance costs and changes in greenhouse gases (GHG). The reduction in road accidents has been estimated using statistics on the number of accidents associated with the coal transport fleet, converted into a rate per vehicle-kilometer. These have been converted into monetary equivalents using the standard values used in highway evaluations in South Africa as provided by SANRAL.

92. Coal trucks represent a large proportion of the total traffic on some routes and the transfer of coal transport to rail will improve travelling conditions for the non-coal traffic. The reduction in traffic delays has also been estimated by estimating the change in the volume/capacity ratio on these roads, following the transfer of the coal traffic, and the consequent change in average travel speed. These have been cross-checked against detailed information held by SANRAL. Many of the roads used by the coal trucks are essentially rural farm-to-market roads, constructed with relatively thin structures and which have already suffered severe damage from coal traffic. In the absence of any transfer to rail, such damage will be experienced on a continuing basis and this has been estimated from damage-related road maintenance costs provided by SANRAL.

93. Greenhouse gas benefits were estimated from unit fuel and energy consumptions of road and rail transport. Rail energy consumptions were derived from data provided by TFR and road diesel fuel consumptions from the road cost analysis supplemented by SANRAL. These were then converted into unit emissions of carbon dioxide. In the case of electricity, emission levels were converted using Eskom production system average of 0.97 g/kwh, with an allowance of 7 percent for power transmission losses. Diesel fuel was converted using the standard value of 2.63 kg/liter of CO_2 per liter of Diesel fuel. The difference in carbon dioxide emissions from each transport option was then converted into monetary equivalent using a unit economic cost of US$29/ton of CO_2, as used in the parallel evaluations.

94. Economic Rate of Return and Sensitivity Analysis: Assuming a project life of 30 years, the project is expected to have an Economic Internal Rate of Return (EIRR) of 18.7 percent and a Net Present Value (NPV) of R3.28 billion (US$ 437 million) in 2009 prices (at a discount rate of 10 percent). Table 12 provides an overview of project cost and benefits.

Table 12: Analysis of Project Benefits (in Rand Millions; discounted to 2014/15)

	Rail Operating Costs	Road Operating costs	External benefits	Total
Total Benefits	3,601	2,191	1,095	6,887
Share of all benefits (%)	52	32	16	100
Construction costs				-3,605
NPV				**3,282**

95. The sensitivity of these results was tested against changes in a range of base case assumptions including: an increase in investment costs of 50 percent; only rail and road operating-cost savings; leaving 50 percent of the rail traffic on the existing route; excluding cost savings associated with truck labour; and Greenhouse gases valued at US$10 per tonne of carbon dioxide. The results of these tests are given in Table 13.

Table 13: Majuba Rail Project - Sensitivity Analysis

Sensitivity	EIRR (as a %)	ENPV (in Rand Millions)
Base Case	19	*3,282*
Construction costs +50 percent	13	*1,479*
Include rail and road operating savings only	16	*2,187*
50% of rail traffic travels by current route	14	1,427
Excluding truck labour cost savings	18	2,480
Greenhouse gases valued at $10 per tonne	18	3,152

96. As shown above, the project EIRR is found to be robust against all sensitivity tests and even if the analysis is restricted to benefits from the operating-cost savings, discounting all external benefits associated with the road traffic, the EIRR is still 16 percent.

Project Economics as a Whole

97. Table 14 below summarizes the results of the economic analysis carried out for the project. The baseline aggregate project economic return is 22.7 percent, with an NPV of US$ 15,439 million. The benefits of the project are assessed as the consumer's willingness to pay (WTP) for the incremental power produced by the project, with an average benefit of 17.5 US cents/kWh.

Table 14: Project Economics as a Whole

Component	ERR	NPV @ 10%
	(as a %)	*US$ Millions*
A - Medupi Coal	24.0%	15,727
B - Wind	10.7%	9.2
B - CSP	1.8%	-266
C - Majuba Railway	19.0%	437
Project as a Whole	**22.7%**	**15,907**

98. As shown in Table 15, 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 decrease. As expected, the bulk of the impact is attributable to the Medupi coal project, whose returns are negatively affected as it is the only carbon emitting project. The economic returns of the wind, CSP, and Majuba Railway project components all increase slightly.

Table 15: Project Economics as a Whole, including CO_2 valued at US$29/ton

	ERR (w/o GHG)	ERR (w/ GHG)	Change in EIRR	ENPV
	(as a %)	*(as a %)*	*(as a %)*	*US$ Millions*
A - Medupi Coal	24.0%	21.5%	-2.5%	12,585
B - Wind	10.7%	14.1%	3.4%	54
B - CSP	1.8%	4.0%	2.2%	-206
C - Majuba Railway	19.0%	19.6%	0.6%	457
Project as a Whole	**22.7%**	**20.5%**	**-2.2%**	**12,890**

Annex 10: Financial Analysis

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

Historical Financial Performance of Eskom

Electricity Sales

1. Significant growth of the South African economy during the past few decades resulted in corresponding increase in electricity consumption — From 1994 to 2008 Eskom's electricity sales increased by more than 50 percent and reached 224 TWh in FY08 (ending March 31, 2008). However, the outbreak of the global financial crisis in the second half of 2008 caused South Africa's economy to fall into recession. Thus for FY09, Eskom's electricity sales decreased by 4 percent to 215 TWh, mainly because of the reduction in electricity demand from the steel industry, mines and smelters.

2. At the same time, the revenue realized from electricity sales increased by 22 percent from R43.5 billion in FY08 to R53.0 billion in FY09 due to 27.5 percent average tariff increase approved by NERSA in June 2008. The unit average price of electricity increased from 19.59 Rc/kWh in FY08 to 24.97 Rc/kWh in FY09. The 27.5 percent tariff increase approved by NERSA in FY09 was significantly higher than 5-6 percent tariff growth rate in FY05-FY08 and was a result of a sharp increase in primary energy costs (mostly coal) and accelerated capital expenditures program initiated by Eskom in response to the to a series of electricity outages and load shedding in 2007-2008 (for details on tariff structure see discussion on tariffs below and in Annex 1).

3. Redistributors, industrial and mining are the major customer segments for Eskom. Sales to these three customer types constitute around 82 percent of the total sales of Eskom and account for around 75 percent of the revenues. Export of electricity accounts for approximately 4 percent of Eskom's sales revenues. Eskom has long-term bilateral contracts to sell power to utilities and companies in Mozambique, Lesotho, Namibia and Swaziland. A summary of the Eskom's electricity sales details during the past three years is presented in Table 1 below.

Table 1: Eskom Electricity Sales and Revenues (FY07-FY09)

	FY07		FY08		FY09	
Customers	**GWh**	**Rand (million)**	**GWh**	**Rand (million)**	**GWh**	**Rand (million)**
Redistributors	86,908	14,793	89,941	16,382	88,345	20,628
Industrial	59,822	9,657	61,510	10,629	54,815	11,887
Mining	32,421	5,503	32,373	5,825	32,177	7,439
Residential	4,423	1,753	4,694	1,965	4,558	2,396
Commercial	7,843	1,852	8,373	2,081	8,642	2,732
Agricultural	4,731	1,602	4,848	1,741	4,912	2,249
International	13,589	1,515	13,908	1,971	12,648	2,382
Other	8,383	4,000	8,719	3,054	8,753	4,113
Total	**218,120**	**39,389**	**224,366**	**43,521**	**214,850**	**52,996**
Year to Year increase	*5%*	*11%*	*3%*	*10%*	*-4%*	*22%*

Historical Operating Costs

4. The growth of Eskom's operating-costs has significantly outpaced the growth of revenues during the past several years. The Company's operational expenses increased by 15 percent in

FY07, 21 percent in FY08 and 35 percent in FY09. The main driver of this growth was the rise in the cost of generating electricity, (Primary Energy cost) which includes purchase of coal, uranium, water, natural gas and diesel fuel used in the generation of electricity. The average growth of Primary Energy costs was 33 percent during the last three years. In FY08, Primary Energy expenses increased by 41 percent due to sharp increase in global commodity prices, while the 38 percent increase in FY09 was mainly driven by Eskom management's decision to increase stock piles at power stations to 42 days from the average level of 13 days in FY08. The increase in stock piles also resulted in additional coal purchases on a short-term basis. The average short-term coal purchase price increased from 100 Rand/Ton in FY08 to 151 Rand/Ton in FY09.

5. Staff costs are the second largest operational expense for Eskom. In FY09 it accounted for 28 percent of the Company's total operating expenses. To manage the large new build program, Eskom reviewed its staff compensation strategy in order to attract and retain staff, particularly those with scarce or critical skills. Given that Eskom's skills to develop and manage construction of large power stations were depleted over the last decade, this review and hiring of new staff was deemed essential, but as expected resulted in a doubling of staff costs over the last three years. The actual number of staff increased by 20 percent during the same period of time from 31,548 in FY06 to 37,857 in FY09.

6. Table 2 shows the operating-costs incurred by Eskom in FY06 - FY09. The operating-costs are divided into Primary Energy and Other operating expenses that include Depreciation, Staff and Maintenance costs.

Table 2: Eskom's Operating Costs (FY06 to FY09, in Rand million)

	FY06	**FY 07**	**FY 08**	**FY 09**
Primary Energy	10,854	13,040	18,314	25,351
% increase over previous year	-	*20%*	*41%*	*38%*
Total Other Operating expenses, of which	18,091	20,269	22,204	28,673
Staff Costs	7,608	9,451	11,353	15,166
Maintenance	4,807	5,007	5,235	6,017
Depreciation	4,562	4,709	4,284	4,916
Other	1,114	1,102	1,332	2,574
% increase over previous year		*12%*	*10%*	*29%*
Total Operating expenses	**28,945**	**33,309**	**40,518**	**54,024**
Year to Year increase	-	*15%*	*21%*	*35%*

Capital Investments

7. As discussed earlier, Eskom witnessed falling reserve margins for electricity generation from FY07 until the financial/economic crisis resulted in reduced demand for energy in FY09. In response to the falling reserve margins, in FY07, Eskom initiated capital outlays for its New Build and Major Maintenance Program. This massive investment program has forced Eskom to significantly increase its investments in generation and transmission infrastructure: capital expenditures more than quadrupled during the last three years and reached R47 billion in FY09. Most of these investments, 68 percent or R31.8 billion, were used to build new generation capacity. Commissioning of a new generation capacity increased from 170 MW in FY06 to 1,061 in FY08 and 1,770 in FY09. A summary of the Eskom's capital expenditures during the past four years is presented in Table 3 below.

Table 3: Eskom's Capital Expenditures (FY06 to FY09, in Rand million)

	FY06	FY 07	FY 08	FY 09
Capital Expenditure, of which	**10,616**	**17,707**	**25,985**	**47,099**
Generation	5,023	10,439	15,239	31,824
Transmission	1,263	1,993	3.553	6,465
Distribution	4,027	4,695	5,605	6,446
Other	1,114	1,102	1,332	2,574
Year to Year increase	-	*67%*	*47%*	*81%*

Funding Sources for Operations and Investments

8. Cash from existing operations was the main source of funding for operating and capital expenditures in FY06-FY07. Since FY08, Eskom's investment expenditures have been largely financed through issuance of new domestic debt (domestic bond issuances and commercial paper), use of reserves accumulated in previous years, and support from the Government (of the R60 Billion GoSA shareholder loan to Eskom approved in July 2008 is currently being disbursed). Table 4 below provides a summary of Eskom's funding sources in FY06-FY09.

Table 4: Eskom Funding Sources (FY06 to FY09, in Rand million)

	FY06	FY 07	FY 08	FY 09
Cash from operations	12 346	13 281	(1,912)	11,764
Debt raised, incl. GoSA resources	19,179	15,324	16,831	53,959
Debt repaid	(9,382)	(6,903)	(9,092)	(23,492)
Net Debt stock	**9,797**	**8,421**	**7,739**	**30,467**
Interest paid	(2,210)	(1,807)	(3,154)	(3,869)
Interest received	2 109	2 017	3,109	3,117

9. Eskom is supported by many bilateral/multilateral and commercial lenders. For the purposes of financing the Medupi Power Plant Eskom has undertaken three large Export Credit Agency supported and AfDB (public sector) financings (boilers/turbines) and has also secured EIB, AfDB (private sector), and JICA financing for transmission lines and other investment expenditures. In addition, it has commercial bank debt, government loans, domestic long-tenor bonds, promissory notes and floating rate notes on its books.

Financial Ratios

10. Eskom's financial ratios have all deteriorated during the last three years due to rapid growth of operating expenditures coupled with increase in borrowings needed to finance the accelerated capital expenditures program. Table 5 below summarizes Eskom's main financial ratios.

11. The operating margin, an indicator of operating efficiency and pricing adequacy has dropped from around 33 percent in FY06 to 17 percent in FY07, to 8 percent in FY08 and became negative 3 percent in FY09. Return on Total Assets decreased from 9.1 percent in FY06 to negative 0.8 percent in FY09, while Return on Average Equity dropped from 9.5 percent to negative 16 percent during the same period. Interest cover ratio deteriorated from healthy 3.8 in FY06 to negative 0.7 in FY09.

12. The major reason for weakening of Eskom's financial ratios is the fact that Eskom tariffs have been growing much slower than the increase in operating and capital costs: the average selling price of electricity during the last three years increased by 47 percent from 17.01 R

cents/kWh in FY06 to 24.97 R cents/kWh in FY09, while the average total cost of electricity sold increased by 87 percent during the same period of time from 14.8 R cents/kWh in FY06 to 27.63 R cents/kWh in FY09. The average total cost of electricity sold was higher than the average selling price in FY08 and FY09. The other important factor negatively affecting Eskom's financial performance is the increase in borrowings to finance significantly increased capital expenditures: the debt to equity ratio for Eskom has risen from 0.2 in FY06 to 1.22 in FY09.

