



1. Project Data

Project ID

P116410

Project Name

ZA:Eskom Investment Support Project

Country

South Africa

Practice Area(Lead)

Energy & Extractives

L/C/TF Number(s)

IBRD-78620

Closing Date (Original)

31-Oct-2015

Total Project Cost (USD)

3,159,610,781.04

Bank Approval Date

08-Apr-2010

Closing Date (Actual)

30-Jun-2021

IBRD/IDA (USD)
Grants (USD)

Original Commitment

3,750,000,000.00

0.00

Revised Commitment

3,159,610,781.04

0.00

Actual

3,159,610,781.04

0.00

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2. Project Objectives and Components

a. Objectives

There were slight differences in the wording of the PDO between the PAD and the Loan Agreement, but these were more semantic than substantive. According to the loan agreement (p. 2) ,“The objective of the Project is enabling the Borrower to enhance its power supply and energy security in an efficient and sustainable manner to support both economic growth objectives and the long-term carbon mitigation strategy of the Guarantor.” The Project Appraisal Document (PAD, p. 28, dated March 19, 2010), stated the project objective was 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 South Africa's long-term carbon mitigation strategy.”

This review will assess the project objective as defined in the loan agreement and the PAD. The objectives will be parsed into four, as done in the ICR:

Objective 1: To enable Eskom Holdings to enhance power supply and energy security in an efficient manner

Objective 2: To enable Eskom Holdings to enhance power supply and energy security in a sustainable manner

Objective 3: Supporting GoSA's economic growth objective

Objective 4: Supporting the GoSA's long-term carbon mitigation strategy for South Africa

b. Were the project objectives/key associated outcome targets revised during implementation?

Yes

Did the Board approve the revised objectives/key associated outcome targets?

Yes

Date of Board Approval

07-Jul-2015

c. Will a split evaluation be undertaken?

No

d. Components

Component A: Medupi Coal-Fired Power Plant (MCP) (Component A) (Estimated cost US\$12,048 million, actual cost US\$17,474 million; estimated IBRD Loan US\$3,040 million, actual IBRD disbursed US\$2,866 million). This component comprised a 6 x 794 MW coal-fired power plant based on supercritical technology. The loan was provided for supply, erection, and civil construction contracts for the Medupi power plant and associated facilities.

Component B: Renewable Energy Power Plants (Estimated cost US\$1,227 million, actual cost US\$252 million; estimated IBRD Loan US\$260 million; actual IBRD Loan US\$23 million; estimated Clean Technology Fund (CTF) US\$350 million, actual CTF US\$77 million). The component comprised a 100 MW Sere wind power plant and a 100 MW Concentrated Solar Power (CSP) plant at Upington. The Sere wind power plant was prepared as a first phase of a two-phase 200 MW project in the Western Cape Province. The first phase under this project was expected to generate about 219 GWh when completed. The Upington Power Plant was to be implemented on a design, construct, and commission basis in the Northern Province. It was to be implemented on a pilot basis to provide benchmarks for cost and performance on a utility scale basis in a region that has abundant solar resources.



Component C: Energy Efficiency Investments (Component C) (Estimated cost US\$576 million, actual cost US\$402 million; estimated IBRD financing US\$441 million; actual financing IBRD Loan US\$270 million). The component consisted of both sector investments and TA. Included in this component were three subcomponents:

1. The first was construction of the Majuba Rail, which would be more cost-efficient and environmentally better than road for coal transportation to the Majuba Power Plant. The project also included a new rail yard layout for faster coal off-loading.
2. The second subcomponent was TA for assessing opportunities for coal-fired power plant efficiency improvements to support Eskom's objective of reducing the average heat rate of its fleet by 1 percent by 2012.
3. The third subcomponent provided TA to support implementation of the Upington CSP and provide technical, financial, and legal advisory services to Eskom to develop domestic or cross-border renewable projects.

Revised Components

The main change to the project components was the replacement (during the project restructuring on December 7, 2018) of the Kiwano CSP plant with a gridscale Battery Storage Program (BSP)—later referred to as the battery energy storage system (BESS). The decision to substitute the CSP plant with the BESS was taken after long procurement delays and after Eskom received non-responsive bids for CSP. CSP was conceived as a learning pilot when there was no private sector involvement in renewable energy in South Africa. The World Bank, by packaging renewable energy as an integral part of the EISP and providing technical support to the GoSA, facilitated an uptake of renewable energy, especially under the successful Renewable Energy Independent Power Producer Programme (REIPPP). Thus, by 2018, the private sector had taken interest in CSP technology and was about to launch a CSP of its own. There was, therefore, no compelling reason for Eskom to implement a CSP anymore. (ICR, p. 21)

During the December 27, 2019 restructuring, a further change was made to the description of the investments in renewable energy and energy efficiency component to incorporate support to Eskom in implementing unbundling reforms. A total of US\$100 million was reallocated for that activity. However, the allocation was canceled during the last project restructuring on June 25, 2020, because, with only one year left before loan closing and without any specific proposal for implementation, there was no realistic prospect that the funding would be used. (ICR, p. 22)

