Mozambique: Repair of 110 kV Transmission Line Nampula-Nacala and Rehabilitation of Local Grids (Medium and Low Voltage) in Nampula and Nacala

Ex post evaluation

OECD sector	23040/Electrical transmission/distribution	
BMZ project ID	(1) 1999 65 716 transmission line (2) 1997 65 330 local grids	
Project executing agency	Electricidade de Moçambique (EDM)	
Consultant	(1) Lahmeyer International (2) Swedpower	
Year of ex-post evaluation report	**2010 (1: sample 2010, 2: sample 2011)**	
	Project appraisal (planned)	**Ex-post evaluation (actual)**
Start of implementation	(1) Q 1 2000 (2) Q 3 1997	(1) Q 3 2000 (2) Q 2 1998
Period of implementation	(1) 40 months (2) 48 months	(1) 47 months (2) 67 months
Investment costs	(1) EUR 10.22 million (2) EUR 10.00 million	(1) EUR 10.61 million (2) EUR 9.80 million
Counterpart contribution	(1) EUR 1.53 million (2) EUR 1.21 million	(1) EUR 1.91 million (2) EUR 1.01 million
Financing, of which Financial Cooperation (FC) funds	(1) EUR 8.69 million (2) EUR 8.79 million	(1) EUR 8.69 million (2) EUR 8.79 million
Other institutions/donors involved	None	None
Performance rating	2	
• Relevance	2	
• Effectiveness	2	
• Efficiency	3	
• Overarching developmental impacts	1	
• Sustainability	3	

Brief description, overall objective and project objectives with indicators

The Nampula-Nacala line project (1) comprised the repair of a 199 km-long 110 kV power transmission line that transports the electricity produced by the Cahora Bassa hydropower station from the provincial capital Nampula via Monapo to the port town of Nacala. The project concerning the local grids in Nampula and Nacala (2) aimed at ensuring the reliable and cost-efficient transmission and distribution of electric power to these towns by repairing and improving the network configuration of the local medium-voltage and low-voltage grids.

The overall objective (impact) of both projects was to create the basic conditions for sustainable commercial and industrial development through the reliable and macroeconomically efficient supply of electricity in the two target locations. In both cases, the project objectives (outcomes) were the reliable and cost-efficient transmission and distribution of electric power. Project (2) was to be carried out in close cooperation with a special loss reduction programme implemented by the Swedish SIDA, which was, however, terminated early.

The postulated results chain of rehabilitating infrastructure (output) to contribute to improved power supply (outcome) and thus to economic development (impact) is plausible.

The following overall objective indicators were set:

1) Recovery of long-run marginal costs (LRMC) through rates revenue of at least 80%
2) Minimum ratio of productive electricity use of 60% (considered no longer valid as an indicator at ex-post evaluation in view of today's sectoral strategy)
3) Only for (1): transmission and distribution losses in the target area of max. 20%; project objective indicator for (2)
4) Indicator added at ex post evaluation: growth in electricity demand in the target region as a proxy for economic development with a threshold of > 7% a year to ex post evaluation.

The project objective indicators were defined as follows:

1) Only for (1): availability of the transmission line after project end of at least 95%
1) Only for (2): voltage drop in the low-voltage grids of max. 10%
2) Only for (2): identical with overall objective indicator 3).

The target group of both projects were electricity consumers, particularly commercial enterprises, in the target locations.

Project design/major deviations from original planning and main causes

Besides the construction of a 199 km-long 110 kV line from Nampula to Nacala, the project scope of (1) also included the procurement of an all-terrain double-compartment pickup truck, spare parts and consultancy services. During project implementation, conceptual changes were made as the 110 kV Nampula-Pemba line was laid concurrently and in part parallel. As a more cost-effective option than two separate cables, the lines were built as double-circuit over a length of 22 km from Nampula to Namialo in the FC project, which generally resulted in savings and lower servicing costs for the executing agency. Greater synergies could, however, have been harnessed, as from Namiolo the two 110 kV lines continue to run parallel to each other for about 50 km before the Pemba line bifurcates northwards.