Table 5: Financial Ratios (FY06 to FY09)

Financial Ratios	Definition	FY06	FY07	FY08	FY09
Return on Total Assets (as a %)	Net Operating Income / Total assets	9.1	7.4	3.0	(0.8)
Return on Average Equity (as a %)	Net profit / Average Equity	9.5	7.6	(0.3)	(16.1)
Operating Margin (as a %)	Operating revenue / Operating expenditure	32.8	17.4	7.8	(2.6)
Net Pre-tax Interest Coverage	(Profit before tax - Interest) / Interest	2.8	2.7	1.0	(1.3)
EBITDA Interest Coverage	EBITDA / Interest	4.0	3.3	2.0	0.9
Interest Cover	(EBITDA - Tax) / Interest	3.8	11.4	2.9	(0.7)
Liquidity	Current Assets / Current Liabilities	1.3	1.7	1.6	1.0
Debt to Equity	Debt / Equity	0.2	0.2	0.4	1.22

Credit Ratings

13. Eskom's current international rating is BBB+ rating from Standard and Poor's and Baa2 rating from Moody's. Both ratings have negative outlook, but are equal to the sovereign ratings of the Republic of South Africa, reflecting the full ownership of Eskom by the GoSA. Current local currency ratings of Eskom are A- with negative outlook from Standard and Poor's, Baa2 with negative outlook from Moody's and National long term rating of AAA with stable output form Fitch. As shown below in Table 6, Eskom's ratings have declined in FY08-FY09 which reflects the financial markets sentiment towards Eskom's credit risk.

Table 6: Eskom's Credit Ratings (FY05 to FY09)

Credit ratings and outlook	FY05	FY06	FY07	FY08	FY09
Standard and Poor's					
- Foreign currency	BBB	BBB+	BBB+	BBB+	BBB+
outlook	Stable	Stable	Stable	Negative	Negative
- Local currency	A-	A-	A-	A-	A-
Outlook	Stable	Stable	Stable	Negative	Developing
Moody's					
- Foreign currency	Baa1	A2	A2	A2	Baa2
outlook	Stable	Stable	Stable	Stable	Negative
- Local currency	A3	A1	A1	A1	Baa2
Outlook	Stable	Stable	Stable	Review	Negative
Fitch Ratings					
- National long term (zaf)	AAA	AAA	AAA	AAA	AAA
outlook	Stable	Stable	Stable	Stable	Stable
- National short term (zaf)	FI+	FI+	FI+	FI+	FI+
Outlook	Stable	Stable	Stable	Stable	Stable

14. The ratings of Eskom reflect its dominant position in the South African electricity market, 100 percent government ownership, an increasingly supportive regulatory regime following the introduction of multiyear price reviews and material implicit and explicit support

from the Republic of South Africa during the crucial build program aimed at increasing generation capacity. These strengths are adversely impacted by a very substantial, largely debt-financed capital expenditure program necessitated by the tight reserve margin in South Africa and a range of operational, cost, construction and financial risks associated with the program.

Eskom Financial Projections

15. The following financial analysis — financial projections — aims to assess Eskom's ability to implement its operations, capital expenditure program and to maintain financial sustainability without jeopardizing essential electricity service obligations. The following analysis also takes into account the context under which Eskom is likely to operate, as the Country's premier utility mandated to provide reliable and affordable electricity which is a critical imperative for sustainable economic growth in South Africa. These projections are the result of extensive due diligence on the assumptions undertaken by Eskom which are discussed in this Annex and Annex 1 of the PAD.

Electricity Tariffs

16. Eskom's revenues are almost entirely regulated by tariffs set by the NERSA. The Company's profitability and financial sustainability are dependent on NERSA's approvals of future multi-year tariff increases to cover the costs of building substantial new generation capacity. In 2006, NERSA replaced its annual rate-of-return methodology with MYPD (Multi Year Price Determination), a forward-looking, multiyear system that sets a predetermined tariff over a three-year period. The new methodology is more transparent and provides more predictability for Eskom's future cash flows. The initial MYPD 1 application approved by NERSA in February 2006, allowed for 5.1 percent tariff increase in FY06/07, 5.9 percent increase in FY07/08 and 6.2 percent increase in FY08/FY09. However, strong inflationary pressures in FY08-09 resulted in Eskom submitting an additional submission to NERSA, which approved additional tariff increases of 14.2 percent in December 2007 and 11.7 percent in June 2008.

17. On June 25, 2009, NERSA approved an interim FY10 tariff increase of 31.3 percent following an application from Eskom for an increase of 34 percent. However, the effective tariff for Eskom was 24.08 percent, because the 31.3 percent increase included the 2c/kWh environmental levy payable to the GoSA. This interim tariff increase request was based primarily on Eskom's energy cost drivers and was proposed as a short-term intervention in the absence of clearer long-term revenue requirements in the context of the massive investment plan that the Company was undertaking. To protect the poor, NERSA limited the increase to the poor to 15 percent, thus resulting in an average increase to other customers of 36.7 percent. In addition, after reviewing Eskom's financial situation, including its projected capital expenditure and limitations on borrowing needs, it provided indications for the future tariff path. A pricing cone was projected with an upper and lower limit on the tariffs. The upper limit curve was calculated using the submitted Eskom values for Operational expenditure, Capital expenditure and sales for FY11 and FY12, extrapolated for future years after FY12. The lower limit was estimated using optimistic assumptions for cost reductions. The price cone indicated that the future MYPD2 determination could increase prices in a range of 30 percent to 60 percent per annum in nominal terms, with the upper limit stabilizing in FY13 around R0.8/kWh in real FY09 values.

18. In September 2009, Eskom submitted its MYPD2 application to NERSA requesting a 45 percent annual tariff increase for the next three years during FY10-FY13, which was within the pricing cone indicated by NERSA. However, after extensive consultations with its stakeholders, including the government, its high voltage customers, and feedback from the public, Eskom revised its MYPD2 application and reduced its tariff increase request to 35 percent per annum for the next three years FY10-FY13 which was resubmitted to NERSA on November 30, 2009.

19. On February 24, 2010, NERSA completed review of the MYPD2 application and announced its decision to allow Eskom to raise tariffs by 24.8% in FY 2011, 25.8% in FY 2012 and 25.9% in FY 2013. To protect the poor NERSA differentiated tariff increases for different categories of residential customers: while the average cumulative price increase of electricity sold by Eskom in FY11-FY13 will be 98%, the total cumulative price increase for customers consuming less than 50 KWh of electricity per month will be only 11% and for customers consuming more than 50 KWh, but less than 350 KWh per month will be 28%.

Electricity Demand and Revenue Projections

20. Electricity demand is closely correlated with GDP growth and in FY04-FY08 it was growing by approximately 5 percent a year, in line with the expansion rate of the overall economy in the country. In FY09, Eskom reported 4 percent drop in total electricity consumption, mainly because of the reduction in electricity demand from the steel industry due to global economic recession. In June-November 2009, Eskom conducted a comprehensive review of the projected electricity demand in South Africa over the next ten years that included analysis of the current economic situation in South Africa and input from major customer groups on their growth prospects. According to this forecast, total electricity sales for Eskom are projected to increase at an average rate of 2.8 percent during the next seven years, from 217 TWh in FY10 to 263 TWh in FY17, which is lower than the expected long term average South African GDP growth of 3 percent during the same period of time. Table 7 below provides details of sales projections provided by Eskom from FY10 to FY17.

Table 7: Electricity Sales Projections (GWh)

	FY10	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18**	**FY19**
Domestic Sales	204,654	213,285	219,182	224,331	228,907	232,835	240,169	249,351	258,254	267,784
Export Sales	12,674	14,992	14,266	13,851	13,553	13,670	13,949	13,956	13,991	14,029
Total Sales	**217,328**	**228,276**	**233,448**	**237,911**	**242,460**	**246,505**	**254,118**	**263,307**	**272,245**	**281,813**
Year to Year increase	*1.0%*	*5.0%*	*2.3%*	*1.9%*	*1.9%*	*1.7%*	*3.1%*	*3.6%*	*3.4%*	*3.5%*

21. Eskom's electricity sales revenues are projected to increase from R70 billion in FY10 to R148 billion in FY13. The projected revenue growth is mainly driven by the growth in tariff[179] as demand for electricity is forecasted to grow at CAGR of around 3 percent during the forecasted period. Table 8 below presents revenue projections from FY2010 to FY2017. With lower than anticipated tariff increases provided by NERSA, Eskom's revenues are projected to result in a cash flow shortfall over the next three years until MYPD 3 is submitted.

Table 8: Revenue Projections (in Rand millions)

	FY10	**FY11**	**FY12**	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**
Domestic Revenues	67,413	87,617	112,387	143,844	181,559	229,085	250,367	275,444
%, change	*33%*	*30%*	*28%*	*28%*	*26%*	*26%*	*9%*	*10%*
Export Revenues	2,766	3,310	3,765	4,534	5,286	5,795	6,125	6,795
%, change	*-17%*	*20%*	*14%*	*20%*	*17%*	*10%*	*6%*	*11%*
Total Revenue	**70,179**	**90,927**	**116,152**	**148,378**	**186,845**	**234,880**	**256,492**	**282,239**
%, change	*32%*	*30%*	*28%*	*28%*	*26%*	*26%*	*9%*	*10%*

[179] Projected tariff increases are 24.8% in FY 2011, 25.8% in FY 2012 and 25.9% in FY 2013 (as per NERSA decision on the MYPD2 application), followed by 25% in FY2014-15 and inflation plus 1% in FY 2016-17.

Operating Expenses

22. Eskom's total operating expenses are projected to increase from R66 billion in FY10 to R181 billion in FY17, a CAGR of 16 percent. Primary energy expenses which constitute almost half of total operating-costs are expected to increase at a CAGR of 18 percent. However, the main driver of the operating expenses growth will be increased generation of electricity: the average total unit cost of electricity sold will increase from R35 cents in FY10 to R76 cents in FY17 which translates into CAGR of only 12 percent. A summary of operating expenses projections is in Table 9 below.

Table 9: Operating Expenses (FY 10 to FY19, in Rand millions)

	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17
Primary Energy	29,071	42,213	48,789	55,311	64,946	72,144	83,462	90,861
%, change	*15%*	*45%*	*16%*	*13%*	*17%*	*11%*	*16%*	*9%*
Manpower	14,616	16,226	17,552	18,910	20,719	22,785	26,095	28,507
%, change	*3%*	*11%*	*8%*	*8%*	*10%*	*10%*	*15%*	*9%*
Depreciation	5,956	7,630	8,924	10,902	13,463	16,361	20,188	23,361
%, change	*31%*	*28%*	*17%*	*22%*	*23%*	*22%*	*23%*	*16%*
O&M	15,919	19,342	21,174	23,687	25,946	29,415	35,217	38,147
%, change	*31%*	*18%*	*9%*	*11%*	*9%*	*12%*	*16%*	*8%*
Total Operating Expenses	**65,562**	**85,411**	**96,439**	**108,810**	**125,074**	**140,705**	**164,962**	**180,876**
%, change	*19%*	*30%*	*13%*	*13%*	*15%*	*12%*	*17%*	*10%*

Capital Investment Program

23. Assuming Eskom's current role to be responsible for security of supply and to undertake the required massive New Build Program, it would need to spend around R702 billion on capital investments over the next seven years. About R497 billion or 71 percent of the total amount will be spent on generation and transmission.[180] Investments in distribution (R117 billion or 17 percent of the total) will be aimed at strengthening and refurbishment of existing networks. Eskom's major generation capital investment projects are noted in Annex 1.

24. Over the next five years, Eskom is planning to undertake R464 Billion of investments, primarily on the Ingula, Medupi and the other generation projects. The table below provides a summary of Eskom's planned capital expenditures in FY10-FY17.

Table 10: Eskom's Capital Expenditure Program (FY10-FY19, in Rand millions)

Capital Expenditure	FY10	FY 11	FY 12	FY 13	FY14	FY15	FY16	FY17
Generation	36,529	63,228	69,546	53,579	34,953	49,118	76,674	93,292
Transmission	7,582	14,533	11,327	16,112	16,667	22,099	23,897	24,216
Distribution	5,338	8,355	10,466	12,496	14,571	16,793	19,817	21,789
Other	1,328	1,531	3,078	4,051	2,592	895	7,566	2,614
Total	**50,777**	**87,646**	**94,417**	**86,239**	**68,783**	**88,905**	**126,492**	**156,703**
% increase	36,529	63,228	69,546	53,579	34,953	49,118	76,674	93,292

[180] Investments in transmission are mostly expansions of the existing grid to allow integration of new power plants.

Eskom's Financial Recovery Plan and Financing Assumptions

25. Based on financing projections carried out, based on available and current information about Eskom's operating and investment program, it is projected that the Company would need to raise around R440 billion (US$60 billion) of cash flow during the next 7 years to fully implement its planned capital expenditures program. Clearly, this is a large amount of financing to be generated. At present, Eskom plans suggest that it would require R264 billion (US$35 billion) of this amount to be funded in FY11-FY13. Financial projections indicate that tariff increases alone approved by NERSA for FY11-FY13 will not allow Eskom to generate sufficient cash flows to fully implement its capital investments program. In order to maintain financial sustainability in the near term, Eskom would need to adjust its capital investments program by canceling/postponing certain projects (other than Medupi) and/or obtain additional support from GoSA in the form of additional equity injection and/or shareholder loan.

26. Given the strategic importance of Eskom's build program for the South African economy and the limited ability of the Company to attract funding on commercial terms without jeopardizing its credit ratings, the government has already provided Eskom with a shareholder loan and debt guarantees. In July 2008, the National Treasury approved a R60 billion interest free subordinated loan to Eskom. R40 billion of this amount was disbursed in FY08-10, while the remaining portion will become available to Eskom in FY11 (R20 billion). In February 2009, the South African government announced that it will directly guarantee R26 billion of Eskom's existing debt and an additional R150 billion of new debt over the next five years. In FY10, Eskom utilized approximately R60 billion of the guarantees provided by the South African government. Undisbursed portion of the Shareholder loan and unutilized debt guarantees will provide Eskom with R110 billion or 42 percent of its total external funding needs during the FY11-FY13 period, meaning that the Company would need to raise R154 billion from other sources of financing.

27. Eskom's ability to fully implement its near to medium term capital expansion plan is thus based on assumption that this large financing, provided without GoSA guarantees will materialize. Given the current financial position of the Eskom, it is unlikely that it will be able to borrow the required R154 billion financing in FY11-FY13 on the international markets without the support from either the GoSA or other agencies. The GoSA and Eskom realize this problem and are currently considering the option of bringing in private participation in the next coal plant in such a manner that Eskom's does not have to finance some of the capital expenses associated with its construction costs – possibly as a PPP scheme. If the next coal fired plant is further developed as an IPP, a private sector investor will assume the responsibility to complete the construction of the plant and sell power to the Single Buyer under a PPA. Implementation of this plan would reduce Eskom's funding needs in FY11-FY13 by R79 billion meaning that the company will be required to raise only R75 billion on commercial terms during this period of time.

