



RESTRUCTURING PAPER
ON A
PROPOSED PROJECT RESTRUCTURING
OF
ESKOM INVESTMENT SUPPORT PROJECT
APPROVED ON APRIL 8, 2010
TO
ESKOM HOLDINGS SOC LIMITED
GUARANTEED BY THE REPUBLIC OF SOUTH AFRICA

ENERGY & EXTRACTIVES GLOBAL PRACTICE
AFRICA REGION

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ABBREVIATIONS AND ACRONYMS

AFD	Development Agency of France
AfDB	African Development Bank
BER	Bid Evaluation Report
BSP	Battery Storage Program
CO ₂	Carbon Dioxide
CSP	Concentrating Solar Power
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EISP	Eskom Investment Support Project
ERSP	Eskom Renewables Support Project
FGD	Flue Gas Desulphurization
GoRSA	Government of the Republic of South Africa
GWh	Gigawatt-hour
IP	Implementation Progress
IPP	Indigenous Peoples Plan
IPPF	Indigenous Peoples Policy Framework
IRP	Integrated Resource Plan
LRMC	Long Run Marginal Cost
LTMS	Long-term Mitigation Strategy
mg/Nm ³	milli-gram per Normal cubic meter
MU	Moderately Unsatisfactory
MW	Megawatt
NERSA	National Electricity Regulator of South Africa
OCGT	Open Cycle Gas Turbine
OP	Operational Policy
PAD	Project Appraisal Document
PDO	Project Development Objective
PIU	Project Implementation Unit
PPA	Power Purchase Agreement
PPPFA	Preferential Procurement Policy Framework Act
PPSD	Project Procurement Strategy for Development
PV	Photovoltaic
RE	Renewable Energy
REIPP	Renewable Energy Independent Power Producer
SDR	Safeguards Diagnostic Review
SO ₂	Sulphur Dioxide



The World Bank

Eskom Investment Support Project (P116410)

TFC

Trust Fund Committee

VRE

Variable Renewable Energy



BASIC DATA

Product Information

Project ID P116410	Financing Instrument Investment Project Financing
Original EA Category Full Assessment (A)	Current EA Category Full Assessment (A)
Approval Date 08-Apr-2010	Current Closing Date 31-Dec-2019

Organizations

Borrower ESKOM Holdings SOC Limited	Responsible Agency ESKOM
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Project Development Objective (PDO)

Original PDO

The project development objective (PDO) of the Eskom Investment Support Project for South Africa is 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 longterm carbon mitigation strategy.

Summary Status of Financing

Ln/Cr/Tf	Approval	Signing	Effectiveness	Closing	Net Commitment	Disbursed	Undisbursed
IBRD-78620	08-Apr-2010	16-Apr-2010	31-May-2010	31-Dec-2019	3750.00	3036.99	713.01

Policy Waiver(s)

Does this restructuring trigger the need for any policy waiver(s)?

No



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I. PROJECT STATUS AND RATIONALE FOR RESTRUCTURING

Project Status

1. The project was approved on March 19, 2010 in the amount of US\$3,750 million (IBRD loan), and became effective on May 31, 2010. The project development objective (PDO) is to enhance 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. The project is co-financed by Eskom, African Development Bank, European Credit Agencies, China Development Bank and other financiers. The estimated total cost to completion is US\$ 18.4 billion (an increase from US\$ 13.86 billion at appraisal) and 19 percent of the IBRD loan is undisbursed. The overrun is mainly due to the Medupi Power Plant, but this restructuring does not cover the Medupi overrun. The estimated disbursement from the IBRD loan is US\$ 3.06 billion. When procurement for the Battery Storage Program and amendments of other ongoing contracts, other than Medupi, are completed, the project costs will be reviewed, and a decision taken on whether to cancel the undisbursed amount at the time,
2. To achieve the PDO, the project supports the financing of: (a) the Medupi Coal-Fired Power Plant (4,800 MW), using supercritical (clean-coal) technology; (b) associated transmission lines; (c) Majuba rail; (d) investments in renewable energy (a 100 MW wind farm (Sere) and a 100 MW concentrating solar power plant (Kiwano CSP)¹) to diversify sources of electric power; and (e) technical assistance to assist Eskom develop regional projects and for improving demand-side and supply-side energy efficiency.
3. The IBRD loan is 81 percent disbursed (as of November 28, 2018). A significant part of the remaining amount (about 6 percent) is currently allocated for Kiwano CSP (now proposed to be a battery storage program) and the main element of the proposed restructuring.
4. The PDO rating is Moderately Unsatisfactory and the Implementation Progress (IP) rating is Unsatisfactory. The PDO and IP ratings have been in the unsatisfactory ranges since October 2013. The original reason was poor implementation progress (leading to construction delays) of the Medupi power plant component and lack of progress on the Kiwano Concentrating Solar Power (CSP) sub-component. The delays in construction of the Medupi power plant has now been addressed. Since 2017, issues related to Eskom's corporate governance and internal controls, a qualified audit in 2017 and 2018 and deteriorating financial condition, contributed further to the poor ratings. An action plan pertaining to Governance, Internal Controls and project-related items was agreed upon with Eskom during the 2017 Annual Meetings to address the concerns, and significant progress has been made. A new permanent Eskom Board was appointed on January 20, 2018, a new permanent Group Chief Executive Officer (CEO) was appointed in May 2018 and a new Chief Financial Officer (CFO) was appointed on November 28, 2018.

