

**Burundi: 110 kV line Bujumbara-Gitega**

**Ex-post evaluation**

<b>OECD sector</b>	23040 Power Transmission and Distribution	
<b>BMZ project ID</b>	1987 66 511	
<b>Project-executing agency</b>	Régie de Production et de Distribution d'Eau et d'Electricité (REGIDESO)	
<b>Consultant</b>	Lahmeyer International GmbH, Frankfurt Büro Männlein, Kempten	
<b>Year of ex-post evaluation</b>	<b>2005</b>	
	<b>Project appraisal (planned)</b>	<b>Ex-post evaluation (actual)</b>
<b>Start of implementation</b>	05/1987	05/1987
<b>Period of implementation</b>	Line: 35 months City grid: 24 months	Line: 54 months Line: 72 months
<b>Investment costs</b>	EUR 9.7 million	EUR 9.6 million
<b>Counterpart contribution</b>	EUR 1.6 million	EUR 1.5 million
<b>Financing, of which Financial Cooperation (FC) funds</b>	EUR 8.1 million	EUR 8.1 million
<b>Other institutions/donors involved</b>	none	none
<b>Performance (overall rating)</b>	5	
<b>Significance / relevance (sub-rating)</b>	5	
<b>Effectiveness (sub-rating)</b>	5	
<b>Efficiency (sub-rating)</b>	5	

**Brief Description, Overall Objective and Project Objectives with Indicators**

The executing agency of the FC project was Régie de Production et de Distribution d'Eau et d'Electricité (REGIDESO), founded in 1968. It is in charge of the country's power and urban water supply and maintains a branch office in the project area (Gitega).

The project served the purpose of providing cost-efficient and reliable power to meet the growing needs of the town of Gitega. As this is an economically important regional centre the target group was industry, public utilities and private consumers. The 110 kilovolt single line and a sub-station connected the city of Gitega to the transnational integrated network between the Democratic Republic of Congo, Rwanda and Burundi. A remaining balance and a loan supplement of EUR 1.4 million were then used to finance the foreign currency costs involved in the maintenance of the Gitega town grid. These were investments which the Burundian side originally intended to carry out and finance itself but did not consider itself factually capable of.

The project objective was to provide cost-efficient and reliable power to meet the town's growing needs. Given the importance of this economic and administrative centre it was to make a major contribution to economic and social development of the central Burundian region and to balanced development overall (overall objective). The main target groups of the project were industry, public utilities and private consumers. The share of industrial electricity consumption

was already 70% at the time. The indicator for measuring full project objective achievement was to be the absence of power cuts with demand and capacity utilisation evolving as forecasted. Technical losses of less than 5% and voltage drops of less than 10% were expected as well. The overall objective was to have been considered fully achieved when industrial jobs doubled (to 2000) within 10 years.

### **Project Design / Major Deviations from the original Project Planning and their main Causes**

At the time of appraisal in 1987 the project comprised the construction of a 71-km 110-kilovolt single line between Bujumbura in Gitega as well as a sub-station in Gitega. In our 1993 final follow-up report we established that the project had been implemented in a technically satisfactory manner overall. However, the rehabilitation and expansion of the Gitega town grid, which had been scheduled to be done under the administration of REGIDESO in parallel with the construction of the line, had not taken place, principally for lack of funding. In order not to jeopardise the success of the overall project only for lack of comparatively minor complementary measures KfW recommended financing replacement investments and a moderate grid expansion from residual FC funds of EUR 0.5 million as well as supplementary FC funds of EUR 0.9 million. The grid rehabilitation activities began in 1994 but were hampered and interrupted by growing political unrest. The German experts' technical support and KfW's local progress reviews eventually had to be suspended. During this phase the project-executing agency REGIDESO reported on the progress of the project to KfW only sporadically, for the last time in May 2001. At this time the additional measures in the Gitega distribution grid (loan increase) had been largely completed. The result of the complementary measures was the rehabilitation and moderate enlargement of the Gitega local grid.

### **Key Results of the Impact Analysis and Performance Rating**

The overall conditions in Burundi's electricity sector were considerably affected by the political unrest that started in 1994. Necessary replacement investments in the production capacities were delayed, transmission and distribution lines were damaged in violent clashes, spare parts were in short supply owing to funding shortages but at times also the trading partners' embargo policy, and industrial power demand fell to disappointing levels as a result of the crisis. Low production capacities and high network losses of around 30% currently force the project-executing agency to ration power. This means there is not even enough capacity to even meet the current power demand, which has already grown less than expected. The same applies to the core network of REGIDESO (Bujumbura) and to the Gitega grid (project measure).