Component A for the MCPP also included about 2,244 km of 765 kV and/or 400 kV transmission lines (and associated substations) to evacuate power from the power plant to the electricity grid. The scope of the transmission lines activities was designed with broad network flows and stability considerations in mind and was not limited to the needs for integrating the MCPP. The scope was later revised due to internal cash constraints within Eskom to a level necessary to effectively integrate the MCPP to the grid while maintaining technical requirements according to the grid code. Hence, the lengths of the lines were revised to about 1,020 km during the 2019 project restructuring. The revised lengths of the lines were included in the Results Framework as an intermediate indicator. (ICR, p. 22)

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates



Project Cost: The total project was originally estimated at US \$13,861.82 billion (according to Financing table on p. 2 of the ICR and the PAD p. 130). The revised amount was US \$18,128.61 billion, which was also the actual cost at completion in June 2021. The increase in the projects costs was due to cost overruns and delays, although only minimal details on the increased costs were provided in the ICR (see Revised Components above).

Financing: At appraisal, World Bank financing was estimated at US \$3,750 billion. At project closing in June 2021, the project had disbursed US\$3,159,610,781. Eskom was also supported by many bilateral/multilateral and commercial lenders. For the purposes of financing the Medupi Power Plant, Eskom had undertaken three large Export Credit Agency supported and AfDB (public sector) financings (boilers/turbines) and had also secured EIB, AfDB and JICA financing for transmission lines and other investment expenditures (PAD, p. 190).

Borrower contribution: At appraisal, the borrower's contribution was estimated at US\$4,736.7 billion. At project closing, the borrower's actual contribution was US\$19,208 billion. There were no other lenders other than those mentioned in the previous paragraph.

3. Relevance of Objectives

Rationale

The overall assessment of relevance of the PDO is based on three considerations: (a) the alignment of the PDOs with the World Bank's Country Partnership Strategy (CPS)/Country Partnership Framework (CPF) for South Africa at project closure; (b) the country context for the project (whether the project's objectives were outcome oriented and appropriately pitched for the development status and capacity of the country); and (c) the World Bank's historical experience in the country and sector (ICR, p. 24).

Project objectives were substantially relevant in terms of the country context at project start and close. The World Bank's preparation of the Eskom Investment Support Project (EISP) started in 2009 following a request by the GoSA for financing support for urgent implementation of the MCPP. The project was the most feasible option in the short term for addressing a severe energy crisis (which was adversely affecting economic growth and employment and forcing businesses to close) that posed a serious threat to economic recovery after the 2007/08 global financial crisis. Additionally, South Africa had no viable alternative to coal in seeking to meet urgent generation needs, which continued to negatively impact the country's economy. At the time of appraisal, South Africa had undertaken the use of the most efficient technologies available in the development of all of its new coal-fired power plants. This was in line with the GoSA's commitment on climate change. Further, adoption of these technologies was in line with the World Bank's Climate Strategy (PAD, p. 19). It was also envisioned that the project, as well as the longer-term partnership between the GoSA and the World Bank, would enable the country to achieve a low carbon trajectory (PAD, p. 1).

The EISP was prepared during the period of the FY08–12 World Bank CPS for South Africa. The CPS had the dual objectives of supporting the Government's national growth and development programs and collaborating with regional partners on key regional development issues. The World Bank's support strategy was organized under two pillars for (a) Urban and Rural Development focusing on urban and municipal development, land reform, agriculture, private sector development, environment, and infrastructure and (b)



Regional Integration through outward investment, regional communities, and knowledge sharing. Improved service delivery was a cross-cutting theme.

The FY08–12 CPS was prepared before the 2008/09 global financial crisis at a time when South Africa had easy access to finance and as a result consisted entirely of demand-driven advisory services and analytics and TA. The EISP was, therefore, not part of the lending program under the original CPS. When the power crisis emerged, the World Bank assessed that addressing power shortages was critical for South Africa's economic recovery and the whole Southern Africa subregion. Ending power shortages was also essential for broader developmental outcomes as increased access to reliable and affordable electricity would stimulate entrepreneurship and job creation in the informal sector. Therefore, the PDO was supportive of the CPS's overall objective of supporting national growth and development programs.

A CPS Progress Report, dated March 1, 2010, was prepared in parallel with the EISP. The progress report included and described, in some detail, the EISP's activities and objectives under the Urban and Rural Development pillar's infrastructure sub-objective. The results matrix (Progress Report, page 26) stated the issues to be addressed by the EISP as the backlog of unmet investment needs, which had precipitated an energy crisis and the high costs of infrastructure due to the international financial crisis. The outcomes to be delivered by the EISP were identified as increased power generation capacity and a gradual shift to a low carbon trajectory.