¹ Subject of the restructuring and formally known as Upington CSP



5. Eskom has also made significant progress to address the root causes that gave rise to irregular expenditures which led to qualification of the FY17 and FY18 audit reports. It has been implementing remedial actions and has communicated regularly with the World Bank and other financiers to provide progress reports and interim financial statements. Eskom has also provided the World Bank with a list of on-going governance related investigations, and a comprehensive report detailing both the findings from completed governance related investigations and steps Eskom is taking to address the key concerns outlined in those findings.
6. Eskom has taken measures to address the lack of progress on the CSP sub-component by proposing (on October 13, 2017) an alternative involving battery storage, which would make a similar contribution to meeting the development objectives as the original Kiwano CSP component. The recent leadership change in the Republic of South Africa, and appointment of a new credible Eskom Board and management team have had a positive effect on the World Bank engagement with Eskom and on progress made with respect to the action plan.
7. The following summarizes progress of each of the project components:
 - a. **Medupi Power Plant (US\$17 billion):** The largest project component, comprising six units of 800 MW each, has made good progress since the last restructuring, in mid-2015. Overall plant completion is about 93 percent. The first three units are now in commercial operation and the fourth unit is connected to the network and undergoing tests. The remaining units are projected to be in commercial operation by end-2019. Each of the six units is expected to be retrofitted with Flue Gas Desulphurization (FGD) six years after commercial operation. This a legal requirement of South Africa and of the Loan Agreement. There has been a delay in identifying financing for the FGD work and the implementation schedule shows a delay of one to two years in retrofitting the first unit that became operational in 2015. Eskom has now identified sources of financing and is in the process of optimizing the implementation schedule to reduce the delay.
 - b. **Transmission Lines (US\$260 million):** Some of the transmission lines required to evacuate power from Medupi have experienced delays in construction due to access issues (primarily farmers delaying permission of access through their land) and poor performance of some of the contractors. All access issues have now been resolved, and the lines are expected to be completed by December 31, 2019.
 - c. **Majuba Rail (US\$491 million):** This component is close to 90 percent complete and expected to be in operation by June 2019.
 - d. **Renewable Energy (US\$655 million):** The first sub-component, Sere Wind, has been in commercial operation since March 2015 and is operating well. Progress on the second sub-component has been at a stand-still over most of the past two years due to issues related to Kiwano CSP. Eskom decided not to continue with this second sub-component (formerly Upington CSP) and requested termination of the procurement process, after the two bids received were found to be non-responsive. The proposed restructuring involves a change in this sub-component, from Kiwano CSP to battery storage per Eskom's proposal of October 13, 2017 (more details are provided under "Description of Proposed Changes").
 - e. **Technical Assistance (US\$10 million):** Good progress has been made on the demand and supply side efficiency improvements, but little progress has been made on developing cross-border projects. The aim of the latter is to develop regional projects that would facilitate import of power from low carbon sources. Since Eskom now has surplus power, including around 4,000 MW from the Renewable Energy



Independent Power Producer (REIPP) program², Eskom plans to conduct studies on development of collector stations for renewable power plants and distribution of this power both locally and regionally.

8. **Social and environmental safeguards:** The project uses OP 4.00 *Piloting the Use of Borrower Systems to Address Environmental and Social Safeguard Issues in Bank-Supported Projects*. The last mission (July 2018) confirmed that the project continues to comply with the regulatory requirements and conditions of authorization by the relevant Government of South Africa authorities. However, there are issues relating to Sulphur Dioxide (SO₂) emissions. SO₂ peaks occur a few times per week beyond the current limit of 3,500 mg/Nm³, due to higher Sulphur coal than was envisaged at the design stage. Eskom's application to Department of Environmental Affairs (DEA) for an increased daily average SO₂ emission limit to 4,000 mg/Nm³ was not approved. Instead, Eskom is now required to comply with the monthly average limit, which it can based on latest data. Nonetheless, Eskom is installing equipment to blend high with low Sulphur coal and exploring ways of securing low Sulphur coal to ensure that daily spikes above 3,500 mg/Nm³ are avoided, pending commissioning of Flue Gas Desulphurization (FGD) equipment. For Majuba Rail, three on-farm resettlements are not complete yet. The two issues (on-farm resettlement and SO₂ spikes) resulted in the overall safeguards rating being downgraded to moderately satisfactory recently.

Compliance with Legal Covenants

9. Owing to Eskom's poor financial position the company is not in compliance with the target under Loan Agreement, Schedule 2, Section B4 requiring the Borrower to achieve a Debt Service Coverage Ratio equal or greater than 1.3. Eskom did however achieve an EBITDA Margin of above 25 percent. Eskom has therefore submitted the required Financial Plan explaining how it plans to achieve the target as required by the covenant.