28. Eskom's long term financial sustainability is dependent on its ability to secure additional annual tariff increases of around 25 percent in its MYPD3 application for FY14-FY15 period to be able to service its debt obligations and implement the remaining portion of its capital expenditure plan. Securing of such increase would be in line with the existing MYPD methodology that allows recovery of capital expenditures through tariff increases. Table 12 below presents expected financial performance of Eskom assuming implementation of NERSA's decision on MYPD2 application (tariff increases of 24.8% in FY11, 25.8% in FY12 and 25.9% in FY13), approval of MYPD3 application as described above (25% increase in FY14 and FY15), and inflation plus 1% tariff increase in FY16-FY17.

Expected Financial Performance and Projected Ratios

29. The base case financial projections, under the assumptions noted above, indicate that the Eskom will be able to maintain reasonable profitability and generate sufficient cash flows to implement its capital investments program and service the debt throughout the projection period. A summary of the projected financial performance and main ratios is presented in Table 11 above.

Table 11: Expected Financial Performance and Projected Ratios (FY10-FY19)

	FY10	FY11	FY12	FY13	FY14*	FY15*	FY16*	FY17*
Revenues	**70 179**	**90 927**	**116 152**	**148 378**	**186 845**	**234 880**	**256 492**	**282 239**
%, change	*32%*	*30%*	*28%*	*28%*	*26%*	*26%*	*9%*	*10%*
Operating Costs, *Including:*	**65,562**	**85,411**	**96,439**	**108,810**	**125,074**	**140,705**	**164,962**	**180,876**
Primary Energy	*29,071*	*42,213*	*48,789*	*55,311*	*64,946*	*72,144*	*83,462*	*90,861*
Manpower	*14,616*	*16,226*	*17,552*	*18,910*	*20,719*	*22,785*	*26,095*	*28,507*
O&M	*15,919*	*19,342*	*21,174*	*23,687*	*25,946*	*29,415*	*35,217*	*38,147*
EBITDA	**10,573**	**13,146**	**28,637**	**50,470**	**75,234**	**110,536**	**111,718**	**124,724**
Depreciation	*5,956*	*7,630*	*8,924*	*10,902*	*13,463*	*16,361*	*20,188*	*23,361*
Interest	*2,387*	*5,088*	*8,609*	*13,442*	*15,287*	*18,197*	*22,203*	*22,876*
Taxes	*- 967*	*145*	*3,131*	*7,357*	*12,947*	*21,207*	*19,344*	*21,911*
Other Expenses	*5597*	*0*	*0*	*0*	*0*	*34*	*66*	*70*
Net Profit	**-2,400**	**283**	**7,973**	**18,769**	**33,537**	**54,737**	**49,917**	**56,506**
Cash from Operations	*10,878*	*16,143*	*28,912*	*48,237*	*73,153*	*112,291*	*121,418*	*130,681*
Capital Expenditures	*50,777*	*87,649*	*94,420*	*86,243*	*68,784*	*88,905*	*127,954*	*139,297*
Debt Service	*-11,982*	*20,519*	*27,517*	*40,634*	*44,768*	*42,045*	*50,629*	*51,819*
Funding Requirement	*27,917*	*92,025*	*93,025*	*78,640*	*40,399*	*18,659*	*57,165*	*60,435*
Assets, *including:*	**216,836**	**328,258**	**416,234**	**516,640**	**595,855**	**713,718**	**834,066**	**963,916**
Non-current assets	*202,246*	*291,989*	*391,873*	*486,433*	*559,773*	*650,035*	*775,154*	*911,659*
Current Assets	*14,590*	*36,269*	*24,361*	*30,207*	*36,082*	*63,683*	*58,912*	*52,257*
Liabilities, *including:*	**148,250**	**250,386**	**320,389**	**392,025**	**427,703**	**480,833**	**551,274**	**624,628**
Non-current Liabilities	*128,540*	*223,260*	*289,104*	*356,462*	*393,996*	*441,029*	*502,424*	*570,054*
Current Liabilities	*19,710*	*27,126*	*31,285*	*35,563*	*33,707*	*39,804*	*48,850*	*54,574*
Equity	**68,588**	**77,872**	**95,845**	**124,613**	**168,151**	**232,884**	**282,792**	**339,289**
Total Equity and Liabilities	**216,836**	**328,258**	**416,234**	**516,640**	**595,855**	**713,718**	**834,066**	**963,916**
Key Ratios								
Debt/Equity	*1.50*	*2.29*	*2.66*	*2.50*	*1.97*	*1.43*	*1.34*	*1.26*
DSCR	*1.06*	*0.70*	*1.14*	*1.32*	*1.77*	*2.72*	*2.23*	*2.44*
Current Ratio	*0.74*	*1.34*	*0.78*	*0.85*	*1.07*	*1.60*	*1.21*	*0.96*
EBITDA Margin	*15%*	*14%*	*25%*	*34%*	*40%*	*47%*	*44%*	*44%*

**Based on MYPD2 Application and Staff Estimates*

Financial Analysis of Projects Financed by the IBRD Loan

Component A – The Medupi Power Plant

30. Capital Costs and Financing Plan: The project base capital-costs are expected to be R83.2 billion in nominal terms. An additional R6.0 billion are considered as Eskom's development costs associated with the project and R9.3 billion are allocated for contingencies on placed and unplaced contracts resulting in an overall project cost of about R98.5billion (for funding purposes). The total cost of the Medupi Power Plant is estimated at R125.7 billion including interest during construction. Approximately R18.6 billion or 15 percent of the total project cost was expended in FY07-FY09, while the remaining costs are expected to be incurred in FY10-FY16.

31. It is expected that the project will be funded through debt facilities from IBRD (R825 million), CTF (R750 million) and AFD (R750 million). The loan disbursements will start in FY11. IBRD will also finance interest during construction for its own debt tranche for the project. Remaining estimated financing needs of about R1,056 million or 31 percent of the total project costs on are expected to be financed by Eskom and other lenders such as AfDB and other bilaterals.

32. Operating Assumptions: The proposed investment is expected to generate revenues of R1.11/kWh (in 2009 Rands). This assumption is based on NERSA's announcement on REFITs on October 29, 2009 in which the regulator indicated that it would allow renewable energy producers to recover the real weighted average cost of capital (12 percent) plus the rate of domestic inflation (6 percent). Under the base case assumptions the project is expected to result in 18 percent FIRR for Eskom. These revenues are assumed to grow at the rate of domestic inflation. The average plant load factor is estimated to be 25 percent. Operations and maintenance costs are assumed to be R96/kW/year plus 11.7 EUR /kW/year as per Eskom estimates. Transmission and distribution losses are estimated at 11 percent, while transmission and distribution expenses are projected to be around 15 percent of the total plant revenues in line with the current Eskom average. The total useful life of the project is estimated at 20 years.

33. Projected Project Cashflow: Total revenues of the project during its 20 years of operation period are projected at R8.4 billion. Total operating-costs of the plant during its useful life period are estimated around R805 million, while transmission and distribution expenses are expected to reach R1.3 billion. Projected total EBITDA of the project is around R6.3 billion.

34. Financial Rate of Return and Net Present Value: Under the base case scenario, it is expected that the project will have a FIRR of 6.8 percent. The NPV of the project is estimated at negative R678 million (about US$90 million), assuming a discount rate of 10.3 percent, which is Eskom's current estimated average weighted cost of capital. The FIRR for the equity component of the project (Eskom's own capital) is estimated to be 18 percent, while the nominal NPV for Eskom is estimated to be R398 million (about US$53 million). The NPV and IRR are higher for Eskom due to significant leveraging of the project: approximately 69 percent of the project capital is expected to be financed by loans directly associated with the Sere Wind Power Project.

35. Sensitivity Analysis: A sensitivity analysis was conducted to assess the financial viability of the project. Scenarios examined include: (a) Project implementation delay of one year (FY14 commissioning of the plant) and payment of contingencies (R303 million in FY11-FY14); (b) Lower than expected REFIT: 10 percent less than the current expected tariff at commissioning; (c) Construction cost overruns of 10 percent; and (d) Decrease in Load Factor of the Plant by 10 percent.

36. The results of the sensitivity analysis are shown below in Table 12. The analysis shows that although on a standalone basis the project is likely to result in negative NPV under all of the sensitivity scenarios, the availability of long term funding from CTF and IBRD would allow Eskom to achieve positive financial returns under the base case, and all sensitivity scenarios with the exception of the Worst Case Scenerio. Financial performance of the project is most sensitive to implementation delays and the load factor of the plant associated with wind i.e. average wind availability during the year for operation of the plant.

Table 12: Medupi Power Plant - Sensitivity and Scenario Analyses

Scenario	Project IRR	Project NPV (Rand billions)	Eskom IRR	Eskom NPV (Rand billions)
Base Case	**17.5%**	**117**	**21.4%**	**129**
Project implementation delay (1 year)	16.1%	105	18.9%	116
Lower than anticipated Tariff Increases	14.1%	54	16.7%	66
Construction cost overruns of 10%	16.8%	112	20.1%	123
Increase in O&M Costs, incl. coal of 5%	17.4%	116	21.2%	128
Worst Case Scenario (Combination of the above)	*13.0%*	*42*	*14.8%*	*54*

Component B.1 – The Sere Wind Power Project (100 MW)

37. Capital Costs and Financing Plan: The project base capital-costs are expected to be R2,759 million in nominal terms. An additional R284 million are considered as Eskom's development costs associated with the project and R303 million are allocated for contingencies on unplaced contracts resulting in an overall project cost of about R3,347 million. The total cost of the Sere Wind Power Project is estimated at R 3,381 billion including interest during construction. These costs are expected to be incurred in FY10-FY14 and the first electricity production is projected in FY13.

38. It is expected that the project will be funded through debt facilities from IBRD (R825 million), CTF (R750 million) and other DFIs (R750 million). The loan disbursements will start in FY11. IBRD will also finance interest during construction for its own debt tranche for the project. Remaining estimated financing needs of about R1,056 million or 31 percent of the total project costs on are expected to be financed by Eskom and other lenders such as AfDB and other bilaterals.

39. Operating Assumptions: The proposed investment is expected to generate revenues of R1.11/kWh (in 2009 Rands). This assumption is based on NERSA's announcement on REFITs on October 29, 2009 in which the regulator indicated that it would allow renewable energy producers to recover the real weighted average cost of capital (12 percent) plus the rate of domestic inflation (6 percent). Under the base case assumptions the project is expected to result in 18 percent FIRR for Eskom. These revenues are assumed to grow at the rate of domestic inflation. The average plant load factor is estimated to be 25 percent. Operations and maintenance costs are assumed to be R96/kW/year plus 11.7 EUR /kW/year as per Eskom estimates. Transmission and distribution losses are estimated at 11 percent, while transmission and distribution expenses are projected to be around 15 percent of the total plant revenues in line with the current Eskom average. The total useful life of the project is estimated at 20 years.

40. Projected Project Cashflow: Total revenues of the project during its 20 years of operation period are projected at R8.4 billion. Total operating-costs of the plant during its useful life period are estimated around R805 million, while transmission and distribution expenses are expected to reach R1.3 billion. Projected total EBITDA of the project is around R6.3 billion.

41. Financial Rate of Return and Net Present Value: Under the base case scenario, it is expected that the project will have a FIRR of 6.8 percent. The NPV of the project is estimated at negative R678 million (about US$90 million), assuming a discount rate of 10.3 percent, which is Eskom's current estimated average weighted cost of capital. The FIRR for the equity component of the project (Eskom's own capital) is estimated to be 18 percent, while the nominal NPV for Eskom is estimated to be R398 million (about US$53 million). The NPV and IRR are higher for

Eskom due to significant leveraging of the project: approximately 69 percent of the project capital is expected to be financed by loans directly associated with the Sere Wind Power Project.

42. Sensitivity Analysis: A sensitivity analysis was conducted to assess the financial viability of the project. Scenarios examined include: (a) Project implementation delay of one year (FY14 commissioning of the plant) and payment of contingencies (R303 million in FY11-FY14); (b) Lower than expected REFIT: 10 percent less than the current expected tariff at commissioning; (c) Construction cost overruns of 10 percent; and (d) Decrease in Load Factor of the Plant by 10 percent.

43. The results of the sensitivity analysis are shown below in Table 13. The analysis shows that although on a standalone basis the project is likely to result in negative NPV under all of the sensitivity scenarios, the availability of long term funding from CTF and IBRD would allow Eskom to achieve positive financial returns under the base case, and all sensitivity scenarios with the exception of the Worst Case Scenerio. Financial performance of the project is most sensitive to implementation delays and the load factor of the plant associated with wind i.e. average wind availability during the year for operation of the plant.

Table 13: Sere Wind Power Project - Sensitivity and Scenario Analyses

Scenario	Project IRR	Project NPV (Rand millions)	Eskom IRR	Eskom NPV (Rand millions)
Base Case	**6.8%**	**-678**	**18%**	**398**
Project implementation delay (1 year)	5.3%	-1,073	10.3%	2
Lower than anticipated REFITs (by 10%)	5.6%	-885	14.1%	190
Construction cost overruns of 10%	6.0%	-891	13.0%	185
Decrease in Load Factor by 10%	5.6%	-885	14.0%	190
Worst Case Scenario (Combination of above)	*2.4%*	*-1,671*	*3.3%*	*-596*

44. Additional analysis of the project has been carried out to include potential revenues resulting from the sales of carbon credits. The following assumptions were utilized for these calculations: the South African grid emission factor (the amount of carbon emissions associated with each unit of electricity in an electricity grid) was estimated at 1.02 and realization price of carbon credits was projected at US$10/ton. Based on these assumptions, sales of carbon credits of the wind project are expected to generate US$2.2 or R298 million annually. The impact of these cash flows on the Eskom's IRR and NPV of the project will be minimal: the IRR would increase by 0.04 percent, while the NPV is expected to increase by R2 billion.