The World Bank's subsequent CPS for FY14–17 reaffirmed the importance of the then-ongoing EISP stating explicitly that the "IBRD strategy will be centered on knowledge and technical cooperation...the implementation of the ongoing lending program in energy and the environment." The CPS was anchored in the Government's National Development Plan's objectives of eliminating poverty, reducing inequality, and improving job creation. The CPS's particular focus was organized around three engagement areas to (a) promote increased competition and improved business environment for sustainable growth, (b) strengthen the performance of MSMEs and skills development to support job creation, and (c) improve the infrastructure investment framework and selected infrastructure services. Under the three pillars were included eight program areas, including energy which fell under the pillar of promoting investments.

The FY14–17 CPS further confirmed, as a continuing priority, support to South Africa's collaboration and cooperation with partners on the Southern Africa Power Pool (SAPP) and the planned energy schemes such as the Inga Hydropower Program in the Democratic Republic of Congo and the Kudu gas-based power generation in Namibia, among others. These were all highlighted as strategic priorities for the SAPP countries in the EISP PAD. The CPS results matrix confirmed (pages 29 and 30) the energy sector developmental issues addressed by the EISP, and the CPS outcomes as described above and in the PAD.

The FY14-17 CPS was revised in the Performance and Learning Review of November 2016 and also extended by one year through FY18. There was a three-year gap before the current country program (FY2022-26) was approved on July 22, 2021. The first two years gap was due to the need to align the policy dialogue with the electoral cycle of the May 2019 national elections and to build consensus with the new leadership. The additional one-year gap arose due to the COVID-19 pandemic.

Overall, based on these factors the relevance of the PDOs is **Substantial**. This is due to the strong alignment of the EISP objectives with both the CPF at project closure (FY14-17, extended to FY2018) and the FY22–26 CPF which came into effect three weeks after the loan closed. This rating also accounts for the fact that the objectives (increasing power supply and security, supporting economic objectives, and the GoSA's carbon emissions mitigation strategy) were outcome oriented, but there were some deficiencies in



the selection of the indicators, as noted in the ICR (pp. 24-25). Additionally, the objectives were within the capacity of ESKOM to achieve, but this later turned out to have been an inaccurate assessment during project implementation.

Rating

Substantial

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

Objective 1: Enhancing Power Supply in an efficient and sustainable manner

Objective 2: Enhancing Energy Security in an efficient and sustainable manner

Objectives 1 and 2 are combined in the ICR since they share a common results chain in supporting the MCPP, renewable energy, TA for development of renewable energy and energy efficiency, and the Majuba Rail components. It should be noted, however, that sharing a results chain is not a sufficient condition for combining these objectives for the purpose of evaluating efficacy.

Rationale

Theory of Change for Objectives 1 and 2

The first two objectives, combined, were to measure the MCPP's contribution to power supply and energy security. As revised, the outcome indicators and targets were generation capacity installed and commissioned at Medupi (target of 4,800 MW) and also at the Sere wind power plan (target of 100 MW).

The first project objective was to enhance power supply in an efficient and sustainable manner through the installation, construction and commissioning of the Medupi coal-fired power plant (4,800 watts, based on supercritical technology) and the associated transmission system to evacuate electricity from the plant. It was theorized that a supercritical design for boilers would be able to operate at high temperatures and pressures than subcritical boilers, and thus operate with greater efficiency, leading to enhanced power supply and energy security through improved cycle efficiency and improved environmental performance. This increase in efficiency would ultimately result in a reduction in coal consumption of approximately 5 percent as well as a reduction in emissions in the order of 5 percent. (PAD, p. 113)

The second project objective was to enhance energy security in an efficient and sustainable manner through the design, procurement, construction, supply, and installation and commissioning of a 100MW wind power plant (Sere Wind Project) and 100 MW concentrating solar power plant (Upington CSP Project). The supporting theory of change was that alternative sources of energy (wind and solar) would increase energy



efficiency and sustainability without contributing to CO2 emissions. Cumulative emissions savings from the Sere Wind Project were expected to be 5 million tons of CO2 over the 20-year life of the plant. (PAD, p. 116)

Outputs (from ICR, Annex 1.B Key Outputs by Component, p. 60-67):

- Medupi construction progress rate: the target was 100 percent completion; 99.5 percent was achieved at completion of project
- Transmission lines constructed: the target was 1,200 KM; 941.90 KM was achieved at completion
- Transmission lines progress rate toward completion: the target was 100 percent; 95.88 percent was achieved at completion
- Number of units handed over for commercial operation: the target was 6; 5 were achieved at completion
- Progress rate towards completion of Sere Wind Farm: the target was 100 percent, which was achieved at completion
- Direct project beneficiaries. The original target for this was 3.6 million on December 31, 2019, but was revised to 5.5 million on June 30, 2021. At completion, the project did not achieve its target with a total of 4,234,100 beneficiaries reached. According to the ICR, p. 61 (Annex 1), the targeted was not met due to delays in commissioning the plant and due to its low energy availability factors