Rationale for Restructuring

10. The main rationale for the restructuring is to substitute Kiwano CSP with a Battery Storage Program (BSP), which would install batteries at some existing Eskom-owned and fully fenced-out substations close to locations where REIPP wind and solar photovoltaic (PV) feed into the Eskom grid. This would enable the PDO to be achieved. Battery storage is important for the key objectives of promotion of a low-carbon economic growth because it facilitates the integration of wind and solar PV plants into the grid. Without the proposed restructuring, the PDO cannot be achieved and the project will remain unsatisfactory until closure.
11. BSP is a suitable replacement for Kiwano CSP as it is a transformational technology that would enhance utilization of energy produced from fast-increasing Variable Renewable Energy (VRE) sources, such as wind and solar PV, from the Renewable Energy Independent Power Produced (REIPP) program. Kiwano CSP was designed to be implemented by Eskom because at the time of project appraisal (in 2010), Eskom had already been working on preparing this project for over nine years and there was no private sector involvement in renewable energy, including CSP. However, due to delays in the procurement process and receipt of non-responsive bids for Kiwano CSP, the private sector (through the REIPP program) has now overtaken Eskom and is about to commence implementation of a CSP project of the same design as Kiwano. Thus, the learning experience on CSP will now be through the experience of the private sector. Battery storage of energy from VRE is a promising technology that is yet to be implemented commercially or for demonstration at the envisaged scale in South Africa and sub-Saharan Africa, so applying CTF and IBRD resources to this alternative is considered a better utilization of these scarce resources.

² The program had not commenced when the project was approved.



12. The project is also being restructured to ensure that interim measures to address SO₂ emission exceedances prior to installation of Flue Gas Desulphurization are implemented timely.

II. DESCRIPTION OF PROPOSED CHANGES

13. The following seven changes are proposed: (1) a change in one of the Renewable Energy sub-components (Part B2); (2) change in implementation schedule and closing date; (3) change in disbursement estimates; (4) change in the results framework to reflect the revised scope and project timeline; (5) change in legal covenants; (6) updated appraisal to reflect the new subcomponent; and (7) change in financing plan. The project would also trigger the policy OP 4.10 on Indigenous Peoples.

Change in subcomponent

14. The BSP is a demonstration program that would be led and financed by Eskom and co-financed by IBRD (EISP project) CTF (ERSP project) and CTF funds managed by AfDB, and AfDB (new loan to be approved on November 29, 2018). The program will consist in installing grid-connected electrochemical batteries at (a) Eskom-owned 100 MW Sere wind farm (financed under the project); (b) new 60 MW (cumulative) solar PV implemented by Eskom³; and (c) Eskom substations close to 300 MW of the REIPP program plants in Northern Cape. By December 2021, the cumulative storage will be 1440 Megawatt hours (MWh), the size of energy storage capacity needed to meet the same targets in terms of MW and greenhouse gas (GHG) offset in tCO₂ as originally envisaged under the project⁴. A technical assistance sub-component would be added to (a) support the final design, procurement and supervision of energy storage infrastructure to be supplied through the project; (b) strengthen Eskom technical capacity in sustainable operation and maintenance of large scale batteries; and (c) prepare the enabling environment for further private investment in VRE capacity using storage.

Change in implementation schedule and closing date

15. The BSP involves over 40 subprojects⁵ and one subproject involves triggering the policy on Indigenous Peoples, which was not envisaged in the Safeguards Diagnostic Review prepared under the original project scope. As a result, the component has required more time to prepare than originally envisaged and it is now not feasible to achieve the expected results by December 2019. It is proposed to extend the closing date by one year to December 31, 2020 to allow the completion of the Renewable Energy component, which as proposed in this restructuring would involve the BSP sub-component. There would be no more disbursement for the other components after December 31, 2020.

³ The two (a and b) are expected to be completed by the proposed new closing date, December 31, 2020.

⁴ The MW capacity is of the generation source that would be used to charge the batteries, either of Eskom-installed and owned capacity or of capacity from the REIPP program

⁵ Primarily batteries in substations close to the REIPP investments



Change in disbursement estimates

16. The disbursement estimates will be revised to reflect the alternative component and extension to 2020. The following are the revised estimates: 2019 (US\$120 million); 2020 (US\$150 million); 2021 (US\$100 million).

Change in results framework

17. The change from Kiwano CSP to BSP would require the following adjustment to the Results Framework: (i) an indicator measuring the storage capacity (in MW) installed under the project would be added; (ii) the intermediate indicator measuring percentage of achievement of Upington/ Kiwano CSP plant would be removed; (iii) end target of core indicator ‘CTF leverage’ would be adjusted to reflect the private investment that the REIPP program would leverage. The full results of the BSP would be delivered by December 2021 through IBRD, CTF and AfDB, the co-financing sources for Eskom BSP. By the proposed new closing date of the IBRD loan (December 2020), part of the results would be delivered.

18. The estimated allocation from all financing sources for the original scope of Part B2 (Kiwano CSP) amounted to US\$1.197 billion to deliver 100 MW generation capacity and 525 GWh of clean energy per annum. The estimated joint financing for BSP is US\$661⁶ million for delivery of at least 525 GWh (1440 MWh storage per day) of energy through at least 360 MW of storage capacity -- 60 MW of cumulative new solar PV capacity (Eskom-owned) and enabling optimal use of 300 MW of VRE from the REIPP program. Of this amount, at least US\$468 million will be for battery storage and the balance for Eskom-owned solar PV plants and technical assistance (Eskom and AfDB-financed). By the proposed closing date of the IBRD loan, at least 800 MWh of storage per day (200 MW storage capacity) will be operational. The balance will be operational by December 2021 when the CTF loan closes.