Component B.2 – The Upington Concentrating Solar Power Project (100 MW)

45. Capital Costs and Financing Plan: The project base capital-costs are expected to be R4,670 million in nominal terms. An additional R75 million are considered as Eskom's development costs associated with the project and R1,125 million are allocated for contingencies on unplaced contracts resulting in an overall project cost of about R5,870 million for funding purposes. The total cost of the Upington CSP is estimated at R6,040 million including interest during construction. These costs are expected to be incurred in FY10-FY14 and the first electricity production is projected in FY14.

46. Approximately 50 percent of the project's total cost will be funded through debt facilities from IBRD (R1,125 million) and CTF (R1,870 million). The loan disbursements will start in FY11. IBRD will also finance Interest during Construction for its own debt tranche for the project. Remaining estimated financing needs of about R3,045 million are expected to be financed by Eskom.

47. Operating Assumptions: The proposed investment is expected to generate revenues of R1.49/Kwh (in 2009 Rands). This assumption is based on the NERSA's announcement on Renewal Energy Feed-in Tariffs (REFITs) on October 29, 2009 in which the regulator indicated that it would allow renewable energy producers to recover the real weighted average cost of capital (12 percent) plus the rate of domestic inflation (6 percent). Under our base case assumptions the project is expected to result in 18 percent FIRR for Eskom. Even though it is intended to design the plant for a load factor of 60-65 percent, because of the limited long-term experience with the technology, the financial analysis is based on a conservative load factor of 40 percent. Operations and maintenance cost are assumed to be R1,090/kW/year of capacity, while variable operations and maintenance costs are projected at R12.9 / MW/hr (in FY10 prices) as per Eskom estimates. Transmission and distribution losses are estimated at 11 percent, while transmission and distribution expenses are projected to be around 15 percent of the total plant revenues in line with the current Eskom average. The total useful life of the project is estimated at 20 years.

48. Projected Project Cashflow: Total revenues of the project during its 20 years operation period are estimated at R18.8 billion, while the total operating-costs of the plant during its useful life period are estimated at R4.6 billion. Transmission and distribution expenses are expected to reach R2.8 billion. Projected total EBITDA of the project is R11.4 billion.

49. Financial Rate of Return and Net Present Value: Based on the financial analysis carried out for the project, the Upington CSP Project is expected to be financially viable for Eskom. Under the base case scenario, it is expected that the project will have a Financial Rate of Return (FIRR) of 7.6 percent. The nominal Net Present Value (NPV) of the project is estimated at negative R909 million (about US$121 million), assuming a discount rate of 10.3 percent, which is Eskom's current estimated average weighted cost of capital. The FIRR for the equity component of the project (Eskom's own capital) is estimated to be 18 percent, while the nominal NPV for Eskom is estimated to be R1,094 million (about US$254 million). The NPV and IRR are higher for Eskom due to significant leveraging of the project - approximately 50 percent of the project capital is expected to be financed by loans from IBRD and CTF.

50. Sensitivity Analysis: A sensitivity analysis has been conducted to assess the financial viability of the project. Scenarios examined include: (a) Project implementation delay resulting in commissioning of the plant in FY15 and payment of contingencies (R1,125 million in FY11-FY14) ; (b) Lower than expected REFIT: 10 percent less than the current expected tariffs at commissioning; (c) Construction cost overruns of 10 percent of base project costs; and (d) Decrease in Load Factor of the Plant by 10 percent.

51. The results of the sensitivity analysis are shown below in Table 14. A review of this analysis shows that the project viability is highly sensitive to: project implementation delays, lower REFIT tariffs and the changes to the load factor of the plant, i.e. average solar intensity and solar availability during the operations of the plant. The outcome of the analysis indicate that although Upington CSP Project is not financially viable for Eskom on a standalone basis, availability of long term, low cost financing from CTF and IBRD will allow Eskom to achieve healthy 18 percent FIRR under the base case assumptions and positive NPV under most of the sensitivity scenarios.

Table 14: Upington CSP Project - Sensitivity and Scenario Analyses

Scenario	Project IRR	Project NPV (Rand millions)	Eskom IRR	Eskom NPV (Rand millions)
Base Case	**7.6%**	**-909**	**18%**	**1,094**
Project implementation delay (1 year)	5.0%	-2,112	9.8%	-108

Scenario	Project IRR	Project NPV (Rand millions)	Eskom IRR	Eskom NPV (Rand millions)
Lower than anticipated REFITs (by 10%)	6.1%	-1,336	15.3%	668
Construction cost overruns of 10%	6.7%	-1,298	14.4%	705
Decrease in Load Factor by 10%	6.1%	-1,331	15.3%	673
Worst Case Scenario (Combination of the above)	*1.7%*	*-3,342*	*4.4%*	*-1,339*

52. Additional analysis of the project has also been carried out to include potential revenues resulting from the sale of carbon credits. The following assumptions were utilized for these calculations: the South African grid emission factor (the amount of carbon dioxide emissions associated with each unit of electricity in an electricity grid) was estimated at 1.02 and realization price of carbon credits was projected at US$10/ton. Based on these assumptions, sales of carbon credits of the wind project are expected to generate US$6.3 or R477 million annually. The impact of these cash flows on the Eskom's IRR and NPV of the project will be minimal: the IRR would increase by 0.1 percent, while the NPV is expected to increase by R3 billion.

Component C.1 – The Majuba Rail Project

53. Capital Costs and Financing Plan: The project base capital-costs are expected to be R2,672 million in nominal terms. An additional R477 million are considered as Eskom's development costs associated with the project and R383 million are allocated for contingencies on placed and unplaced contracts resulting in an overall project cost of about R3,532 billion for funding purposes. The total cost of the Majuba Rail Project is estimated at R4,234 million including interest during construction. Eskom began development and pre-investment expenditures on the project in FY08 and approximately R173 million or 5 percent of the total project cost has been spent in FY08-FY09. The remaining costs are expected to be incurred in FY10-FY14.

54. It is expected that the project will be mostly funded through debt facilities from IBRD (R3, 375 or US$450 million). IBRD will also finance interest during construction for its own debt tranche for the project. Remaining financing needs of about R859 million are expected to be financed by Eskom.

55. Operating Assumptions: The Majuba Rail project involves construction of a 68 km railway line from the west of Ermelo to the existing Majuba Power Plant. The railway line will change coal supply logistics to the Majuba Power Plant from a combination of road transport (700 trucks per day or 7 million tons/year) and rail using the GFB network (6 million tons/year) to the new rail link which will transport around 13 million tons of coal per year and reduce the average haul distance by 150 km. The new line is expected to be commissioned in January 2014.

56. The main financial benefit of the project is reduction of operating-costs to Eskom. The current cost of transporting the coal via road is R74.3/ton and the average cost of rail transport using the GFB is R83.2/ton. The new Majuba line will transport almost all the coal consumed by Majuba power plant. The coal is planned to be supplied from five mines in the Witbank area. The new line will be operated by Transnet Freight Rail (TFR), state owned rail freight operator of South Africa. A Coal Transportation Agreement (CTA) is under development between TFR and Eskom. The CTA will include the terms and conditions for the operation of the transportation of coal in the Majuba line using rolling stock supplied, maintained and managed by TFR. Although the CTA has not been finalized, the parties reached a preliminary agreement that the coal transportation tariff that TFR will charge Eskom for the operation of the line will be R24.27/ton.

57. Eskom will be responsible for the maintenance of the infrastructure, including the signaling and electrification equipment. The total annual maintenance costs are estimated at R12 million. It is also projected that the amount of coal consumed by the Majuba power plant will gradually decrease from 13 MTpa in FY14 to 9.9 MTpa in FY44 due to aging of the plant and decline of its generation capacity. For the purposes of the financial analysis, all costs are expected to grow in line with inflation rate.

58. Projected Project Cashflow: The total amount of savings that the project is projected to generate after the new line becomes operational in FY14 is estimated to be about R60 billion per annum. These savings are calculated as the difference between the cost of maintaining the current mode of coal transport (combination of road and rail) and the use of the new Majuba rail line. The maintenance cost during the useful life of the project is expected to reach R1.1 billion, while the total capital expenditures will be around R3,149 million.

59. Financial Rate of Return and Net Present Value: Based on the financial analysis carried out for the project, the Majuba Rail Project is expected to be financially viable. Under the base case scenario, it is expected that the project will have a Financial Rate of Return (FIRR) of 30.3 percent. The NPV of the project is estimated at R5,687million (about US$ 758 million), assuming a discount rate of 10.3 percent, which is Eskom's current estimated average weighted cost of capital. The FIRR for the equity component of the project (Eskom's own capital) is estimated to be 69.5 percent, while the nominal NPV for Eskom is estimated to be R6,528 million (about US$870 million). The NPV and IRR are higher for Eskom due to significant leveraging of the project - around 80 percent of the project capital is expected to be financed by loans directly associated with the Majuba Rail Project from IBRD.

60. Sensitivity Analysis: A sensitivity analysis has been conducted to assess the financial viability of the project. Scenarios that have been tested include: (a) Project implementation delay resulting in commissioning of the rail in FY15 (vs. FY14 in the base case) and payment of contingencies (R383 million in FY11-FY14); (b) Higher than expected transportation tariff: 20 percent more than the current expected agreement between Eskom and TFR.; (c) Construction cost overruns of 10 percent of base project costs; and (d) Increase in O&M costs of 5 percent over and above the projected inflation rate.

61. The results of the sensitivity analysis are shown below in Table 15. A review of this analysis shows that the project is financially viable in all cases, including the worst case scenario (all downside sensitivities occur at the same time). The project viability is sensitive to implementation delay and transportation tariff charged by TFR for the proposed project. The project is relatively immune to construction cost overruns and increase in O&M costs.

Table 15: Majuba Rail Project - Sensitivity and Scenario Analyses

Scenario	Project IRR	Project NPV (Rand millions)	Eskom IRR	Eskom NPV (Rand millions)
Base Case	**30.3%**	**5,687**	**69.5%**	**6,528**
Project implementation delay (1 year)	24.7%	4,957	52.7%	5,779
Higher than anticipated transportation tariff	28.9%	5,206	68.1%	6,048
Construction cost overruns of 10%	28.6%	5,530	63.0%	6,372
Increase in O&M Costs by 5%	30.2%	5,567	69.5%	6,408
Worst Case Scenario (Combination of the above)	*22.4%*	*4,232*	*45.7%*	*5,074*

Annex 11: Safeguard Policy Issues

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

Executive Summary of Safeguard Diagnostic Review prepared by the Bank under OP 4.00

BP 4.00 requires that for projects in which safeguards are being addressed through the use of country systems, the findings of the Safeguards Diagnostic Review are summarized in an annex to the PAD. It is standard procedure to accomplish this by reproducing the Executive Summary of the Safeguards Diagnostic Review (SDR) in this annex.

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 World 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 World 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 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. This SDR is prepared for the Eskom Investment Support Project (EISP) in South Africa. The project has been requested by the Government of South Africa (GoSA) to support selected investments by Eskom Holdings Ltd. (Eskom) in the power sector. The SDR describes the scope, methodology, and findings of the equivalence analysis and acceptability assessment carried out in South Africa by staff from the World Bank. It also identifies and proposes 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, 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 (DoEA).[181] 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. This revised document takes into consideration comments received from stakeholders, and is being disclosed by the Bank and by Eskom.

5. **Project Objectives**. The strategic objectives of the EISP are to: (a) support the GoSA in removal of the growing infrastructure bottlenecks on an accelerated basis; and (b) revive economic growth in the Southern Africa region through enhancement of South Africa's power supplies in an efficient and sustainable manner to bridge current and projected electricity supply-demand imbalances that already have taken a toll on sustained regional as well as South Africa's economic growth. The objective of the SDR is to assess the borrower's safeguards systems, and for this purpose the SDR has looked at safeguards documents prepared for several Eskom investment projects, not all of which would receive Bank support.

6. **Project Components.** The proposed Project, which will be implemented by Eskom, will consist of three Components. Section II.C of the PAD provides further details.

7. For purposes of assessing 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, the Medupi Power Plant and another major Eskom investment currently under construction, the 4,800 MW Kusile power plant in Mpumalanga Province, were selected by the Bank team 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 achieves two important objectives: it allows the SDR to assess the integrity and robustness of DoEA's environmental review and approval process for two major projects that could be considered of national importance; and it provides broader 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 is well underway for both the Medupi and Kusile power plant projects. Moreover, this focus on these two key projects is a particularly valuable approach because both the safeguards work and the initial stages of construction have been 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 SDR analytical work focuses 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 additional Eskom investments that are expected to be financed in part by the Bank's EISP. For example, in preparing the SDR, the Bank team also reviewed the final EIRs prepared by Eskom for the proposed Sere Wind Power Project (WPP) in Western Cape Province, the Concentrating Solar Power (CSP) plant near Upington in Northern Cape Province, and the 67-km Ermelo-Majuba rail line for coal transport in Mpumalanga Province, 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,

[181] From 1994 through May 2009, DoEA 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, DoEA 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.

Physical Cultural Resources, and Involuntary Resettlement. The Bank team also will continue reviewing the safeguards documents, such as Environmental Impact Reports (EIRs), Environmental Management Plans (EMPs), or similar documents, prepared by Eskom for other EISP 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 has already been 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 are 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,[182] 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 is reason to expect that Eskom's systems are likely to demonstrate strong equivalence with the World 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.** This SDR for the EISP builds and expands on the results of the SDR completed in March 2009 for the GEF-funded iSimangaliso project, which received Board approval in December 2009. Although the iSimangaliso project involved a protected natural habitat rather than an energy generation (and associated infrastructure) project, the SDR included an Equivalence Analysis of the South African legal framework for Environmental Assessment, Natural Habitats, Physical Cultural Resources, and Involuntary Resettlement. The March 2009 SDR 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 its application to management of a designated protected area.

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

[182] www.unglobalcompact.org.

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 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 DoEA. 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 DoEA 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 DoEA 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 this report.

Summary of Equivalence Analysis

18. The first step in the Equivalence Analysis is to identify the World Bank environmental and social safeguard policies triggered by the project. The four environmental and social safeguards triggered by the project include: Environmental Assessment (EA); Natural Habitats (NH); Physical Cultural Resources (PCR); and Involuntary Resettlement (IR).

19. This Equivalence Analysis finds that South Africa's regulatory systems for all of the four safeguards applicable to the 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. DoEA (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 EIA), 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 legislation concerning land acquisition.