Outcomes (from ICR, Annex 1.B Key Outcomes by Component, pp. 59-67):

- 4,764 MW generation installed and commissioned at Medupi (targeted); 4,000 MW achieved at completion. The underachievement of this output was primarily due to substantial defects in design and construction. In Annex 1, the original target is listed as 4,800 MW (ICR, p. 59)
- 100 MW generation capacity added at Sere Wind Power (targeted); 100 MW achieved at completion
- 7 power plants efficiency studies completed (targeted); 7 achieved at completion

Taken collectively, the efficacy of objectives 1 and 2 is rated overall as **Modest**, as detailed in the section above. There were some objectives full or partially achieved, including the following: (a) the renewable energy activities fully achieved their capacity (100 MW Sere wind power plant) and energy expectations; (b) the technical assistance activities made substantial contributions to the PDO; and (c) the MCPP delivered fully on potential capacity (4,764 MW), but only partially on actual energy output (significantly low availability energy factors relative to both Eskom's target and international benchmarks, and significant unplanned outages that account for 28 percent of time on average over the past three years in particular constrained the ability of the project to fully contribute to the energy security). It should be noted that these results were realized over an 11-year period, as opposed to the 5 years initially anticipated at appraisal (ICR, p.25). Additionally, the ICR describes serious design and construction defects encountered which contributed to low plant reliability and an increase in unplanned capacity loss factors (ICR, pp. 25-26).

It is also noted that the MCPP is contributing a significant 15 percent of the power system generation, which has helped to alleviate power shortages. MCPP is also the lowest carbon emitter in Eskom's fleet of coal power plants and is enabling Eskom to start work on decommissioning/repurposing its most inefficient coal power plants.



Based on the above, efficacy of these objectives is rated Modest.

Rating

Modest

OBJECTIVE 2

Objective

See Objective 1, since Objectives 1 and 2 were combined for this ICR Review.

Rationale

See Objective 1, since Objectives 1 and 2 were combined for this ICR Review.

Rating

Modest

OBJECTIVE 3

Objective

Objective 3: Supporting GoSA's economic growth objectives.

Rationale

There were no indicators or targets provided for this objective in the ICR. The underlying objective in developing the project was to increase availability of adequate and reliable electricity so that industry, manufacturing, and MSMEs would grow and create jobs and access would be expanded to the remaining 20 percent of the population without access. Therefore, this objective was assessed with reference to the success of the project in increasing energy availability to the customers. Because the objectives of enhancing power supply and energy security in an efficient and sustainable manner are rated **Modest** for efficacy, so is the rating of the objective of supporting the GoSA's economic growth goals.

Rating

Modest

OBJECTIVE 4

Objective

Objective 4: Supporting the GOSA's long-term carbon mitigation strategy for South Africa



Rationale

There were two activities related to this objective: The Majuba Rail Project and technical assistance to Eskom. The Majuba Rail Project activities included the design, procurement, construction and commissioning of the Ermelo to Majuba railway line that would become the main coal transport system to the Majuba power station. This railway line was expected to produce 100 percent of the required coal capacity. It was theorized that this would result in a financial benefit (less cost to transport coal) and also multiple environmental and other strategic benefits (e.g., freeing up capacity in the general freight railway to supply coal to Tutuka Power Station). (PAD, p. 120). The technical assistance activity targeted coal-fired power plant efficiency improvements, including a 1 percent reduction in the average heat rate of Eskom's current fleet of coal-fired power station by 2012. Subsequently, this would help to reduce the CO2 emissions from the power plants.

The theory of change for objective 4 only mentions the outcome indicator of CO2 emission discharged. The activities of Objectives 1 and 2, taken collectively, appear to have been viewed as the activities for achieving objectives 3 and 4.

The overall aim of Objective 4 was to support the reduction in the carbon intensity of electricity generation. As stated in the ICR (p. 30), initially, achievement of this objective was to be measured by a reduction in the carbon emissions discharged per unit of electricity with a target of 0.950 kg per kWh by project closure. The indicator was replaced by the volume, in metric tons of CO2 reductions by project end (with a target of 238,000 MT) since that was a more reliable indicator for achievement of Objective 4. The actual reduction in CO2 emissions was 315,330 MT (exceeding the target), which contributes to the country's long-term carbon mitigation strategy. It was also noted that the achievements could have been even higher had the BESS and the Majuba Rail components become operational by project closure or soon thereafter and had the Medupi plant's EAFs been higher resulting in displacement of more output from less-efficient coal-fired power plants. Even though there was non-completion of two other activities (the BESS and the Majuba Rail) that were expected to contribute to this target, the objective is rated as **Substantial** since the target for CO2 emissions was exceeded, 97.5 percent of the Majuba Rail Project was completed, and the Sere Wind Farm was 100 percent completed.