Financing Source	Amount (MUS\$)
IBRD	195
CTF (IBRD)	215
CTF (AfDB)	41
AfDB	210

Change in legal covenants and conditions

19. Additional covenants and conditions will be added requiring (a) three concerning measures Eskom needs to take to ensure the supply of lower sulphur coal for Medupi Power Plant; (b) a requirement for Eskom to submit an Indigenous Peoples Plan acceptable to WB prior to disbursement for one of the sub-project sites; and (c) a requirement for Eskom not to carry out any battery storage program installation activity in a site which may be subject to an outstanding land claim.

Due diligence and appraisal summary

Technical Appraisal

⁶ US\$ 195 million IBRD, US\$ 273 million CTF



20. Based on the various reviews of proposals and discussions with Eskom teams, the WB and AfDB teams assess that Eskom’s battery program is technically feasible and supports an important step towards increasing the value and penetration of wind and solar energy into the grid, through demonstrating an approach to managing the variability of these energy sources and making VRE dispatchable⁷. It is in line with Eskom’s Corporate Plan, demonstrating ownership of this strategic direction. Eskom has hired a Technical Advisor to assist in more detailed feasibility work, planning, design, procurement and contact management.

21. Eskom has demonstrated substantial commitment towards the battery storage program as evidenced by its internal approval process (as shown below):

Item no.	Date	Eskom Committee	Government Depart.	Status
1.	February 19, 2018	Eskom Executive Committee (EXCO)	National Treasury (NT)	Submitted letter to Minister of NT requesting exemption of PPPFA
2.	February 28, 2018	Eskom EXCO	-	Supported the project
3.	March 8, 2018	Eskom Board	-	Approved the battery storage project as a replacement for CSP
			-	ii) Approved the signing of the PPA’s of bid windows 4.0
4	March 21, 2018	Eskom Group Capital and Investment Committee (GCIMC)	-	Design Release Approval for further development to complete business case (released funding to proceed to project preparation)
5.	April 30, 2018	Eskom	DPE	Draft pre-PFMA (Public Finance Management Act) notification; submitted end May 2018. Approved.
6	October 23, 2018	Eskom GCIMC	-	Supported Execution Release Approval - business case
7.	November 5, 2018	Eskom Capital Committee (CAPCOM)	-	Supported Execution Release Approval - business case

⁷ Dispatchable generation refers to sources of electricity that can be made available at the request of power grid operators or of the plant owner according to needs of the power market.



8.	November 15, 2018	Eskom Investment and Finance Committee	Supported Execution Release Approval – business case
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22. **Regulatory (NERSA license):** NERSA has decided that generation licenses will be required for Battery Storage systems. It will be a 4-month license process. Eskom has engaged with NERSA and will submit a license application for each site in December 2018. Implementation of Eskom’s PV takes account of the licensing requirement.

23. **Interim Measures to Address Sulphur Dioxide Emissions.** Another change involves a new covenants requiring Eskom to take measures that will ensure that Sulphur Dioxide emissions do not spike above the current legal limit of 3,500 milligram per Normal meter cubed (mg/Nm³). Eskom is in the process of installing equipment that will help address the problem by facilitating measurement of coal Sulphur content and blending of high and low Sulphur coal. However, the process cannot be effective if lower Sulphur coal is not available. Therefore, the primary challenge that Eskom needs to address is identification of sources of lower Sulphur coal, which when blended with the high Sulphur coal will reduce the combined Sulphur Dioxide concentration to below the legal limit.

Economic appraisal

24. The rationale for implementing BSP is dual -- to enable an increase of the share of VRE into the power mix and to improve the local and overall system reliability, thereby enabling more customers to be connected to the grid. As the proportion of VRE⁸ (wind and solar PV) in the South African power system increases, the need to quickly ramp up electricity supply from other sources⁹ will also increase. Coal power plants cannot adjust generation levels quickly, so battery storage could offer a sustainable solution. In addition, the increasing number of grid-related constraints (bottlenecks at distribution level, aging infrastructure) decreases the quality and reliability of supply. This could be addressed by introducing VRE with battery storage in close proximity to demand, rather than the usual way through which utilities address the issues by installation of fossil-fueled peaking plants at such locations, installation of reactive compensation (capacitors) or increasing the size of distribution or transmission line conductors.

25. An economic analysis has been carried out for the ‘battery storage’ subcomponent. From a baseline scenario comprising the current power system with the clean energy projects from the last REIPPP round (Round 4), the analysis estimates the benefits from adding the battery storage systems, assuming that these batteries displace energy at the evening peak for an average of four hours (4 MWh of daily energy displaced per MW of battery installed). Alternative to the batteries in the base case would be a greater use of the existing open cycle gas turbines (OCGT) to cope with peak demand ramp up and localized grid bottlenecks. The analysis estimates the viability of investing in the battery systems, against the economic cost of running OCGTs to cope with VRE variability and keep a similar system reliability level.

26. The following assumptions were made to simplify the number of possible scenarios:

⁸ Variable Renewable Energy is an energy source that is non-dispatchable because it generates electricity only when the sun is shining or wind blowing – factors which cannot be controlled. To mitigate the problem this causes in power system operation, more flexible generation capacity is needed to be on standby, to be used when the renewable resource (solar and wind) is low. This is provided through sources like fossil-fueled gas turbines and hydropower. Storing some of the energy from the variable sources at times when not all of it is needed, through storage in batteries, ensures that the ramping up (see following footnote) is from the same renewable source.