  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 appear 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.

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 project include, in the first instance the borrower, Eskom, as well as DoEA (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 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. **DoEA**. Established in 1994, as the Department of Environmental Affairs and Tourism, DoEA 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. DoEA 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 DoEA has been fully engaged in developing and implementing ambient air and emissions standards that are aligned with international good practice as defined by the World Bank, the European Union, and the United States Environmental Protection Agency.

Processes and Procedure for Environmental Assessment and Management for Coal-Fired Thermal Power Plants and Associated Infrastructure

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, DoEA (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.

33. South Africa's legal and regulatory framework for management of ambient air quality is based on World Health Organization standards, and is therefore closely aligned with those used by the World Bank Group (WBG) as specified in the WBG General Environmental, Health and Safety Guidelines (EHSG) issued in April 2007. With respect to levels of emissions from thermal power plants, the proposed South African regulatory approach to emissions standards for new plants is generally comparable to the WBG EHSG for Thermal Power issued in December 2008 in that it distinguishes between new and existing plants and sets more stringent requirements for plants that discharge emissions to a degraded airshed. (see Annex 4 of the SDR).

34. Permitting is a key output of the EIA process in South Africa. With respect to the air quality impacts of electrical generating facilities, the principal authorization is the Atmospheric Emission License (AEL). The granting of an AEL must be preceded by the issuance of a ROD, now referred to as an Environmental Authorization, for an EIA application, which, for listed activities (including thermal power plants with more than 70 MW heat output) is required to be accompanied by an Air Quality Impact Assessment Study prepared by qualified specialists. Metropolitan and district municipalities are charged with implementing the atmospheric licensing system per Section 36 of the Air Quality Act of 2004 (AQA), subject to alternative arrangements in which a provincial organ of state may be designated as the issuing authority. The contents of an AEL must include the maximum allowed amount, volume, and emission rate or concentration of pollutants that may discharged into the atmosphere under normal working conditions and during start-up, maintenance, and shut-down conditions.

35. Compliance monitoring and enforcement requirements for ambient air quality and emissions from electricity generating facilities are set forth in the Atmospheric Pollution Prevention Act of 1965 (APPA) which is being phased out under the terms of the 2004 AQA. Standards issued under the AQA also set forth reference methods and siting criteria for sampling of priority air pollutants associated with electricity generation facilities including particulate matter (PM_{10}), sulfur dioxide (SO_2), nitrogen oxides (NO_x), and carbon monoxide (CO) as well as ozone, lead, and benzene.

36. As part of the National Framework for Air Quality Management in South Africa (National Framework), and in implementation of mandatory provisions of the AQA, an extensive network of ambient air quality stations has been established, owned and operated by a variety of organizations. South African National Standards (SANS) for ambient air quality monitoring have been established.

37. However, the AQA itself makes no provision for the enforcement of its own provisions; rather, enforcement provisions are located in NEMA as framework legislation, where provision is made for the statutory designation of Environmental Management Inspectors (EMIs) to monitor compliance with and enforce AQA. NEMA grants EMIs (acting within their designation and mandate) extremely wide powers, including powers of inspection, investigation, administrative and enforcement actions. The first EMIs were designated by the Minister of Environmental Affairs and Tourism in June 2006 and there were 903 trained and designated EMIs reached as of March 31, 2008.

Processes and Procedures for Management of Social Impacts from Thermal Power Plants and Associated Infrastructure

38. 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.

39. Eskom provides security of tenure to resettled parties and helps register deeds of ownership.

40. Replacement accommodation is based on South African Bureau of Standards requirements for housing, which require minimum brick, mortar and tile structures with running potable water and proper sanitation. Where cost-effective, Eskom also seeks to provide electricity to replacement structures. Eskom's expenditure in these transactions is strictly controlled by the Public Finance Management Act; however, it is Eskom's policy to ensure that resettled parties are better off than prior to resettlement. Eskom seeks to maximize employment of displaced persons in whatever jobs may be available on project sites. However, these are typically unskilled construction jobs of limited duration.

41. Where in-kind resettlement opportunities are not available, Eskom provides cash compensation based on an independent valuation using open market selling trends of similar land based on registered sales over a period between three months and three years. In cases where the land owner disagrees with the compensation offered, the owner is entitled to hire a valuer of his or her own choosing, with the final offer typically reflecting the difference between the two valuations.

42. 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

43. In examining the EIA process for both the Medupi and Kusile projects, 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, 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.

44. The main issues raised by stakeholders for the Medupi and Kusile projects concerned increases in air and noise pollution and the consequent potential impacts on public health. The issues raised and the responses by Eskom and government authorities to public comments and questions is 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. The public consultation process is continued during construction, and will continue throughout project implementation with the assignment of Environmental Control Officers and the constitution of Environmental Monitoring Committees that include local stakeholder representatives.

Outputs: EIA Process and EIR Content for Medupi and Kusile

45. The EIA process for the Medupi and Kusile plants, as well as associated transmission lines and most of the investments under consideration for the EISP, 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.[183] The EIA processes and content of the EIRs for the two thermal power plants now under construction conform fully to the regulatory requirements in effect at the time that the applications to commence the EIA process were approved, i.e., the EIA Regulations issued in 1997 under the authority of the ECA of 1989. However, the EIA process and EIR content for both projects was strongly influenced by and is essentially consistent with the EIA Regulations that became effective in July 2006, although they are not legally applicable to the Medupi and Kusile projects. This is because the EIA process for both projects began at a time when the draft new regulations were already out for public comment; therefore, Eskom chose, and instructed its consultants, to conform with the proposed new regulations as well. As noted in the Equivalence section of this report, the 2006 EIA Regulations are nearly fully equivalent to the Objectives and Operational Principles of OP 4.00 Table A1 with the exception of an ambiguity in the regulations regarding whether capital and recurrent costs, and training and monitoring requirements are among the criteria to be considered as part of the alternatives assessment. However, as would be expected, these criteria were fully addressed in the strategic planning and project-specific EIA process for the two plants as per Eskom's corporate practice.

46. An independent assessment of the EIA process and resulting EIRs 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 and which also make reference to the WBG Thermal Power Guidelines issued under the 1998 PPAH and as revised in December 2008.

47. The Bank's own review of the EIRs indicated 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.

48. To date final EMPs have been prepared and approved by DoEA 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 satisfy South African regulatory requirements and are consistent with Bank-recommended practice for EMP.

49. The EIRs for the two plants were approved by DoEA 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. These impacts relate primarily to air emissions and ambient air impacts; liquid effluent control; management of ash and other solid wastes; and hazard assessment. 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 DoEA) and establish Environmental Monitoring Committees including local stakeholder representatives. The RODs demonstrate that DoEA has the capacity and commitment to independently assess and identify conditions that should be imposed on projects on a case-by-case basis.

50. It should be noted that the RODs issued by DoEA 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, Eskom must still obtain individual

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

permits, including an AEL from the Chief Air Pollution Control Officer (DoEA) as per the AQA, a Water Use License, and licenses for waste disposal, among others. Issuance of some of these licenses, especially for the operational phase, is still pending. RODs for some of the other EISP components and associated transmission lines are publicly disclosed and available on DoEA's website (http://www.environment.gov.za/).

Projected Outcomes: Environment

51. The major potential environmental impacts of both the Medupi and Kusile projects relate to the impact of emissions on local air quality and human health, in particular with respect to the major pollutant, SO_2. As existing ambient air quality conditions and water resources differ among the two sites, so does the timing of the proposed mitigation measures as presented in the EIR and required by the ROD.

52. The designated airshed at Medupi, which corresponds to the Waterberg District Municipality, is not yet considered degraded with respect to ambient air quality. However, ambient conditions in the airshed are expected to deteriorate in the future. Accordingly, DoEA intends to propose that the Minister declare the Waterberg airshed as a National Priority Area for Air Quality and this declaration is likely to be issued sometime within the next year. Such a declaration would provide DoEA with additional authority to require designated sources of emission, including Eskom, to take specified measures to reduce emissions such that ambient conditions are maintained at acceptable levels. In addition, DoEA has proposed emission limitations for new and existing thermal power plants that will come into effect along with certain provisions of the AQA on April 1, 2010. Under these provisions as currently proposed, Medupi would be required to meet the limitations for existing plants within five years of commencing operations, and the much more stringent limitations applicable to new plants within an additional three to five years.

53. These ambient and emission limitations will oblige Eskom, to take unspecified measures to substantially reduce its sulfur dioxide (SO_2) emissions from the levels that would result from direct unmitigated combustion of coal to levels below the applicable emission limits and to take other actions, as necessary as specified in its ROD, (and to be further specified in its AEL) in order to further reduce its contribution to ambient conditions. Flue Gas Desulfurization (FGD) technology is the only means of achieving significant reductions in SO_2 emissions from a given coal feedstock; accordingly, Eskom's Board of Directors has approved installation of FGD and Eskom has designed and is constructing the Medupi plant to be "FGD-ready," with sufficient infrastructure in place to accommodate installation of wet-FGD technology when it becomes necessary, and technically and operationally feasible to do so. Eskom's staged approach to FGD is consistent with its environmental authorization (the ROD).

54. Although wet-FGD is the most efficient technology for reduction of SO_2 emissions, Eskom faces a potential significant constraint in that wet-FGD is highly water intensive and local sources of water are insufficient to operate the plant at full capacity, even without FGD. Accordingly, Eskom is seeking from DWA an allocation of water from supplemental water sources, sufficient not only to operate the plant at full capacity, but to operate FGD when necessary. This allocation is dependent on the availability of water from the Mokolo and Crocodile Water Augmentation Project (MCWAP) that is being developed by DWA to supply supplemental water to priority users, including Eskom, in the Waterberg District Municipality and elsewhere in Limpopo Province. This water supply is not expected to become available until 2014 at the earliest by which time all six units at Medupi are expected to be operational.

55. As noted above, initially, and for five years of operations, Eskom will be required to operate Medupi in compliance with the proposed emissions standards for existing plants. Based on the data from the EIR, it would appear that Medupi should be able to meet these standards in the absence of FGD. However, once the standard for new plants become applicable to Medupi, in

about 2019, Eskom will need to have FGD installed at Medupi. Accordingly, Eskom is planning to undertake FGD installation from 2018-2021, as part of its scheduled operational maintenance program, during which each power block is taken off-line for routine maintenance beginning after six years of operation. Although progress on the project to supply the required amount of water is on schedule, the Bank has, nevertheless, requested evidence from the Department of Water Affairs, committing to timely water supply to Eskom. Furthermore, in the event that sufficient water is not available (or allocated to Eskom) from the MCWAP, the Bank will recommend that Eskom proactively investigate the feasibility of using a less water intensive dry-FGD technology prior to commencing full operations.

56. It should be noted that with either wet- or dry-FGD technology installed it is expected that Medupi would be able to operate in compliance not only with the proposed South African limitations for new plants, but with the equally stringent World Bank Group Environment, Health and Safety Guidelines for Thermal Power plants issued in December 2008.

57. In contrast to Medupi, Kusile is located in an airshed that is already considered degraded with respect to particulates, but is adequately supplied with sufficient water to operate a wet-FGD system from the commencement of operations. Therefore the ROD for Kusile requires that the FGD system be fully operational at commissioning. Accordingly, Kusile will comply from the outset with international good practice as recommended in the Bank's 2008 EHSG for Thermal Power Plants, as well as with the forthcoming national regulations for new sources. Both plants are to be equipped with fabric (baghouse) filters to control emissions of particulates, and low-NO_x burners to reduce emissions of NO_x to levels consistent with proposed South African regulatory requirements and international good practice as recommended in the Bank's 2008 EHSG for Thermal Power Plants.

58. With respect to wastewater control, both Medupi and Kusile are designed as Zero Effluent Discharge facilities during operations, with all process and wastewater to be recycled. Solid waste, in the form of coal ash, will be disposed of in engineered ash storage facilities that will be lined and equipped with leachate detection and collection capacity. Ash disposal will occur with the minimum amount of water necessary to prevent dust formation; once deposited, the ash is quickly covered with topsoil for purposes of revegetation.

Projected Outcomes: Social Impacts

59. The social impacts from both Medupi and Kusile are of a moderate scale. As explained below, there was no need to conduct a full Resettlement Action Plan or Framework under OP 4.00 Table A1 (or OP 4.12) for the Medupi project, and resettlement was relatively small scale for the Kusile project. In neither case has expropriation been required nor are there any outstanding restitution claims on lands to be acquired for the projects. In both cases land has been acquired by Eskom through voluntary willing buyer-willing seller transactions at realistic market based prices wherein land was acquired from local farmers. Social assessment and public outreach were undertaken to fully identify individuals and households, including neighboring farms and farm laborers, whose livelihoods might be affected by the land acquisition and other project activities.

60. For the construction and operation of Medupi two game farms were purchased by Eskom. At one of the game farms there was one full-time worker residing on the farm at the time of purchase, and it was agreed that the farm worker will continue to be in the owner's employ and be relocated at the owner's expense to one of his other properties. No laborers or any other occupiers resided on the other farm at the time of purchase, and therefore no relocations were required with respect to that property.

61. At Kusile, social assessment indicated the presence of 18 family units of farm laborers requiring resettlement. To implement the resettlement, Eskom engaged the services of a

specialized contractor, and, through a process of extensive consultation with the directly affected people, provided the families with several resettlement options on neighboring farms, some owned by Eskom, or on other land leased from other farmers for the purpose of resettlement. The families that opted to resettle on the Eskom-owned farms were provided with permanent homes with individual fencing, running water and sanitation, vegetable gardens, and a playground for children. Eskom assisted the project-affected peoples in establishing a Communal Property Association that would acquire ownership of the properties in the names of the family units. For those families who elected through the consultation process to be resettled on other properties, Eskom arranged to have existing structures rehabilitated or constructed new structures where existing structures were not of sufficient quality.

62. For the transmission lines that will be built as associated facilities for the EISP, 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

63. 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 begins 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 focuses on the consistency of Eskom's policies, procedures, and practices for its projects with respect to OP 4.00 Table A1.

64. **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.

65. 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.

66. 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. In any case, neither the Medupi nor Kusile projects will impact significant areas of high quality natural habitat to an extent that such an offset would be necessary or appropriate.

67. 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.