The dynamic unit cost calculation for the project shows a specific power supply unit cost through the 110 kV line (including work on the grid) of EUR 0.17 per kWh. This puts it just below the cost established at the time of project appraisal (EUR 0.18 per kWh) even though the actual consumption development was much lower than forecasted. This is explained particularly by the fact that in the past the Mugeru hydropower plant generation performance used to be heavily impaired by failures of one or more turbines and these failures used to be compensated by electricity transmitted through the project line. On this basis transmission performance in the first seven years of the operating phase significantly exceeded expectations. Moreover, demand for electricity increased more than expected given the relatively high network losses of 20%. Our ex-post evaluation analysis was based on the assumption that up to the year 2009 donor activities in the electricity sector would contribute to rehabilitating the broken down production capacities and reducing grid losses to the rate of 12% assumed at the time of project appraisal. We have therefore counted in the pent-up demand resulting from power rationing that will have to be met from the year 2009 rather conservatively with a one-time 10% consumption increase. The ensuing consumption trend will match the consumption assumptions made at the time of project appraisal, with a growth rate of 5%. We have proceeded to include new connections of consumers in the central region in five-year intervals only (project appraisal: every two years).

Given the high dynamic unit cost of power supply in Gitega the appraisal report already questioned whether full cost recovery would be achievable without substantial tariff increases. The fact was that so far during the operation phase the somewhat lower cost of EUR 0.17 per kWh was always higher than the tariff. The current average tariff of EUR 0.064 per kWh covers

less than 40% of costs. When system losses and collection efficiency are counted in, the cost recovery ratio is even lower. Furthermore, the dynamic unit cost of power supply in Gitega is also well above the average power supply cost in the rest of the country, which the project-executing agency has specified at around EUR 0.09 per kWh on the basis of 2003 figures. This last comparison, however, is only of limited informative value. Burundi's power network essentially supplies the capital city of Bujumbura. The cost of transport and distribution, which accounts for roughly two-thirds of unit costs in Burundi, is naturally much higher in the provinces. So the project constitutes a significant financial burden for the project-executing agency.

At the time of project appraisal the project was expected to yield economic advantages consisting in substantial power supply cost savings. A comparison was made between the cost of power obtained from the integrated network and power supplied by local diesel power plants. Given that the actual unit costs almost match the target costs this comparison would speak in favour of the project even today, and all the more so because the fuel costs have risen significantly in the meantime. Indeed, REGIDESO still has unused production capacities in a diesel power plant in Bujumbura which it is not running because of its high running costs of EUR 0.16 per kWh. However, the effects of the technically related consumption increases specified above (hydropower plant base load failures, excessive grid losses) must be incorporated into an overall economic assessment of this kind. As they are not being offset by any additional benefits the calculation must be adjusted by these impacts. The result is economic unit production costs of EUR 0.19 per kWh. As these full costs (including depreciations) are only slightly higher than the current (variable) costs of the diesel power plants it can be expected that preference is still to be given to the transmission line over the alternative of a diesel power plant.

In connection with the above project alternative the question arises whether the realisation of one or more diesel power plants would have led to any meaningful power supply for the Gitega town grid at all. For the operating phase that has run so far the answer to this question is very likely "no". The country's crisis-related foreign exchange shortage, combined with the goods embargo, would hardly have enabled a diesel power plant-based power supply. These capacities would probably have remained unutilised, as is the case with the Bujumbura diesel power plant today. As the hydropower plant used to suffer from technical failures the power supply for Gitega would have been strongly impaired under this alternative. So the project at least succeeded in ensuring a general power supply - even if inadequately.

The project was designed to contribute to development in general. However, it is not possible to quantify the income and employment effects created by the project. The greatest portion of the electricity transmitted through the line is being used for consumptive purposes. The current electricity consumption structure shows that the project benefits private households most of all.