⁹ To quickly restore demand/supply balance, especially at times when the transition to peak demand is fast. For South Africa, Open Cycle Gas Turbine (OCGT) and pumped hydro plant are used for this purpose. Battery storage has a faster response time than OCGT and when the batteries are charged by VRE they provide a cleaner ramp-up option.



- a. the batteries would store and dispatch four hours of daily generation from VRE (ratio wind/solar in VRE mix and estimated generation costs deduced from the REIPPP data on VRE);
 - b. only one use of the battery -- energy displaced to peak period -- is represented (other uses like offset intermittency or grid frequency modulation would imply several cycles of charge/discharge per day);
 - c. the alternative to new RE injected through battery is OCGT¹⁰ as its energy would be displaced at daily evening peak;
 - d. the social cost of carbon (avoided cost due to displacement of CO₂ emissions) used for this analysis is US\$35 / tCO₂ (based on WB Guidance Note for Social Value of Carbon in Projects, base value, 2020);
 - e. a battery load factor of 90 percent (reducing to 80 percent after 7,000 cycles and 70 percent after 10,000 cycles) and a battery replacement after ten years (based on technology with shortest life time, Lithium-ion battery).
27. The economic rate of return calculated from the project data - and using battery capital costs from the World Bank consultant assessment of costs – provides an Economic Rate of Return (ERR) of 1.2 percent. If load factor decreases over time and a fixed cost of VRE generation in the RE project life cycle are considered, the net present value of the battery program is negative (- US\$139 million). When the cost of carbon offset is factored in, the ERR increases to 3.1 percent, the amount of energy stored – hence CO₂ offset - being relatively small compared to the investment cost.
28. As the main purpose of the batteries is to maintain / increase system reliability by managing VRE intermittency and making VRE a dispatchable resource, the system cost of failure (and then savings from avoided failure) should also be included into the evaluation. This analysis would require a much more precise least cost dispatch approach and some robust assumptions on the impact on the grid. This more complex analysis is worth doing (ex post, through the technical assistance sub-component), as it would show the real transformational impact of battery storage into the South African grid.
29. Because of the pioneering role of this battery storage project, its assessment should not be limited to the amount of clean energy enabled and CO₂ offset but the impact that the demonstration would have on maturing the technology, lowering costs and enabling scale-up. Concessional funding is needed at this stage to support maturity of the technology.

Fiduciary appraisal

30. **Procurement (National Treasury Preferential Procurement Policy Framework Act (PPPFA) exemption):** The Eskom and World Bank teams conducted technology and market reviews (visiting battery storage manufacturers in USA and China for both Solid State and Flow technologies) to assist them in deciding on the most appropriate procurement process. Eskom has prepared a Procurement Strategy, which is in the process of being revised to follow the Project Procurement Strategy for Development (PPSD) template. Eskom requires exemption from the PPPFA to apply the World Bank Procurement Guidelines/ Framework, which Eskom obtained in May 2018. The following is an outline of the procurement plan for the first set of batteries to be installed by end-2020:
- a. Appoint of Technical Advisor: November 9, 2018 (completed)
 - b. Complete PSD: December 10, 2018

¹⁰ OCGT generation marginal cost estimated from Eskom annual report 2017 at US\$97/kWh.



- c. Complete feasibility analysis: January 17, 2019
- d. Finalize technical designs: February 14, 2019
- e. Finalize bidding documents: March 15, 2019
- f. Receipt of bids: April 30, 2019
- g. Complete bid evaluation: June 2, 2019
- h. Contract award approvals: August 21, 2019
- i. Completion: October 2020

Safeguards appraisal

31. **Environmental:** The project follows OP 4.00 (*Piloting the Use of Borrower Systems to Address Environmental and Social Safeguard Issues in Bank-Supported Projects*). All the sites (about 40 to be completed by December 2020) selected in the proposal require a basic Environmental Impact Assessment (EIA). The basic EIAs will be conducted for each individual site such that each will have its own EIA approval (Environmental Authorization). Currently, indications are that a full EIA approval is required if the hazardous material volume increases above 500 cubic meters (5000 liters). Based on the high-level analysis the team conducted, indications are that there will not be hazardous materials volume of 500 cubic meters or more. Overall, Eskom anticipates that the entire environmental approval process timeframe will be six months per site (which will be carried out in parallel). A full EIA will also be carried out for Eskom financed and operated solar PV sites which will include a battery storage component. The EIA process for this could take up to 18 months to finalize¹¹.
32. There is an Eskom environmental representative for each of the four battery storage packages: Western Cape, Eastern Cape, Northern Cape and Kwa-Zulu Natal (KZN). Eskom teams requested for proposals in July 2018 from independent EIA consultants as per Department of Environmental Affairs (DEA) requirements. As most of the sites are in the Western Cape (WC), there are six EIA consultants per group of sites in the WC. Two EIA consultants have been appointed for Eastern Cape, four for Northern Cape and four will be appointed for KZN where there are twelve sites.
33. **Social:** One of the project sites (Rietfontein) will involve acquisition of land from the Khomani-San community. This will require application of OP4.10 (Indigenous Peoples Policy) since its equivalence to Country Systems was not considered in the Safeguards Diagnostic Review (SDR). Eskom has submitted terms of reference acceptable to the World Bank for the Social Impact Assessment (SIA) and Indigenous Peoples' Policy Framework (IPPF) and respective Indigenous Peoples Plan (IPP). Until a SIA and IPPF and IPP acceptable to the World Bank are completed, there will be no disbursement of the IBRD or CTF loan for this sub-project. A World Bank-appointed consultant will also conduct due diligence on the other sites to ascertain there are no legacy claims, prior to disbursement for these sites.