68. 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 proposes to encourage Eskom to introduce such an administrative mechanism as corporate practice. Eskom has already disclosed on its website its corporate resettlement policy,[184] 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.[185] 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.

69. **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, the Equator Principles, and relevant WBG EHSG. There are, however, two outstanding issues where there are potential gaps in Eskom's performance with respect to the expected outcomes of the Medupi and Kusile projects.

70. With respect to SO_2 emissions and ambient impacts on air quality and human health, the Bank, due to short tenure of its proposed loan agreement, relative to the regulatory timetable for Medupi's compliance with the proposed South African regulations, will seek agreement with Eskom to commit to timely installation of FGD in all six units at Medupi as soon as it is technically and operationally feasible to do so, and to seek Eskom's agreement to provide to the Bank in mid 2013 a report satisfactory to the Bank that provides a plan and schedule for timely installation of SO_2 emissions abatement measures. This may include an independent feasibility analysis of alternative control technologies in the event that sufficient water is not available or allocated to enable Eskom to operate the wet-FGD units. Given that Eskom's compliance with South African emissions requirements can be expected to result from the implementation of the South Africa's existing and proposed regulatory system, without Bank intervention, and the supplemental agreements reached between the Bank and Eskom are for the sole benefit of the Bank as a medium-term lender, these agreements need not be considered as "gap-filling measures" as this term is used in this SDR. However, any subsequent changes in South Africa's regulatory requirements or actions, which would bring this compliance into question, would trigger Bank remedies per OP 4.00.[186]

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[184] "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

[185] "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

[186] OP 4.00, para. 6, "***Changes in Borrower Systems and Bank Remedies.*** If, during project implementation, there are changes in applicable legislation, regulations, rules or procedures, the Bank assesses the effect of those changes and discusses them with the borrower. If, in the judgment of the Bank, the changes reflect a further improvement in the

71. With respect to IR, 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.

country systems, and if the borrower so requests, the Bank may agree to revise the legal framework applicable to the operation to reflect these improvements, and to amend the legal agreement as necessary. Management documents, explains, and justifies any changes to such framework, and submits them for Board approval (normally on an absence of objection basis). If the country system is changed in a manner inconsistent with the legal framework agreed with the Bank, the Bank's contractual remedies apply."

Annex 12: Project Preparation and Processing

SOUTH AFRICA: ESKOM INVESTMENT 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	02/03/10	02/01/10
Negotiations	02/16/10	03/16/10
Board	03/23/10	04/08/10
Planned date of effectiveness	04/20/10	-
Planned date of mid-term review	01/1/13	-
Planned closing date	10/30/15	-

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

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Reynold Duncan	Lead Energy Specialist/Co-Task Team Leader	AFTEG
Pankaj Gupta	Lead Financial Specialist/Co-Task Team Leader	AFTEG
Suman Babbar	Consultant and Project Finance Advisor	AFTEG
Sandeep Mahajan	Lead Economist	AFTP1
Elzbieta Sieminska	Lead Procurement Specialist	AFTPC
V.S. Krishnakumar	Regional Procurement Manager	AFRPC
Mark Walker	Chief Counsel, Africa Region	LEGAF
Edith Ruguru Mwenda	Sr. Counsel	LEGAF
Mohammed Bekhechi	Lead Counsel, Environment	LEGEN
Charles Di Leva	Chief Counsel, Environment	LEGEN
Juan Gaviria	Sector Leader, Sustainable Development	AFTTR
Pierre Pozzo de Borgo	Lead Transport Specialist	AFTTR
Harvey Himberg	Consultant, Environmental Specialist	OPCQC
Harvey van Veldhuizen	Lead Environmental Specialist	OPCQC
Thomas Walton	Consultant, Environmental Specialist	AFTEN
Frederick Edmund Brusberg	Lead Social Development Specialist	SARDE
Mudassar Imran	Sr. Economist	AFTEG
Mustafa Zakir Hussain	Sr. Infrastructure Finance Specialist	FEUFG
Andrey Gurevich	Financial Analyst	AFTEG
Ahmad Slaibi	Young Professional/Economist	AFTEG
Heather B. Worley	Communication Officer	AFREX
Sarwat Hussain	Sr. Communications Officer	AFREX
Karan Capoor	Sr. Financial Specialist	AFTEN
Gert Van Der Linde	Lead Financial Management Specialist	AFTFM
Modupe Adebowale	Senior Financial Management Specialist	AFTFM
Miguel Oliviera	Finance Officer	CTRFC
Andrew Asibey	Senior Monitoring and Evaluation Specialist	AFTRL
Armando Araujo	Consultant/Procurement Advisor	AFTEG
Aman Sachdeva	Consultant/Financial Analyst	AFTEG
Peter M. Meier	Consultant/Power Economics	AFTEG
Richard Bullock	Consultant/Railway Economics	AFTEG
Victor Loksha	Consultant/CTF Financing	AFTEG
Susan Shilling	Program Assistant	AFTEG
Jemima Harlley	Program Assistant	AFCS1
Rita Ahiboh	Program Assistant	AFTEG

Bank funds expended to date on project preparation:

1. Bank resources: ~US$1,500,000
2. Trust funds: None
3. Total: ~US$1,500,000

Estimated Supervision costs:

Estimated annual supervision cost: US$400,000

Annex 13: Documents in the Project File

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

1. Alpha-Charlie (Medupi Power Plant), Business Case, 2005
2. Assessing the macro-economic impact of Eskom's Planned R343 billion capital expenditure on the South African economy, Eskom/BER/CITI, 2008
3. CSP Information Document, Eskom 2009
4. CTF Investment Plan, November 2009
5. Deloitte Report on Eskom Electricity Sector, 2008
6. Electricity Pricing Policy, 2008
7. Eskom Financial Statements and Projections (Dashboard), 2009-10
8. Eskom Long-term Transmission Plans – Presentation to World Bank – November 2008
9. Eskom Medupi Project Independent Assessment – Nexant LLC (USA) – March 2010
10. Expert Panel Report on Project Consistency with Development and Climate Change Strategic Framework – January 2010
11. Hendrina/Matimba Project Information Note
12. Independent Review of Compliance with Equator Principles, SE Solutions (Pty) Ltd.
13. Integrated System Expansion Plan, 2009
14. Long Term Mitigation Scenario, Strategic Options for South Africa – Department of Environmental Affairs – South Africa, October 2007
15. Majuba Rail Economic Analysis – Richard Bullock – December 2009
16. MCWAP EIA Scoping Report (http://www.dwa.gov.za/Projects/MCWAP/EIA.aspx)
17. Medupi Economic Analysis – Peter Meier – December 2009
18. Mokolo and Crocodile Water Augmentation Project – DWAF Presentation to World Bank – December 2009
19. Multi-Year Tariff Determination 2, Eskom November 2009
20. Review of Medupi Contracts – Armando Araujo – February 2010
21. Safeguards Diagnostic Review – World Bank – January 2010
22. SAPP Regional Generation and Transmission Expansion Plan Study, Nexant of USA.
23. Social Impact of Electricity Tariffs, Diego Bondorevsky, 2009
24. South Africa Electrification Program – Electrification Statistics, 2009
25. South Africa Nuclear Energy Policy, 2008
26. Various Presentation, Energy Efficiency and DSM, 2009

Annex 14: Statement of Loans and Credits

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
		Total:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

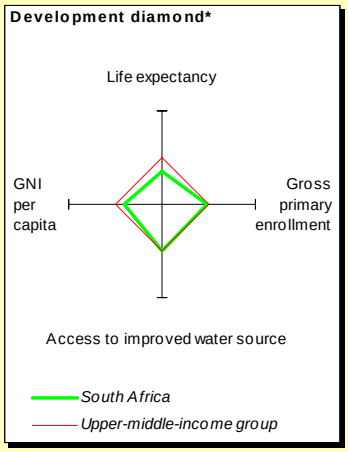
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
1999	AEF Dargle Timbr	0.37	0.00	0.00	0.00	0.37	0.00	0.00	0.00
1999	AEF IHS Techno	0.00	0.00	0.22	0.00	0.00	0.00	0.22	0.00
2000	AEF Tusk	1.61	0.00	0.00	0.00	1.61	0.00	0.00	0.00
2004	African Bank	2.39	0.00	0.00	0.00	0.89	0.00	0.00	0.00
2002	Bioventures	0.00	2.17	0.00	0.00	0.00	1.51	0.00	0.00
2006	Buffalo City	5.87	0.00	0.00	0.00	5.87	0.00	0.00	0.00
2004	City of Johannes	29.00	0.00	0.00	0.00	29.00	0.00	0.00	0.00
2000	EDU LOAN	1.16	0.00	0.00	0.00	1.16	0.00	0.00	0.00
2006	Ethos V	0.00	25.00	0.00	0.00	0.00	1.91	0.00	0.00
2005	FirstRand Lim...	0.00	0.00	26.70	0.00	0.00	0.00	26.70	0.00
	Formeset	1.23	0.00	0.00	0.00	1.23	0.00	0.00	0.00
2004	Hernic	23.02	4.70	1.99	0.00	23.02	4.70	1.93	0.00
2006	Hernic	3.73	0.00	1.52	0.00	0.00	0.00	0.60	0.00
2006	Karsten Farms	6.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Kunene	0.00	0.67	0.00	0.00	0.00	0.67	0.00	0.00
2004	Mvela Gold	0.00	0.00	36.93	0.00	0.00	0.00	36.93	0.00
2002	NAMF	0.00	3.47	0.00	0.00	0.00	2.08	0.00	0.00
2000	SAHL	0.00	2.19	0.00	0.00	0.00	2.11	0.00	0.00
2003	SAHL	0.00	4.19	0.00	0.00	0.00	4.19	0.00	0.00
2004	SAHL	0.00	0.66	0.00	0.00	0.00	0.66	0.00	0.00
2005	SAHL	0.00	0.00	1.29	0.00	0.00	0.00	1.29	0.00
1999	SAPEF	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
	Sphere I	0.00	4.65	0.00	0.00	0.00	0.45	0.00	0.00
2001	Spier	12.43	0.19	0.00	0.00	12.43	0.19	0.00	0.00
	Total portfolio:	87.48	48.14	68.65	0.00	75.58	18.47	67.67	0.00

Annex 15: Country at a Glance

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

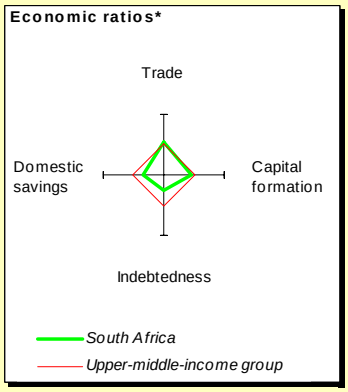
POVERTY and SOCIAL	South Africa	Sub-Saharan Africa	Upper-middle-income
2007			
Population, mid-year *(millions)*	47.6	800	823
GNI per capita *(Atlas method, US$)*	5,760	952	6,987
GNI *(Atlas method, US$ billions)*	274.0	762	5,750
Average annual growth, 2001-07			
Population *(%)*	1.0	2.5	0.7
Labor force *(%)*	1.0	2.6	1.3
Most recent estimate (latest year available, 2001-07)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	60	36	75
Life expectancy at birth *(years)*	51	51	71
Infant mortality *(per 1,000 live births)*	56	94	22
Child malnutrition *(% of children under 5)*	..	27	..
Access to an improved water source *(% of population)*	93	58	95
Literacy *(% of population age 15+)*	..	59	93
Gross primary enrollment *(% of school-age population)*	106	94	111
Male	108	99	112
Female	103	88	109



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

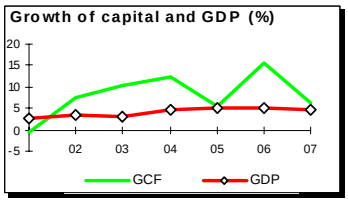
	1987	1997	2006	2007
GDP *(US$ billions)*	104.0	148.8	255.0	277.6
Gross capital formation/GDP	15.8	16.6	20.5	20.1
Exports of goods and services/GDP	30.3	24.6	29.8	30.3
Gross domestic savings/GDP	25.7	17.8	17.1	16.4
Gross national savings/GDP	22.5	15.1	13.9	13.4
Current account balance/GDP	2.8	-1.5	-6.5	-6.4
Interest payments/GDP	..	0.6	0.5	..
Total debt/GDP	..	17.0	13.9	..
Total debt service/exports	..	17.2	6.7	..
Present value of debt/GDP	..	..	14.1	..
Present value of debt/exports	..	..	43.9	..

	1987-97	1997-07	2006	2007	2007-11
(average annual growth)					
GDP	1.3	3.7	5.0	4.8	4.6
GDP per capita	-0.8	2.2	3.9	4.4	4.5
Exports of goods and services	4.7	3.6	5.5	7.0	5.5

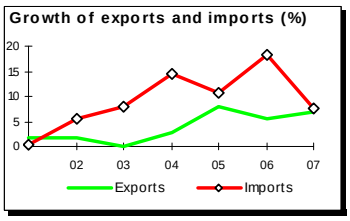


STRUCTURE of the ECONOMY

	1987	1997	2006	2007
(% of GDP)				
Agriculture	5.6	4.0	2.7	2.7
Industry	41.7	32.7	30.9	30.9
Manufacturing	22.4	19.9	18.2	18.2
Services	52.7	63.3	66.4	66.4
Household final consumption expenditure	55.1	63.0	63.5	63.7
General gov't final consumption expenditure	19.2	19.2	19.5	19.9
Imports of goods and services	20.3	23.4	33.2	34.0



	1987-97	1997-07	2006	2007
(average annual growth)				
Agriculture	-0.1	0.6	-13.1	4.8
Industry	0.4	2.8	4.3	4.8
Manufacturing	0.4	3.2	4.8	4.8
Services	1.8	4.4	5.9	4.8
Household final consumption expenditure	1.3	4.1	7.8	3.8
General gov't final consumption expenditure	1.2	4.3	5.4	8.7
Gross capital formation	3.3	6.4	15.5	6.4
Imports of goods and services	6.9	6.5	18.4	7.6



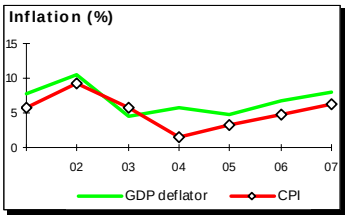
Note: 2007 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

* 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.