Outputs

- 46 wind turbines installed (targeted); 46 achieved at completion
- 100 MW wind capacity added at Sere (this was also an output for objectives 1 and 2 (see above))
- 7 power plants efficiency studies completed, which was achieved at completion

Outcomes

- Direct CO2 emissions avoided under the project. The target for this was 238,000 Metric tons, which was surpassed at completion with an achievement of 315,330 Metric tons.

On the basis of these results, the project contributed substantially to the GoSA's long-term Carbon Mitigation Strategy.



Rating
Substantial

OVERALL EFFICACY

Rationale

Overall, the causal pathways in the theory of change (ToC) from activities to outcomes were partially valid and direct, and the outcomes achieved could be moderately attributed to the project's intervention. There were no outcome indicators proposed for economic growth, however. There were also misrepresented outputs and outcomes in the ToC and Annex 1 (Results Framework and Key Outputs). For example, the ToC states 2,224 KM transmission lines as an output, but the actual target for this indicator in Annex 1 is 1,020 Km (ICR, p. 62). Additionally, direct project beneficiaries are not listed at all in the ToC but are listed as indicators in Annex 1. Further shortcomings in the ToC will be described in section 9.

The overall efficacy rating is **Modest**. This is due to the majority of modest ratings for three of the objectives as detailed above. Taken collectively, Objectives 1 and 2 were rated as modest. These two objectives also directly supported the achievement of Objectives 3 and 4. There were no indicators utilized or measured for Objective 3. Objective 4 was rated as Substantial.

Overall Efficacy Rating
Modest

Primary Reason
Unintended negative effects

5. Efficiency

At project appraisal, the project's economic and financial analysis was conducted for the following 4 subprojects: (a) Medupi Coal Power Project, (b) Sere Wind Power Project, (c) Kiwano Concentrated Solar Power Plant, and (d) Majuba Rail Subproject (ICR, p. 30, PAD, pp. 12-13).

Economic Analysis

The main aspects covered by the economic analysis at appraisal were assessments of (a) whether additional base load capacity was required and whether the Medupi Power Project represented the least cost option for meeting that requirement and what its economic incremental rate of return (EIRR) would be; (b) the economic viability of the Sere wind power and Kiwano CSP projects using the EIRR and net present value (NPV) analysis, primarily; and (c) the economic viability of the Majuba Rail Project based on the EIRR and NPV analysis (ICR,



pp. 30-31). The aggregate NPV was US\$15.9 billion and the ERR was 22.7% (originally, the PAD estimated the consolidated EIRR at 29.3%, (PAD p. 12, 50)).

MCCP was viewed as the least-cost expansion plan for Eskom to supply energy to meet South Africa's demands for electricity in the short term. The Bank's economic analysis confirmed this by comparing Medupi to alternatives such as renewable energy, diesel generation and LNG, and imports from the region. Additionally, the Bank's Inspection Panel received a "Request for Inspection" related to the project on April 10, 2010. The IP determined in its report (No.64977-ZA) that the PAD has gone beyond the identification of the "least cost" options for meeting electricity needs, and thereby satisfied requirements for analysis of alternatives in projects of this type.

According to the ICR (p. 33), the project's overall ERR was re-estimated at 12.8%. The significant reduction was attributable largely to those of the MCCP, which was the largest component. The reduced ERR was also due to a capital expenditure (CAPEX) increase of 25%, extended project period (delayed for 6 years), cost overruns, and failure to meet expected energy generation in the early years of operation up to project closure (ICR, pp. 33-34). Only the Sere wind power plant was completed below budget and had an ERR above the appraisal estimate (17.1% compared to 10.7%)

Operational and Administrative Efficiency

Assessment of efficiency of use of resources compared the unit of generation costs (US\$ per kW) of the MCCP and Sere wind power plant to industry comparators. The cost per kW for the MCCP is about US\$4,000 compared to an industry comparator of US\$3,500 in 2021 nominal prices. The Sere Wind Project's capital cost is about US\$2,700 per kW compared to industry comparator of US\$2,600 per kW. Therefore, the project was implemented efficiently with outcomes comparable to industry standards. But the implementation delay of about six years involved substantial additional resources by both Eskom and the World Bank that were not captured in the revised ERRs, including the costs of staff time and other resources (ICR, p. 34).

The ICR also noted that in addition to the higher unit costs per kW of the MCCP, the implementation delay of about six years involved substantial additional resources by both Eskom and the World Bank that are not captured in the revised ERRs, including the costs of staff time and other resources (ICR, p. 34)

Overall, the project is rated as **Modest** for efficiency for the following reasons:

1. Total project costs were 45 percent higher at closing than at appraisal
2. Although the overall ERR was robust and above the cost of capital, two subprojects were not completed—one is deferred for completion under another operation and the second one will only be completed in 2023 with an expected negative ERR. Additionally, the estimated ERR at project closing (12.8 percent) was significantly lower than at appraisal (22.7 percent) (see table below).