Risks

34. The overall risk rating of the project remains high. Current risk ratings are not being revised but below is a summary of the specific risks associated with the proposed restructuring and the key risks facing the project.
35. **Eskom may not progress as planned on measures it is taking to address the issues of governance and internal controls:** With appointment of a new board and management, and Government's renewed focus on Eskom

¹¹ These sites would come under CTF-only project financing, proposed to close in 2021



- performance and enhanced oversight, such as ensuring that Eskom obtains Government approval of contracts and contract amendment above prescribed limits, the risk is considered low. In addition, Eskom financiers' oversight has also increased, and Eskom meets with its main financiers to inform them on the progress made in addressing the issues and on Eskom's financial performance.
36. **Eskom's poor financial position may continue:** Eskom's current assets in FY18 did not cover its current liabilities and Eskom had to service its debt through additional borrowing. The main factors were a lower than requested tariff adjustment, reduced demand and increased municipality arrears. While measures are being taken to address these issues and ensure that both targets will be achieved within three years, the situation is unlikely to affect the project since it is fully financed. Eskom's large investment program is coming to an end and the financial projections show significant improvement in the next three years.
37. **Technology risk may delay implementation:** The risk is low since Eskom has been implementing a small battery storage pilot for the past three years and use of the technology worldwide is already being mainstreamed. The risk may be in integrating battery storage to the power grid and ensuring optimal dispatch. Eskom will ensure that this requirement is appropriately reflected in the bidding documents. Eskom has made and will continue to make study tours to learn from manufactures and developers and has appointed a technical advisor to support design and implementation.
38. **Eskom's lack of commitment may result in BSP not proceeding:** The proposed alternative has been approved at various stages by Eskom's Board and in Government. Before the decision to propose a change from Kiwano CSP to BSP, the technology was part of Eskom's Corporate Plan. Eskom considers the technology more important than CSP as it has the dual purpose of addressing low voltage and capacity issues at remote distribution terminals and enabling VRE to be dispatchable. The risk is therefore considered low.
39. **The sheer number of Battery Storage sites could be a challenge in meeting the already tight timeline:** The locations of the more than 40 sub-project sites are spread over four provinces of South Africa, which if not managed well could pose implementation difficulties. To address this issue, Eskom plans to consolidate the sites into three or four large contract packages and has also put in place separate project teams to manage these packages.
40. **Eskom's lack of familiarity with OP 4.10 could delay preparation of the IPP:** To mitigate this risk, the World Bank team is working closely with Eskom to ensure that Eskom and the consultant fully understand the Policy, the requirements and content of the IPP as well as its implementation requirements.
41. **Continuation of SO2 Spikes:** The main risk associated with SO2 spikes is the long time it might take for the measures being planned to be implemented or the inability of Eskom to identify a source of lower Sulphur coal, so the spikes would continue until Flue Gas Desulphurization (FGD) is operational. To mitigate this risk Eskom would continue to take measures such as reducing generation when high Sulphur batches of coal are encountered.
42. **Ministerial Determination (DoE allocation/amendment) may be delayed:** For Eskom to commence the development of 60 MW of solar PV, under the Law the Minister of Energy must approve an allocation to Eskom (other than private sector). Currently, Eskom has an allocation of 100 MW for CSP in IRP 2010, which will need to be changed to 100 MW solar PV. Eskom is currently engaging Department of Energy (DOE) and NERSA to amend the allocation. Government policy allows such amendment. The risk of this negatively impacting the project timeline is minimal since implementation of Eskom financed PV is expected to be completed by December 2021 and since Eskom has already commenced the process to amend the allocation.



The World Bank

Eskom Investment Support Project (P116410)



Results framework

COUNTRY: South Africa

Eskom Investment Support Project

Project Development Objectives(s)

The project development objective (PDO) of the Eskom Investment Support Project for South Africa is 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 longterm carbon mitigation strategy.

Project Development Objective Indicators by Objectives/ Outcomes

Indicator Name	DLI	Baseline	End Target
Enhance power supply and energy security (Action: This Objective has been Revised)			
Generation capacity installed and commissioned from renewable energy (CSP) (Megawatt)		0.00	100.00
Action: This indicator has been Marked for Deletion			
Generation capacity installed and commissioned (Medupi) (Megawatt)		0.00	4,800.00
Action: This indicator has been Revised			
Generation capacity installed and commissioned from renewable energy (Sere Wind Farm) (Megawatt)		0.00	100.00
Action: This indicator has been Revised			
Support longterm carbon mitigation strategy (Action: This Objective has been Revised)			
Direct CO2 emissions avoided under the project (Metric ton)		0.00	238,000.00
Action: This indicator has been Revised			