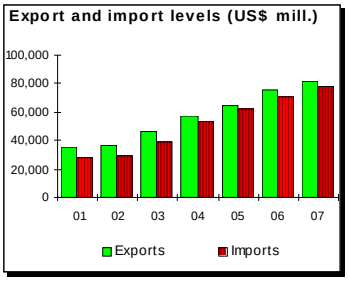
PRICES and GOVERNMENT FINANCE

	1987	1997	2006	2007
Domestic prices				
(% change)				
Consumer prices	17.1	8.6	4.7	6.3
Implicit GDP deflator	14.5	8.1	6.8	8.1
Government finance				
(% of GDP, includes current grants)				
Current revenue	23.9	28.0	26.9	27.4
Current budget balance	-3.0	-2.1	1.6	2.0
Overall surplus/deficit	-6.3	-4.7	0.4	0.8



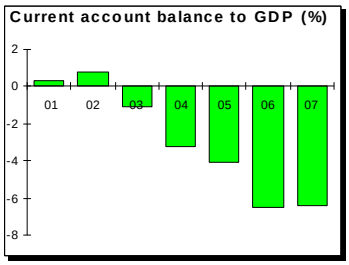
TRADE

	1987	1997	2006	2007
(US$ millions)				
Total exports (fob)	25,964	36,607	75,171	81,806
Gold	10,512	5,596	4,922	5,356
Coal mining	1,261	2,130	3,265	3,553
Manufactures	9,833	18,581	44,081	47,972
Total imports (cif)	15,574	31,398	71,243	77,531
Food	602	1,453	2,328	2,534
Fuel and energy	1,694	2,269	6,854	7,459
Capital goods	2,651	5,854	12,237	13,317
Export price index *(2000=100)*	128	112	115	107
Import price index *(2000=100)*	113	105	111	108
Terms of trade *(2000=100)*	114	107	104	100



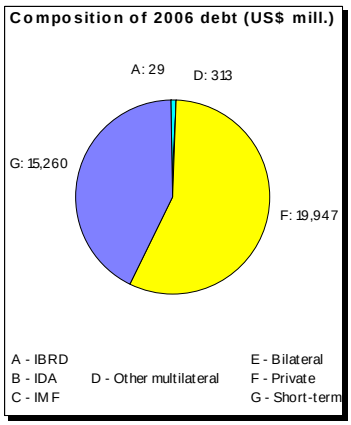
BALANCE of PAYMENTS

	1987	1997	2006	2007
(US$ millions)				
Exports of goods and services	23,557	36,607	76,155	82,877
Imports of goods and services	17,292	34,883	84,746	92,246
Resource balance	6,265	1,724	-8,591	-9,369
Net income	-3,542	-3,222	-5,284	-5,089
Net current transfers	210	-722	-2,733	-3,275
Current account balance	2,934	-2,221	-16,608	-17,733
Financing items (net)	-1,587	108	12,206	14,733
Changes in net reserves	-1,347	2,113	4,402	3,000
Memo:				
Reserves including gold *(US$ millions)*	3,900	5,848	25,613	28,613
Conversion rate *(DEC, local/US$)*	1.7	4.6	6.8	7.0



EXTERNAL DEBT and RESOURCE FLOWS

	1987	1997	2006	2007
(US$ millions)				
Total debt outstanding and disbursed	..	25,272	35,549	..
IBRD	..	0	29	27
IDA	..	0	0	0
Total debt service	..	6,542	5,472	..
IBRD	..	0	3	4
IDA	..	0	0	0
Composition of net resource flows				
Official grants	..	200	339	..
Official creditors	..	0	23	..
Private creditors	..	-51	1,024	..
Foreign direct investment (net inflows)	..	3,811	-120	..
Portfolio equity (net inflows)	..	5,473	14,959	..
World Bank program				
Commitments	..	0	0	0
Disbursements	..	0	0	0
Principal repayments	..	0	2	3
Net flows	..	0	-2	-3
Interest payments	..	0	1	1
Net transfers	..	0	-3	-4



Note: This table was produced from the Development Economics LDB database. 9/24/08

Economic and Social Indicators

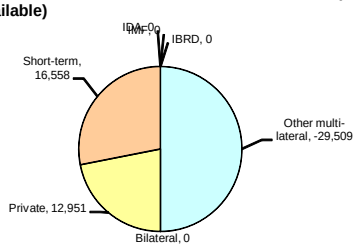
South Africa

Balance of Payments and Trade	2000	2008
(US$ millions)		
Total merchandise exports (fob)	37,058	87,378
Total merchandise imports (cif)	29,757	83,514
Net trade in goods and services	3,930	-8,567
Current account balance	-172	-20,474
as a % of GDP	-0.1	-7.4
Workers' remittances and compensation of employees (receipts)	344	*834*
Reserves, including gold	7,533	34,099

Central Government Finance		
(% of GDP)		
Current revenue (including grants)	22.9	26.8
Tax revenue	22.5	26.2
Current expenditure	23.5	27.4
Overall surplus/deficit	-1.9	-1.0
Highest marginal tax rate (%)		
Individual	45	40
Corporate	30	*28*

External Debt and Resource Flows		
(US$ millions)		
Total debt outstanding and disbursed	24,861	*35,549*
Total debt service	3,861	4,554
Debt relief (HIPC, MDRI)	–	–
Total debt (% of GDP)	18.7	*13.8*
Total debt service (% of exports)	9.8	4.4
Foreign direct investment (net inflows)	617	12,528
Portfolio equity (net inflows)	-7,861	-15,919

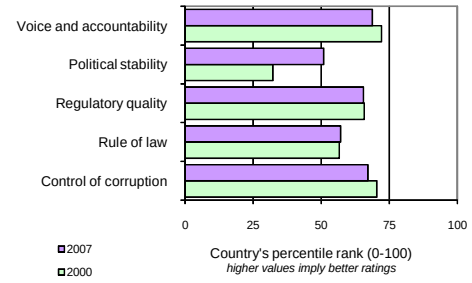
Composition of total external debt, 2007 (data are not available)



US$ millions

Private Sector Development	2000	2008
Time required to start a business (days)	–	22
Cost to start a business (% of GNI per capita)	–	6.0
Time required to register property (days)	–	24
Ranked as a major constraint to business (% of managers surveyed who agreed)	**2000**	**2007**
Skills and education of workers	..	*35.5*
Labor regulations	..	*32.8*
Stock market capitalization (% of GDP)	154.2	293.8
Bank capital to asset ratio (%)	8.7	7.9

Governance indicators, 2000 and 2007



Source: Kaufmann-Kraay-Mastruzzi, World Bank

Technology and Infrastructure	2000	2007
Paved roads (% of total)	20.3	..
Fixed line and mobile phone subscribers (per 100 people)	30	98
High technology exports (% of manufactured exports)	7.0	5.7

Environment		
Agricultural land (% of land area)	82	*82*
Forest area (% of land area)	7.6	*7.6*
Nationally protected areas (% of land area)	..	*6.1*
Freshwater resources per capita (cu. meters)	*990*	936
Freshwater withdrawal (billion cubic meters)	12.5	..
CO2 emissions per capita (mt)	8.4	*8.7*
GDP per unit of energy use (2005 PPP $ per kg of oil equivalent)	3.0	*3.2*
Energy use per capita (kg of oil equivalent)	2,529	*2,739*

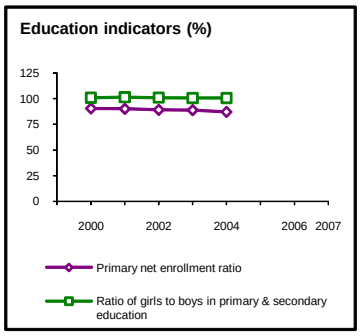
World Bank Group portfolio	2000	2007
(US$ millions)		
IBRD		
Total debt outstanding and disbursed	3	*29*
Disbursements	3	0
Principal repayments	0	*2*
Interest payments	0	1
IDA		
Total debt outstanding and disbursed	*0*	*0*
Disbursements	0	*0*
Total debt service	–	–
IFC *(fiscal year)*		
Total disbursed and outstanding portfolio	55	166
of which IFC own account	55	166
Disbursements for IFC own account	25	27
Portfolio sales, prepayments and repayments for IFC own account	3	28
MIGA		
Gross exposure	12	12
New guarantees	0	0

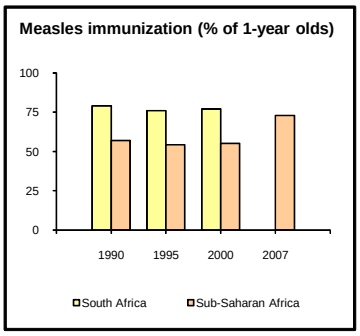
Note: Figures in italics are for years other than those specified. 2008 data are preliminary. 9/3/09
.. indicates data are not available. – indicates observation is not applicable.

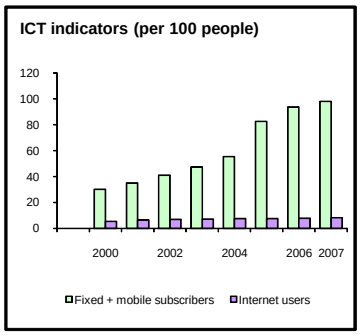
Development Economics, Development Data Group (DECDG).

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**	**2007**
Poverty headcount ratio at $1.25 a day (PPP, % of population)	..	21.4	26.2	..
Poverty headcount ratio at national poverty line (% of population)	..	..	..	..
Share of income or consumption to the poorest quintile (%)	..	3.6	3.5	..
Prevalence of malnutrition (% of children under 5)	..	9.2	*11.5*	..
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*	..	90	*92*
Secondary school enrollment (gross, %)	66	83	86	*96*
Youth literacy rate (% of people ages 15-24)	..	*94*	..	..
Goal 3: eliminate gender disparity in education and empower women				
Ratio of girls to boys in primary and secondary education (%)	*104*	..	101	*101*
Women employed in the nonagricultural sector (% of nonagricultural employment)	43	44	45	*46*
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)	60	59	63	68
Infant mortality rate (per 1,000 live births)	45	45	50	*55*
Measles immunization (proportion of one-year olds immunized, %)	79	76	77	*82*
Goal 5: reduce maternal mortality by three-fourths				
Maternal mortality ratio (modeled estimate, per 100,000 live births)	..	..	230	..
Births attended by skilled health staff (% of total)	..	82	*84*	*92*
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)	224	392	536	*600*
Tuberculosis cases detected under DOTS (%)	..	*5*	62	*103*
Goal 7: halve the proportion of people without sustainable access to basic needs				
Access to an improved water source (% of population)	83	84	87	*88*
Access to improved sanitation facilities (% of population)	69	68	66	*65*
Forest area (% of total land area)	7.6	..	7.6	*7.6*
Nationally protected areas (% of total land area)	..	..	..	*6.1*
CO2 emissions (metric tons per capita)	9.4	9.0	8.4	*8.7*
GDP per unit of energy use (constant 2005 PPP $ per kg of oil equivalent)	3.0	2.7	3.0	*3.2*
Goal 8: develop a global partnership for development				
Telephone mainlines (per 100 people)	9.4	10.2	11.3	9.7
Mobile phone subscribers (per 100 people)	0.0	1.4	19.0	88.4
Internet users (per 100 people)	0.0	0.7	5.5	8.3
Personal computers (per 100 people)	0.7	2.8	6.6	*8.5*







Note: Figures in italics are for years other than those specified. .. indicates data are not available. 9/3/09

Development Economics, Development Data Group (DECDG).

-2.1

7.5

Table 16: National Government Main Budget (2004/05-2010/11)[1]

	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10 (proj.)	2010/11 (proj.)
				(in percent of GDP)			
Total revenue and grants	24.0	25.5	26.2	26.9	26.2	23.3	23.8
Tax revenue	24.5	25.9	27.0	27.5	26.9	24.1	24.0
Income tax	13.8	14.6	15.6	16.3	16.9	14.7	14.3
of which Personal income tax	7.7	7.8	7.7	8.1	8.4	8.3	8.3
Corporate tax	5.8	6.5	7.5	7.8	8.1	6.1	5.7
Indirect tax	10.7	11.2	11.4	11.2	10.1	9.4	9.7
of which VAT	6.8	7.1	7.3	7.2	6.7	6.0	6.1
Excise duties	2.3	2.3	2.2	2.1	2.0	2.2	2.4
Taxes on international trade	0.9	1.1	1.3	1.3	1.0	0.8	0.8
Other tax revenue	0.1	0.0	0.0	0.0	0.0	0.0	0.0
SACU payments	0.9	0.9	1.4	1.2	1.2	1.1	0.6
Nontax revenue	0.4	0.5	0.6	0.6	0.5	0.4	0.4
Grants	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total expenditure	25.4	25.8	25.6	26.0	27.4	30.6	30.3
Interest	3.4	3.2	2.8	2.5	2.3	2.4	2.6
Transfers and subsidies	8.7	9.2	9.7	10.3	10.7	11.4	11.2
Budget balance	-1.4	-0.3	0.6	0.9	-1.2	-7.2	-6.5
Net extraordinary payments	-0.5	0.1	0.0	0.1	0.2	0.2	0.0
Augmented balance	-1.9	-0.2	0.6	1.0	-1.0	-7.0	-6.5
Financing	1.9	0.2	-0.6	-1.0	1.0	7.0	6.5
Net domestic borrowing	2.7	1.8	0.3	0.2	1.5	6.7	5.9
Foreign loans (net)	0.3	0.0	0.0	-0.2	-0.2	0.4	0.4
Change in cash and other balances	-1.1	-1.7	-0.9	-0.9	-0.3	-0.1	0.1
Memorandum items:							
GDP (R billion)	1,449	1,614	1,833	2,082	2,320	2,450	2,700
Real GDP growth (%)	4.6	5.3	5.6	5.5	3.7	-1.8	2.3
GDP deflator (%)change	6.4	5.4	6.5	8.2	9.2	7.4	6.6
Primary balance, (% of GDP)	1.9	2.8	3.4	3.4	1.2	-4.9	-3.8
Debt (% of GDP)	34.6	32.7	30.2	27.7	27	32.5	37.1
Domestic	29.8	28.6	25.7	23.1	22.8	28.7	33.1
Foreign	4.8	4.1	4.5	4.6	4.2	3.8	3.9

Source: Ministry of Finance

[1] For fiscal year beginning April 1. National government comprises the central government and sub-national spending financed by transfers from the national revenue fund.