The project scope for rehabilitating the local grids comprised medium-voltage and low-voltage lines, transformer installations and 19,000 household connections. During project implementation, a number of alterations were made in response to rapid changes in grid requirements, which led to moderate cost overruns. The 19,000 service connections were delivered but had to be installed by EDM itself. The project implementation period was prolonged by approx. 1.5 years, largely due to administrative delays on the Mozambican side, according to the executing agency.

The quality of the works conducted was generally very good in both projects and no significant deficits could be identified either at final inspection or at ex post evaluation.

The plan to award a turnkey contract for all services to a suitable supplier for this project type proved effective.

The operation and maintenance of the installations is satisfactory overall. The operatives are well trained and have long-standing professional experience. Availability of the transmission line has been high since commissioning. Of special importance is the very low figure for unscheduled shutdowns, although bird's nests above the insulators are causing increasing problems. The theft of steel girders along the 110 kV transmission line is also a problem, despite the countermeasures taken, such as welding the screw connections. Little risk to sustainable local grid operation is posed by personnel qualification but finance is increasingly lacking for requisite maintenance, resulting in delayed spare parts procurement, for example.

Key results of impact analysis and performance rating

Attainment of the overall objective indicators is not clear-cut. The indicator for cost recovery through tariffs is no longer met at present (ex post evaluation: 76% of LRMC), as higher costs primarily due to the depreciation of the Mozambican metical (MZN) have not been offset by sufficient rate increases. The transmission and distribution losses in the two target locations are considerably less than at project appraisal, but they have increased again in the last two years to above the threshold of 20% (2009: 21%) after having remained below it in previous years. Nevertheless, considering the high economic growth and the emergence of new industrial enterprises, we see the overall objective of making a contribution to commercial and industrial development in the target region as having been achieved in full. The new additional indicator for growth in power demand has been fully met and is equivalent to average real economic growth in the region of 8% a year. Arguably, this development would not have been possible without the projects and the resultant improvement in electricity supply.

The project objective indicator regarding the availability of the 110 kV transmission line has been met at over 99%. At 8%, the maximum limit for voltage drops in the rehabilitated sections of the local grids has also been met to date, according to the executing agency.

The target group of industrial electricity customers has been reached by the projects. Altogether, interviews with industrial consumers conveyed the impression of improved power supply in comparison with the period before rehabilitation. However problems have increasingly recurred of late, with some production losses and damage due to voltage peaks. A contributory factor has also been the rapid increase in power demand in the target region, which has brought the present system to the limits of its capacity. Considering current information on actual demand trends, scaling up the transmission line (e.g. to 220 kV), while entailing considerably higher investment costs, would have been more economical in the long term than the inevitable new medium-term investment for expanding transmission capacities to Nacala.

The economic impact of the projects on commercial and industrial development cannot be quantified as such, but the rapid economic growth in Nampula Province could hardly have taken place without improved power supply. The rehabilitation of the facilities is unlikely to have had any significant effect on the environment. The two projects were aimed at achieving a general developmental impact and were not geared to direct poverty reduction, but they can be expected to have indirect beneficial effects on poverty through increasing economic growth and employment. The projects were not concerned with gender equality or good governance.

In the evaluation of the developmental efficacy of the projects we come to the following assessments based on the above:

Relevance: National power supply still poses a major challenge, to which the Mozambican Government attaches high priority with support from the donor community. The approach of the projects of supporting economic development by rehabilitating the dilapidated transmission line and distribution grids addressed a major development constraint on the high economic potential in the target region, as correctly identified at project appraisal. The projects were in line with the priorities of German development cooperation at project appraisal and also coherent with the current BMZ sectoral strategy focus on the productive use of electric power and the reduction of losses (energy efficiency). Although energy is no longer a priority sector of bilateral development cooperation today, it is still accorded high status by the Mozambican Government. Due to the low degree of electrification in Mozambique, the poverty impacts are indirect, largely affecting employment. Coordination with other donors was good in both FC projects, as elsewhere in the sector (Subrating: 2).

Effectiveness: The project objective of reliable and cost-efficient power supply in the service area has been attained overall. The project indicator on the availability of the 110 kV transmission line has been met, at over 95%. Transmission and distribution losses in the two target locations have, in contrast, increased again slightly over the objective target indicator threshold of 20% in the last two years. They are, however, still well below the figure at project appraisal. The higher losses are largely due to larger power demand as a result of the faster-than-expected industrial and commercial development (Subrating: 2).