Intermediate Results Indicators by Components

Indicator Name	DLI	Baseline	Intermediate Targets		End Target
			1	2	
Medupi Power Plant					
Direct project beneficiaries (Number)		0.00			4,584,283.00
<i>Action: This indicator has been Revised</i>					
Female beneficiaries (Percentage)		50.00			50.00
<i>Action: This indicator has been Revised</i>					
Quarterly Medupi Environmental Monitoring Committee meetings held and minutes distributed. (Yes/No)		No			Yes
<i>Action: This indicator has been Revised</i>					
Medupi construction progress rate towards completion (Percentage)		0.00			100.00
<i>Action: This indicator has been Revised</i>					
Number of units synchronized (Number)		0.00			6.00
<i>Action: This indicator has been Revised</i>					
Transmission lines completed (Kilometers)		0.00			1,034.00
<i>Action: This indicator has been Revised</i>					
Transmission lines progress rate towards completion (Percentage)		0.00			100.00



Indicator Name	DLI	Baseline	Intermediate Targets		End Target
			1	2	
Action: This indicator has been Revised					
Number of units handed over to commercial operations (Number)		0.00			6.00
Action: This indicator has been Revised					
Renewable energy (Sere Wind Farm and Battery Storage) (Action: This Component has been Revised)					
Number of wind turbines erected (Number)		0.00			46.00
Action: This indicator has been Revised					
Provisional acceptance (CSP) (Yes/No)		No			Yes
Action: This indicator has been Revised					
Progress rate towards completion (Sere Wind Farm) (Percentage)		0.00			100.00
Action: This indicator has been Revised					
Support for low carbon energy efficiency comps., comprising the Majuba Railway for coal transportation & TA prog. for energy efficiency (Action: This Component has been Revised)					
Placement of EPC contract (CSP) (Yes/No)		No			Yes
Action: This indicator has been Revised					
Progress rate towards completion for Majuba rail project (Percentage)		0.00			100.00
Action: This indicator has been Revised					
Number of studies for power plant efficiency improvements completed (Number)		0.00			7.00
Action: This indicator has been Revised					



Indicator Name	DLI	Baseline	Intermediate Targets		End Target
			1	2	
Project generation capacity savings (Megawatt)		0.00			3,171.00
<i>Action: This indicator has been Revised</i>					
Majuba coal transportation cost (Text)		93.00		20.00	20.00
<i>Action: This indicator has been Revised</i>					
Energy Storage Capacity Installed and Commissioned (Megawatt)		1.00			200.00
<i>Action: This indicator is New</i>					



I. SUMMARY OF CHANGES

	Changed	Not Changed
Results Framework	✓	
Components and Cost	✓	
Loan Closing Date(s)	✓	
Disbursement Estimates	✓	
Safeguard Policies Triggered	✓	
Legal Covenants	✓	
Procurement	✓	
Implementation Schedule	✓	
Other Change(s)	✓	
Economic and Financial Analysis	✓	
Technical Analysis	✓	
Social Analysis	✓	
Environmental Analysis	✓	
Implementing Agency		✓
DDO Status		✓
Project's Development Objectives		✓
Cancellations Proposed		✓
Reallocation between Disbursement Categories		✓
Disbursements Arrangements		✓
Overall Risk Rating		✓
EA category		✓
Institutional Arrangements		✓
Financial Management		✓
APA Reliance		✓

IV. DETAILED CHANGE(S)



COMPONENTS

Current Component Name	Current Cost (US\$M)	Action	Proposed Component Name	Proposed Cost (US\$M)
Medupi Power Plant	2380.85		Medupi Power Plant	2380.85
Renewable energy (Sere Wind Farm and Concentrating Solar Power Plants)	267.83	Revised	Renewable energy (Sere Wind Farm and Battery Storage Program)	267.83
Support for low carbon energy efficiency comps., comprising the Majuba Railway for coal transportation & TA prog. for energy efficiency	415.77		Support for low carbon energy efficiency comps., comprising the Majuba Railway for coal transportation & TA prog. for energy efficiency	415.77
TOTAL	3,064.45			3,064.45

LOAN CLOSING DATE(S)

Ln/Cr/Tf	Status	Original Closing	Revised Closing(s)	Proposed Closing	Proposed Deadline for Withdrawal Applications
IBRD-78620	Effective	31-Oct-2015	31-Dec-2019	31-Dec-2020	30-Apr-2021

DISBURSEMENT ESTIMATES

Change in Disbursement Estimates
Yes

Year	Current	Proposed
2010	0.00	0.00
2011	532,104,961.51	532,104,961.51
2012	436,503,059.15	4,350,059.15
2013	333,146,012.24	333,146,012.24
2014	238,355,546.28	238,355,546.28
2015	751,890,298.81	751,890,298.81
2016	496,350,040.67	496,350,040.67



2017	513,100,040.67	217,330,825.00
2018	315,680,040.60	170,509,443.00
2019	104,370,000.00	370,000,000.00
2020	28,500,000.00	359,613,115.00

COMPLIANCE

Safeguard Policies

Safeguard Policies Triggered	Current	Proposed
Environmental Assessment (OP) (BP 4.01)	Yes	No
Performance Standards for Private Sector Activities OP/BP 4.03	No	No
Natural Habitats (OP) (BP 4.04)	Yes	No
Forests (OP) (BP 4.36)	No	No
Pest Management (OP 4.09)	No	No
Physical Cultural Resources (OP) (BP 4.11)	Yes	No
Indigenous Peoples (OP) (BP 4.10)	No	Yes
Involuntary Resettlement (OP) (BP 4.12)	Yes	No
Safety of Dams (OP) (BP 4.37)	No	No
Projects on International Waterways (OP) (BP 7.50)	Yes	Yes
Projects in Disputed Areas (OP) (BP 7.60)	No	No