Table 2: Nonfinancial Public Sector Operations, 2004/05-2010/11[1]

	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10 proj.	2010/11 proj.
	(In percent of GDP)						
General government (excl. local governments) [2]							
Total revenue and grants	25.9	27.7	28.7	30.2	29.7	26.8	27.7
National government	24.0	25.5	26.2	26.9	26.2	24.1	24.0
Provinces (own revenue)	0.4	0.4	0.4	0.5	0.4	0.4	0.4
Social security funds (own revenue)	1.0	1.3	1.1	1.2	1.1	1.3	1.3
Extrabudgetary and other	0.1	0.1	0.1	0.0	0.0	0.0	0.0
Total expenditure	26.8	27.5	27.5	28.5	30.8	34.1	34.0
Current	25.7	26.2	26.0	26.2	27.6	29.8	28.6
Wages and salaries	9.0	9.8	9.3	9.4	10.0	11.1	10.9
Other goods and services	3.5	3.7	4.9	4.9	5.4	6.0	5.8
Interest	3.4	3.5	3.0	2.7	2.5	2.9	3.2
Transfers	9.8	9.2	9.3	9.8	10.2	11.0	10.5
Capital expenditure	1.1	1.3	1.3	1.3	1.4	1.4	1.4
Net lending	0.1	0.0	0.0	0.0	0.0	0.2	0.4
Overall balance	-0.9	0.3	1.2	1.7	-1.0	-7.3	-6.2
Public sector borrowing requirement (PSBR)	1.5	0.4	-0.5	-0.3	4.0	11.8	11.2
National government [3]	1.9	0.2	-0.6	-1.0	1.0	7.0	6.5
Other government borrowing	0.0	0.2	-0.3	-0.2	0.7	0.4	0.1
Provincial governments	-0.1	0.0	0.0	-0.1	0.4	0.0	-0.1
Local government and local enterprises	0.6	0.6	0.0	0.3	0.9	0.5	0.6
Extrabudgetary funds and institutions	-0.5	-0.3	-0.3	-0.4	-0.5	-0.2	-0.3
Nonfinancial public enterprises	-0.4	-0.4	0.6	1.2	2.3	4.2	4.3
Memorandum items:							
Non-financial public sector debt (gross)	43.3	40.4	38.1	35.4	35.3	42.8	46.5
SOE investment	1.7	1.4	1.2	2.8	3.7	4.4	4.7
Social spending [4]	13.9	13.2	14.6	14.7	15.7	16.1	16.1
Defense spending	1.5	1.6	1.4	1.3	1.3	1.4	1.3

Sources: Ministry of Finance.

[1]For fiscal year beginning April 1.

[2]Consolidated national and provincial governments.

[3]Includes extraordinary payments less extraordinary receipts.

[4]Health, education, welfare, and community development.

Table 3: Financial Soundness Indicators, 2004-09

	2004	2005	2006	2007	2008	2009[1]
(Percentage, unless otherwise indicated)						
Capital adequacy:						
Regulatory capital to risk-weighted assets[2]	14.0	12.7	12.3	12.8	13.0	13.5
Regulatory tier 1 capital to risk-weighted assets[3]	10.5	9.7	9.0	9.5	10.2	10.5
Asset quality:						
Nonperforming loans to total gross loans[3]	1.8	1.5	1.1	1.4	3.9	5.1
Nonperforming loans net of provisions to capital[3]	6.2	6.4	5.6	8.2		
Share of mortgage advances in domestic private credit[4]	43.3	46.2	47.7	48.9	48.8	48.9
Earnings and profitability:						
Return on assets (average)	1.3	1.2	1.4	1.4	2.1	1.0
Return on equity (average)	16.2	15.2	18.3	18.1	28.7	17.8
Interest margin to gross income	41.6	38.2	43.8	58.5	44.6	50.6
Non-interest expenses to gross income	68.5	61.5	48.5	48.9	42.2	49.8
Exposure to FX risk:						
Liquid assets to total assets	4.7	4.8	4.6	4.6	4.7	5.3
Share of short-term deposits in total deposits	43.7	43.5	42.8	42.5	36.4	35.0
Maximum effective net open FX position to capital	0.8	1.9	1.4	0.7	0.5	0.5
Share of foreign currency loans in total lending	10.9	11.1	11.4	9.3	7.7	6.9
Share of foreign currency deposits in total deposits[5]	2.7	2.7	3.3	3.0	3.6	3.6
Share of foreign liabilities in total liabilities[6]	4.0	4.2	5.3	6.0	6.2	6.3

Source: IMF, Article IV Consultation 2009

[1] As of March/April 2009

[2] Total (banking and trading book)

[3] The official definition of nonperforming loans comprises doubtful and loss loans. Doubtful are loans overdue for 180 days unless well secured, or with a timely realization of the collateral. Since 2008, the indicator reflects the ratio of impaired advances to total advances (in line with Basel II definitions), a more stringent definition.

[4] Domestic private credit not seasonally adjusted

[5] Foreign funding to total funding

[6] Foreign funding to total liabilities (including capital)

Annex 16: Maps

SOUTH AFRICA: ESKOM INVESTMENT SUPPORT PROJECT

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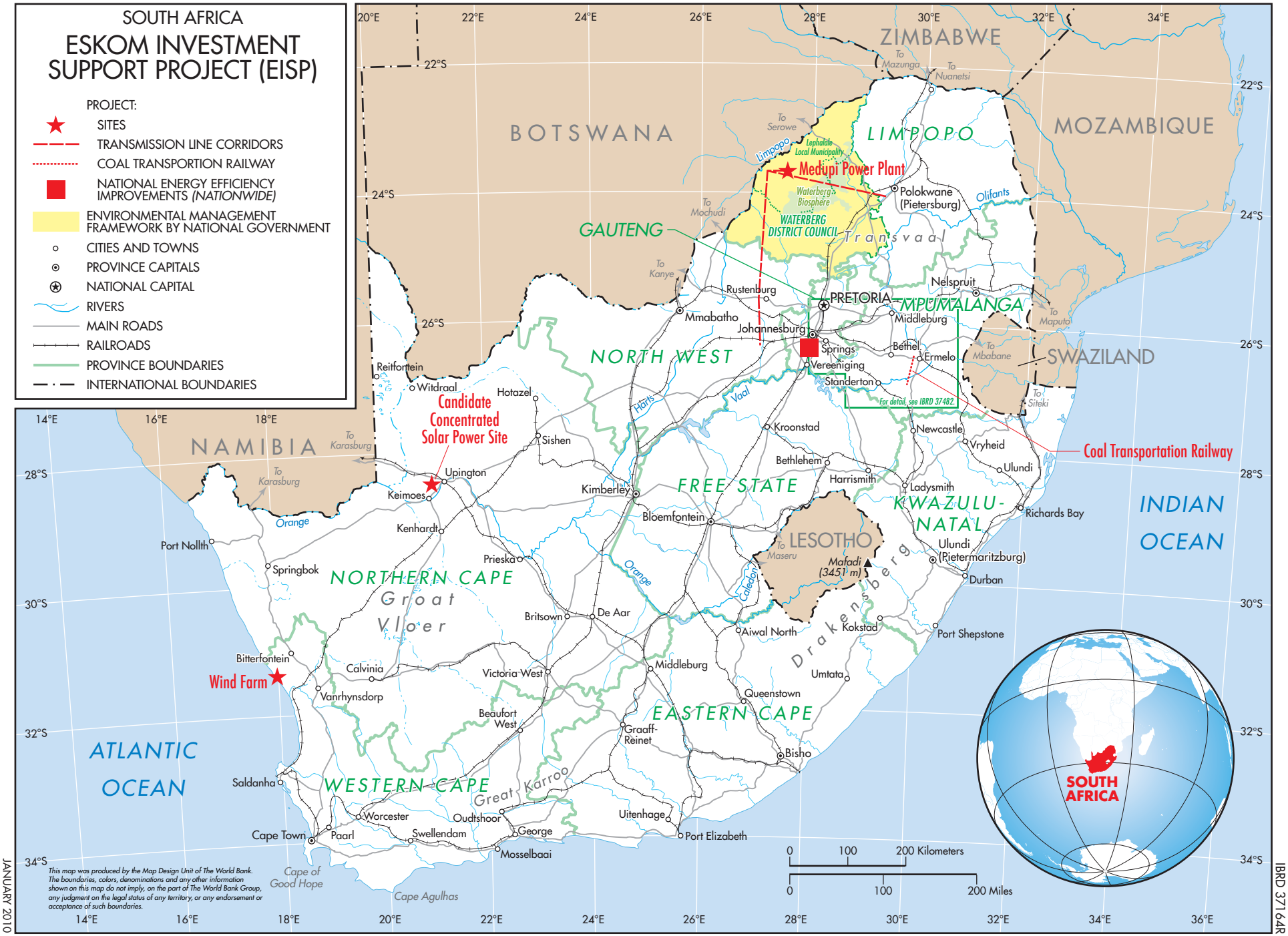
SOUTH AFRICA
ESKOM INVESTMENT SUPPORT PROJECT (EISP)
PROJECT:
SITES
TRANSMISSION LINE CORRIDORS
COAL TRANSPORTION RAILWAY
NATIONAL ENERGY EFFICIENCY IMPROVEMENTS (NATIONWIDE)
ENVIRONMENTAL MANAGEMENT FRAMEWORK BY NATIONAL GOVERNMENT
CITIES AND TOWNS
PROVINCE CAPITALS
NATIONAL CAPITAL
RIVERS
MAIN ROADS
RAILROADS
PROVINCE BOUNDARIES
INTERNATIONAL BOUNDARIES
Medupi Power Plant
Candidate Concentrated Solar Power Site
Wind Farm
Coal Transportation Railway
For detail, see IBRD 37482.
ZIMBABWE
BOTSWANA
MOZAMBIQUE
NAMIBIA
SWAZILAND
LESOTHO
LIMPOPO
GAUTENG
NORTH WEST
MPUMALANGA
FREE STATE
KWAZULU-NATAL
NORTHERN CAPE
EASTERN CAPE
WESTERN CAPE
ATLANTIC OCEAN
INDIAN OCEAN
Great Vloer
Great Karroo
Drakensberg
Lephalale Local Municipality
Waterberg Biosphere
WATERBERG DISTRICT COUNCIL
Transvaal
Limpopo
Olifants
Orange
Vaal
Harts
Caledon
Mafadi (3451 m)
PRETORIA
Johannesburg
Polokwane (Pietersburg)
Nelspruit
Middleburg
Rustenburg
Mmabatho
Springs
Bethel
Ermelo
Vereeniging
Standerton
Reitfontein
Witdraai
Hotazel
Sishen
Upington
Keimoes
Kenhardt
Kimberley
Bloemfontein
Kroonstad
Newcastle
Vryheid
Ulundi
Bethlehem
Harrismith
Ladysmith
Richards Bay
Ulundi (Pietermaritzburg)
Durban
Port Shepstone
Kokstad
Umtata
Aiwal North
Queenstown
Bisho
Graaff-Reinet
Middleburg
Victoria West
Beaufort West
Britsown
De Aar
Prieska
Springbok
Port Nolloth
Bitterfontein
Calvinia
Vanrhynsdorp
Saldanha
Cape Town
Paarl
Worcester
Swellendam
Oudtshoor
George
Mosselbaai
Uitenhage
Port Elizabeth
Cape of Good Hope
Cape Agulhas
To Mazunga
To Nuanetsi
To Serowe
To Mochudi
To Kanye
To Maputo
To Mbabane
To Siteki
To Karasburg
To Maseru
0 100 200 Kilometers
0 100 200 Miles
SOUTH AFRICA
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JANUARY 2010
IBRD 37164R

IBRD 37482

SOUTH AFRICA
ESKOM INVESTMENT SUPPORT PROJECT (EISP)
MAJUBA RAIL LINE

- PROJECT 3 kV DC RAILWAY, ERMELO TO MAJUBA
- 3 kV DC RAILWAYS
- 25 kV AC RAILWAYS
- DIESEL RAILWAYS
- DERELICT RAILWAYS (CLOSED/REMOVED)
- PRIVATE SIDINGS
- THERMAL POWER PLANTS
- COAL MINES WHICH WILL SUPPLY MAJUBA

Pretoria
Silverton
Bronkhorstspruit
Middelburg
Witbank
Uitkyk
New Largo
Arbor
Ogies
Bapsfontein
GAUTENG
Randburg
Rosebank
Johannesburg
Benoni
Delmas
Kendal
Groengoeverden
Koornfontein
Komati
Leeuwpan
Springs
Alberton
Kriel
Matta
Hendrina
Elders
MPUMALANGA
Dunnottar
Nigel
Kliprivier
Leandra
Bethal
Davel
Trichardt
Secunda
Sasol
Breyten
Ermelo
Ermelo Yard
Balfour
Greylingstad
Tutuka
Morgenzon
Standerton
Amersfoort
Majuba
Palmford
FREE STATE

Witbank Lake
Chrissiesmeer
Eilandsmeer
Lake Banagher
W.B. Douglas Res.
Jericho Res.
Heyshope Res.
Over Vaal Tunnel
Groot Lake

to Stoffberg
to Machadodorp
to Carolina
to Bethlehem
to Vrede
to Volksrust
to Piet Retief

Pienaars R.
Wilge R.
Klein-Olifants R.
Olifants R.
Steenkool R.
Trichard R.
Komati R.
uMpuluzi R.
Usutu R.
Vaal R.
Klein-Vaal R.
Ngwempisi R.
Riet R.
Sand R.
Skulp R.
Assegaai R.
Waterval R.
Boesmans R.
Suikerbosrand R.
Koffie R.
Blesbokspruit R.

28°00′
28°30′
29°00′
29°30′
30°00′
30°30′
26°00′
26°30′
27°00′

- MINOR PROVINCIAL AND LOCAL ROADS
- PRIMARY AND MAJOR PROVINCIAL ROADS
- NATIONAL ROADS
- PROVINCE BOUNDARIES
- CITIES AND TOWNS
- NATIONAL CAPITAL

0 10 20 30 40 50
KILOMETERS

JANUARY 2010