3. The unit costs for one of the two completed subprojects (the MCPP) are significantly higher than the industry comparator for similar plants, while the wind project is competitive relative to comparators.

Efficiency Rating

Modest

- a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	22.70	0 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	12.80	0 <input type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The outcome of the project is rated **Moderately Unsatisfactory**. This is on the basis that Relevance is rated **Substantial**, Efficacy is rated **Modest** because the development objectives were only partly achieved, and the project's Efficiency is rated **Modest**, on the basis of both economic analysis and administrative and operational factors. The detailed justifications for the respective performance dimensions have been described in the previous sections.

a. Outcome Rating

Moderately Unsatisfactory

7. Risk to Development Outcome

The project partially achieved its key objectives of enhancing power supply and energy security and in supporting South Africa's carbon mitigation strategy. But significant strategic and operational risks in achieving further outcomes still remain. For example, Eskom continues to lose private sector experts which limits its ability to efficiently operate, not only the MCPP, but other plants in its fleet. Eskom requires a strategic plan to determine the allocation of responsibilities and costs for fixing the plant defects between itself and the contractor. Execution of the strategy needs to continue and reach completion as quickly as possible to enable the MCPP to generate energy at levels consistent with its design purpose. Without implementation of effective solutions, the risk exists that with the age of the plant, the Energy Availability Factors (EAFs) may fall even further below Eskom and industry targets.



Operationally, there were inadequacies in procurement and chain supply management procedures that could have ensured the availability of critical spare parts and financial constraints for maintenance of Eskom's power system, including the MCPP, thus contributing to the power outages. ESKOM is aware of these risks and is taking steps to develop solutions.

Over the past 11 years, the Bank's engagement in the sector has helped to strengthen working relations with client partners in the sector and in the GoSA and has built a strong foundation for further cooperation. This may lead to further interest between the GoSA and Eskom in working together with the Bank on new initiatives, such as the decarbonization/repurposing of existing old coal-fired power plants, and on broader sector reforms.

8. Assessment of Bank Performance

a. Quality-at-Entry

The World Bank's overall performance at entry was **Moderately Unsatisfactory**. There were significant deficiencies regarding three central parts:

1. The PDOs, project design, and Results Framework. PDOs conflated project-level objectives with high-level objectives. For example, Objective 3 (contribution to economic growth) related to a higher-level outcome which the project's contribution could not easily access and did not measure. Additionally, the original project indicators measured system-wide outcomes rather than project-specific outcomes (e.g., installed capacity as a percentage of peak demand and carbon intensity of electricity). Although the indicators were revised during restructuring, they still required additional measurement to properly assess outcomes.
2. The assessment of Eskom's implementation capability and the design of risk and mitigation response measures. There were inherent risks in the assessments of Eskom completed by the Bank and an external consulting firm. The central risk was that Eskom had not implemented a project of a similar scale for at least a decade. Additionally, planned staffing for the operational phase was small relative to the size of the plant, and ESKOM decided against using an independent owner's engineer, which the World Bank could have insisted on ESKOM retaining.
3. The management strategy for ensuring that the project would comply with the World Bank's standards for EHSG even if South African regulations became lax or exceptions were granted to Eskom. For example, the Safeguards Diagnostic Review (SDR) concluded that the MCPP did not meet ambient air quality emission standards under South African regulations without installation of the Flue Gas Desulfurization (FGD) equipment.
4. While extensive preparation work was undertaken by the World Bank, including various due diligence assessments, the identified shortcomings were significant and had adverse impacts on the overall project outcome (ICR, p. 51)

Quality-at-Entry Rating
Moderately Unsatisfactory



b. Quality of supervision

There were several features of the supervision that were strong in their implementation, but other aspects reflect the problems of overcoming the project's preparation deficits. These aspects are:

- a. **Overall adequacy of supervision inputs.** The PAD contained a credible implementation support plan (PAD, annex 6), detailing the timing of supervision missions, skills composition, timing for the midterm review, and proposed budget allocation. The core team remained reasonably stable during the task team leader transitions (there were three task team leaders over a period of 11 years). As the implementation issues increased, adjustments were made to augment the team as needed. Overall, there were twenty-one supervision missions between June 2010 and August 2021. Supervision teams regularly discussed action plans for addressing problems with Eskom, but their acceptance of the recommendations and concerns was initially low, although this improved over time as both parties became more familiar with each other's operating procedures and practices.

(b) **Supervision of safeguards.** The World Bank's supervision of safeguards was Satisfactory. There were detailed status reports of safeguard issues and actions for follow-up in the Aide Memoires.

(c) **Project reporting.** The project supervision records (Aide Memoires, ISRs, ad hoc management memos, and presentations) had high-quality project implementation support. ISRs were filed regularly at intervals of six to nine months.