LEGAL COVENANTS

Loan/Credit/TF	Description	Status	Action
IBRD-78620	Finance Agreement: LA Sch2, Sect IB2 Description :The Borrower shall negotiate and amend each past Medupi contract to include the Audit Right and Fraud and Corruption Provisions in conformity with the Anti-Corruption Guidelines.... Due Date :30-Jun-2010	After delay complied with	No Change



IBRD-78620	Finance Agreement: LA Sch2, Sect II B4 Description :Beginning with the Borrower's Fiscal Year commencing April 1, 2013, the Borrower shall at all times maintain a Debt Service Cover Ratio equal to or greater than 1.3 and EBITDA Margin above 25% Due Date :31-Mar-2014	Not complied with	No Change
IBRD-78620	Finance Agreement: GA Sect 3.01 (a) Description :The Guarantor undertakes to complete the Environmental Management Framework (EMF) for the Guarantor's Waterberg district in compliance with the Environmental Legislation Due Date :30-Jun-2011	After delay complied with	No Change
IBRD-78620	Finance Agreement: GA Sect 3.01 (c) Description :The Guarantor undertakes to take timely action to ensure adequate supply of water to the Medupi Power Plant for the operations of the plant's six units, including the FGD units Due Date :30-Jun-2016	Partially complied with	No Change
IBRD-78620	Finance Agreement: GA Sect. 3.01 (d) Description :The Guarantor undertakes to 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 Plant, as well as the mitigation measures set forth and to be set forth therein, are implemented and adhered to. Due Date :30-Jun-2014	Complied with	No Change
IBRD-78620	Finance Agreement: LA Sch2,Sect II BA(c):(i) Up to and including the Closing Date, if at any time any of the Borrower's interim unaudited financial forecasts referred to above in paragraph B.4(a) of this Section II establish that the Borrower's: (i.1) Debt Service Cover Ratio will be less than 1.3; or (i.2) EBITDA Margin will be less than 25 percent then the Borrower: (A) will prepare a Financial Action Plan, acceptable to the Bank, which the Borrower will deliver to the Bank not later than 120 days following the end of the Borrower's immediately preceding Fiscal Year, and will also prepare an interim unaudited financial forecast for the Borrower covering	Complied with	No Change



	the immediately following 5 Fiscal Years, which forecast shall include calculations of the DSCR and EBITDA margin as at the end of each 6-month period during the said 5 Fiscal Years.		
IBRD-78620	Finance Agreement: LA Sch2,Sect II BA(c):(i) (B) will thereafter prepare on a semi-annual Fiscal Year basis, interim unaudited financial forecasts covering the immediately following 5 Fiscal years including calculation of the DSCR and EBITDA margin as at the end of each 6-month period during the said 5 Fiscal Years.	After delay complied with	No Change
IBRD-78620	The Borrower shall not later than March 31, 2019, complete the drilling and analyses of the coal at the Excess Coal Stockyard to determine if there are is lower Sulphur coal that could be used to avoid Sulphur dioxide ((SO2) spikes above 3500 milligrams per normal cubic meter.	Not yet due	New
IBRD-78620	Finance Agreement: LA Sect. II B. 2.: The Borrower shall prepare and submit to the Bank not later than 45 days after the end of each quarter, interim unaudited financial reports for the Project covering the quarter.	Complied with	No Change
IBRD-78620	Finance Agreement: LA Sch2, Sect IC2 Description :The Borrower shall not later than June 30, 2013, ..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) September 30, 2021 .. Due Date :30-Jun-2013	Complied with	No Change
IBRD-78620	The Borrower shall not later than March 31, 2019, decide and confirm measures, acceptable to the Bank, that will mitigate daily Sulphur dioxide ((SO2) emissions above 3500 milligrams per normal meter cubed	Not yet due	New
IBRD-78620	The Borrower shall refrain from carrying out any BSP installation activity in a site, which may be subject of an	Not yet due	New



	<p>existing or outstanding land claim; provided, however, that if any existing site is within a location which is subject of an existing or outstanding land claim, the Borrower shall not use the proceeds of the Loan or any portion of the Loan to finance any activity in such site</p>		
IBRD-78620	<p>No withdrawal shall be made for: for payments under Category (4) unless the Borrower has prepared, adopted and disclosed the IPP and environmental and social assessment for the Battery Storage Program, in form and substance satisfactory to the Bank.</p>	Not complied with	New
IBRD-78620	<p>The Borrower shall ensure a continuous engagement with the coal suppliers, and request said coal suppliers to supply lower Sulphur coal; and (ii) prepare and furnish to the Bank quarterly reports on the Sulphur dioxide (SO₂) spikes covering the period of one calendar quarter. Each such report shall be submitted to the Bank not later than thirty (30) days after the end of each calendar quarter</p>	Not complied with	New
IBRD-78620	<p>The Borrower shall prepare and disclose IPP and ESA referred to in Section IV.B.1(d) of Sch 2, in accordance with ToR satisfactory to WB. For each activity for which the IPP is required, the Borrower shall (a) prior to the carrying out of any activity, prepare and furnish to WB an IPP and ESA in accordance with the ToR and (b) thereafter adopt and implement said IPP in accordance with its terms.</p>	Not complied with	New