Efficiency: Comparing the results achieved with the resources allocated, the efficiency of the projects is gauged to be adequate overall. The procurement costs were reasonable and the quality of the works executed was very high. Considering the increase in power demand in Nacala and the anticipated future economic development, a larger scale transmission line would have been more cost-effective in the long term. In contrast to the time of project appraisal, insufficient cost recovery through average tariff revenue at ex post evaluation detracts from allocative efficiency in the Mozambican electric power sector. As for production efficiency, the transmission and distribution losses have risen again slightly above the threshold, despite considerable improvement in the interim (Subrating: 3).

Overarching developmental impacts: Without improved power supply, the rapid economic growth well above expectations in Nampula Province would certainly not have occurred. A measure of this is the power demand both from household connections (pre-paid meters) and commercial electricity customers, especially in the medium-voltage range. At the social level, the overarching developmental impact consists in power availability for households thanks to the rehabilitated low-voltage grids, the creation of jobs and contracts to local suppliers (Subrating: 1).

Sustainability: Even though EDM can be expected to continue to maintain the FC financed infrastructure, new investments are urgently needed to meet the growing power demand in the target region. This applies both for the 110 kV line and the local grids, particularly in Nampula, where present capacity is coming under increasing pressure from higher demand and illegal connections. The future expansion of the Nacala Development Corridor (NDC) depends heavily on a stable power supply. The maintenance and repair of the facilities is satisfactory, despite the financial constraints. Significant tariff increases will be unavoidable for the sustainability of EDM's financial health. In this context one should also note, however, the capacity of the executing

agency, which succeeded in meeting the government's access targets before the deadline (Subrating: 3).

Performance rating: In view of the high developmental relevance thanks to the undisputed contribution to the extraordinary economic development in Nampula Province, the projects merit the overall rating *good* (Rating 2).

General conclusions

Without the complementarity of the projects, the beneficial impact on economic development in the target region would certainly not have taken effect to the same extent. This also holds for parallel donor finance to support the NDC in the transport sector. We generally recommend this kind of concerted approach for harnessing the potential of regional economic development.

Notes on the methods used to evaluate project success (project rating)

Projects are evaluated on a six-point scale, the criteria being relevance, effectiveness (outcome), "overarching developmental impact" and efficiency. The ratings are also used to arrive at a final assessment of a project's overall developmental efficacy. The scale is as follows:

1	Very good rating that clearly exceeds expectations
2	Good rating fully in line with expectations and without any significant shortcomings
3	Satisfactory rating – project falls short of expectations but the positive results dominate
4	Unsatisfactory rating – significantly below expectations, with negative results dominating despite discernible positive results
5	Clearly inadequate rating – despite some positive partial results the negative results clearly dominate
6	The project has no positive results or the situation has actually deteriorated

A rating of 1 to 3 is a positive assessment and indicates a successful project while a rating of 4 to 6 is a negative assessment and indicates a project which has no sufficiently positive results.

Sustainability is evaluated according to the following four-point scale:

Sustainability level 1 (very good sustainability)

The developmental efficacy of the project (positive to date) is very likely to continue undiminished or even increase.

Sustainability level 2 (good sustainability)

The developmental efficacy of the project (positive to date) is very likely to decline only minimally but remain positive overall. (This is what can normally be expected.)

Sustainability level 3 (satisfactory sustainability)

The developmental efficacy of the project (positive to date) is very likely to decline significantly but remain positive overall. This rating is also assigned if the sustainability of a project is considered inadequate up to the time of the ex post evaluation but is very likely to evolve positively so that the project will ultimately achieve positive developmental efficacy.

Sustainability level 4 (inadequate sustainability)

The developmental efficacy of the project is inadequate up to the time of the ex post evaluation and is very unlikely to improve. This rating is also assigned if the sustainability that has been positively evaluated to date is very likely to deteriorate severely and no longer meet the level 3 criteria.

The overall rating on the six-point scale is compiled from a weighting of all five individual criteria as appropriate to the project in question. A rating of 1 to 3 indicates a "successful" project while a rating of 4 to 6 indicates an "unsuccessful" project. In using (with a project-specific weighting) the five key factors to form an overall rating, it should be noted that a project can generally only be considered developmentally "successful" if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are considered at least "satisfactory" (rating 3).