(d) **Coordination with the AfDB on the MCCP.** The AfDB financed the major boiler and turbine contracts for the MCCP. The Bank worked closely with them to present a uniform approach with Eskom. Initial problems arose from the use of virtual instead of site-specific designs, which were known at the time the Bank prepared the project. One example is the boiler defects discovered in Unit #6 in 2015. The Bank and the AfDB should have coordinated a risk assessment based on what was known at the time of project preparation, which would have remediated the issue when the boiler issue was first detected.

(e) **The World Bank's proactivity.** The quarterly progress reports submitted by Eskom indicated that action plans were discussed for addressing problems encountered under the various components at different times. The World Bank team engaged at high levels within the GoSA on key implementation issues (FGD, CSP, BESS, and Majuba Rail), but the problems were not fully resolved. Cancellation of any or all these a coal-fired power project would have undermined the rationale for the Bank's support for the project. Further, invoking the legal remedy of suspension of disbursements was considered on account of ESKOM's non-compliance with obligation to submit plans to the WB for implementation of the FGD, but Bank senior management was reluctant to consider this measure, on account of its potential disruptive impact on the Bank's engagement with the sector.

(f) **Eskom's implementation capacity.** Eskom did not effectively manage construction, contract administration, and transitions to commercial operation for individual units at Medupi. This was due to the limited resources and few available experts relative to the size of the tasks. For example, the MCCP had numerous contract packages—more than 400 at peak for the MCCP and associated transmission lines. This posed a huge contract management challenge for Eskom, which did not have an owner's engineer for the MCCP. Instead, Eskom opted to establish Medupi Execution Teams (METs), in which it integrated personnel provided by a consulting firm for various contract packages/activities. This model did not work, and Eskom continued to suffer from a loss of experienced experts to the private sector, which exacerbated the challenges of effective construction and contract management (ICR, p. 41). The Bank could have



provided additional technical assistance to support Eskom's implementation capacity during implementation. Additionally, the Bank could have pressed Eskom to hire an owner's engineer to coordinate all contracts on the MCP in concert with the embedded engineer. This could have taken place at the beginning of the project when problems were occurring during project implementation.

Overall World Bank performance is rated Moderately Unsatisfactory. This is based on a Moderately Unsatisfactory rating as there were significant shortcomings regarding:

- PDOs, project design, and Results Framework
- Assessment of Eskom's implementation capability and the design of risk and mitigation response measures
- Management strategy for ensuring that the project would comply with the World Bank's standards for EHS

There were significant shortcomings on the lack of early coordination with the AfDB to investigate the causes of the problem of success in resolving the problem of slow decision-making within the GoSA's implementation agencies; and the lack of relative to the scale and complexity of the MCP.

Quality of Supervision Rating

Moderately Unsatisfactory

Overall Bank Performance Rating

Moderately Unsatisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

Overall, the design of the M&E system had significant shortcomings regarding monitoring indicators (2 out of 3—installed capacity as a percentage of peak demand and carbon emissions in kgs per unit of electricity), which were initially set to measure systemwide performance instead of measuring impacts that could be unambiguously attributed to the project. These were subsequently revised during restructuring and better aligned to outcomes but set at an intermediate position in the results chain (ICR, p. 44).

The Theory of Change (ICR p. 16) also had significant shortfalls. Outputs were often conflated with outcomes and were not differentiated in Annex 1. There were no indicators for Objective 3. Additionally, the ToC included activities, outputs, and outcomes as planned activities, but outputs and outcomes are intended results and not planned activities.

b. M&E Implementation

Eskom contended that there was a lack of clarity regarding reporting expectations, although reports and the responsibilities for data collection were provided in the Results Framework (annex 3 of the PAD). As



a result, a common reporting format was created and agreed to by the Bank and other financiers. Quarterly and annual reports were regularly submitted to the Bank.

c. M&E Utilization

The use of a common report format facilitated joint missions by the Bank and other financiers and appeared to have helped with getting all the parties focused on the key issues. Action plans, however, were not always implemented in a timely manner and some problems remained unresolved for long periods (ICR, p. 45)

The design, implementation, and utilization of the M&E system is rated **Modest**. This rating is due to the significant shortcomings in the design of the system indicators and in its utilization. The shortcoming on the M&E utilization was because of the limited impacts of the reporting in addressing key problems that arose during project implementation.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

At appraisal, the project was classified at Category A under Environmental Assessment (OP/BP 4.01). The two safeguard policies triggered at project appraisal were:

- OP/BP 4.0 (Piloting the Use of Borrower Systems to Address Environmental and Social Safeguards Issues in Bank-Supported Projects)
- OP/BP 7.50 (Projects on International Waterways). OP/BP 7.50 was not eligible for the Use of Country Systems (UCS), and the project needed to follow the World Bank's policy rather than use the country systems.

Four of the five safeguard policies relevant to the project were eligible for the UCS. These were:

- Environmental Assessment (OP/BP 4.01)
- Natural Habitats (OP/BP 4.04)
- Physical and Cultural Resources (OP/BP 4.11)
- Involuntary Resettlement (OP/BP 4.12).

The Indigenous Peoples (OP/BP 4.10) policy was later triggered during the restructuring of the project in December 2018 due to the presence of indigenous peoples in one site proposed for the BESS.

A Safeguards Diagnostic review (SDR) was carried out to determine equivalence of the four policies with the World Bank's systems and the acceptability of the country systems with respect to these policies and determine gaps between country systems and the World Bank's policies and agree with Eskom on gap-filling measures. The SDR reviewed the South Africa legal system as it related to the four policies



proposed for the UCS and all the environmental impact assessments and environmental management plans that were prepared for Medupi, Kusile, the Sere wind power plant, and the Kiwano CSP. The SDR concluded that the South African systems were fundamentally equivalent to the objectives of OP/BP 4.0 with respect to the three environmental policies and partially equivalent with respect to the policy on Involuntary Resettlement (ICR, p. 45).

No additional information was provided in the ICR on how these safeguards were addressed during implementation.

b. Fiduciary Compliance

Financial management was rated **Moderately Satisfactory** for most of the project implementation period and remained so at project closure. One issue was the continuing audit qualification of Eskom's financial statements. The basis for the audit qualification is that the auditors were unable to confirm whether the accounts fully recorded all irregular expenditures associated with contracts that they had previously deemed irregular. The audit qualification has been issued for the past four years and will cease once the relevant contracts have been closed or the National Treasury has approved them. Eskom has been pursuing approval with the National Treasury, but there has been no decision on this. There were no overdue audit reports at the time of loan closure. (ICR p. 49). The ICR does not provide additional details on compliance with financial covenants.

c. Unintended impacts (Positive or Negative)

Eskom helped relieve pressure on infrastructure services such as wastewater treatment plant in Lephalale, which Eskom has supported through capacity building, and through support to social facilities and services (schools and health clinics). Eskom also built its own waste treatment plant at the Matimba power station to relieve the pressure on the Lephalale plant. (ICR, p. 37)

d. Other

None

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Unsatisfactory	Moderately Unsatisfactory	
Bank Performance	Moderately Unsatisfactory	Moderately Unsatisfactory	



Quality of M&E	Modest	Modest
Quality of ICR	---	Substantial

12. Lessons

Of the several lessons in the ICR, the following two have high value for broad applicability and replicability:

Rushed preparation of projects identified as urgent can lead to larger problems than those they are designed to solve: The Medupi and Kusile projects were rushed responses to counter the looming power crisis due to poor generation capacity planning. As a result, short-cuts, such as the use of a “virtual design” from another plant implemented more than ten years before were used for the MCP and these turned out to be unsuitable for the project. The project that was rushed to deliver energy in five years was completed only eleven years later and even then, is delivering power at levels well below targets and industry benchmarks.

Detailed knowledge of industry design standards and specifications for equipment through own staff and/or through experienced external engineering consultant services is critical for ensuring that specifications are consistent with the industry’s capacity to deliver. Eskom prepared detailed bidding/contract specifications with the objective of reducing quality problems based on many years of special experience with coal-fired plants. However, some OEMs have standard designs for their equipment, which are either expensive or not possible to change. The case with the instrumentation and controls was an example, where the OEM did not comply with Eskom’s specifications. Eskom then canceled the contract, causing huge delays and a mix of controls in the plant to this day. Other contractors, especially local ones, realized that they could not meet Eskom’s specifications and did not bid, leading to few bids being received for some packages. In such cases, Eskom could have requested waivers under the Public Procurement Preferential Act on local content requirements and used international bidding procedures. A further problem was that due to shortage of experienced staff and complexity of Eskom’s project management arrangement, some deviations from specifications were not detected early, which made making changes difficult and costly and contributed to delays. (ICR, pp. 55-56)

Understanding and securing agreement with the borrower and government agencies on the timelines for critical decisions on their part is essential for successful project implementation. Even though the World Bank had no prior experience of working with Eskom and the South African Government, it would have been possible to review the processes and timelines for key approvals or authorizations needed for implementing the project activities, such as those required under the Public Financial Management Act (PFMA) or for licensing of renewable investments by the National Electricity Regulator of South Africa (NERSA). Specific decision timelines could then have been negotiated with the GoSA agencies for key activities and incorporated in implementation action plans. (ICR, p. 56)

13. Assessment Recommended?



No

14. Comments on Quality of ICR

The ICR was forthright in assessing the project's shortcomings and the authors were truthful in describing the main issues, for which they should be complimented. The ICR goes to great lengths to fully describe the problems encountered and also detail, in a balanced manner, both positives and negatives for a very complex project.

It should be noted that Annex 1 did not synchronize with the Theory of Change, and vice versa. Additionally, the theory of change fell short in accurately describing the main indicators and causal chains between the activities, outputs, outcomes, and impacts. Finally, the ICR could usefully have provided more information on safeguards and fiduciary compliance.

a. Quality of ICR Rating

Substantial