Under the 1993 final follow-up we had identified a satisfactory development in power demand but also an unsatisfactory supply security (frequent power cuts owing to deficiencies in the medium voltage distribution grid). The complementary measures (loan supplement) were designed to help overcome these deficiencies and thereby enable the project objective to be achieved. The country's internal crisis had set in prior to our final follow up report, forcing us to rate the project risks as high overall with a medium level of influenceability. We had not anticipated the scope and duration of the armed conflict that succeeded our final follow-up. The concomitant obstacles to electricity generation and consumption as well as the physical impossibility of implementing the complementary measures on schedule and with the usual intensity were key factors that impaired project implementation. The same applies to the cancellation of progress reviews for security reasons.

Based on a combined assessment of the impacts and risks described above, we rate the project's developmental efficacy as follows:

Effectiveness:

With regard to the project objective of providing efficient and reliable electricity to meet the expected demand of Gitega, neither did the forecasted electricity consumption rates occur nor did it reach the goal of avoiding malfunctions and power cuts in the network. Technical losses were reported to be between 5% and 7%, tending to lie higher than the threshold established as indicator (5%). Counting the non-technical losses and losses considered commercial (illegal tappings, etc) this figure is well above the target thresholds, at 15-20%. No statistical data is

available on voltage drops. The inadequate development of consumption is only partly due to lack of production capacities (suppressed demand due to power rationing). Rather, industrial electricity consumption did not increase as expected owing to crisis and armed conflict. Yet the project did make a major contribution to maintaining the electricity supply of Gitega in general during the years of civil war and crisis. Beyond this it was not possible to ensure an efficient and secure supply of electricity for Gitega because the project is not embedded into a sector environment sufficiently conducive to project objective attainment. The operational evaluation criteria for the electricity sector are not sufficiently met (share of electricity for consumptive purposes 40%, network losses of 30%, cost recovery rate of 54%). Therefore, we rate the effectiveness of the project as clearly inadequate (sub-rating: 5).

#### Relevance/significance:

Given the importance of decentralising Burundi's economic development in the secondary and tertiary sector the relevance of the project measures is generally given. However, because of the country's social and economic crisis the project ultimately failed to make the intended contribution to the economic and social development of the project region and to a balanced development of the country (overall objective). We have no reliable data on the development of industrial jobs (indicator of overall objective). As the industrial and commercial activities in the project region diminished as a result of civil war and crisis we conclude that the overall objective so far has not been achieved either (rating: 5).

#### Efficiency:

Even from today's perspective the use of funds invested to achieve the project objectives can still be rated reasonable. The alternative of investing in diesel power plants in the Gitega region ultimately did not prove to be a better solution technically or economically given the prevailing unfavourable conditions. However, from today's perspective, consistent complementary measures aimed at reducing the very high technical and non-technical losses would have been a necessary element of a cost-efficient expansion strategy for the electricity sector. As relatively little transmission line capacity is currently being used (20%) and network losses are high we rate the production efficiency is clearly insufficient. On the basis of the low unit cost recovery rate and the mostly consumption-related electricity use in the project region (65%) we also rate the allocation efficiency as clearly insufficient. We rate the efficiency of the project as clearly inadequate (sub-rating: 5).

The peace process has been gaining momentum for the past two years so donors have stepped up their activities greatly over the past months. Current political developments in the country give reason to hope that conditions for operating the project facilities will improve significantly in the near future. The regional centre of Gitega plays a central role primarily for the donor support that is being relaunched in the area of refugee relief/reconstruction outside the capital and could gain economic strength relatively fast. This would also entail higher demand for electricity. However, the technical conditions necessary for meeting this demand would have to be created first. As it is still difficult to estimate the time when these conditions will be met we have formulated our overall rating of the project as well as the sub-ratings described above on the basis of the current situation. On this basis we classify the overall developmental efficacy of the project as clearly insufficient (sub-rating 5).

### **Conclusions and Recommendations**

Under unfavourable sector conditions, investment projects in the electricity sector should not be financed under German Financial Cooperation unless the partner country has committed itself consistently, credibly and durably to implementing reforms aimed at improving sector performance (operational evaluation criteria as a benchmark).

## Legend

<b>Developmentally successful: Ratings 1 to 3</b>	
<b>Rating 1</b>	<b>Very high or high degree of developmental effectiveness</b>
<b>Rating 2</b>	<b>Satisfactory developmental effectiveness</b>
<b>Rating 3</b>	<b>Overall sufficient degree of developmental effectiveness</b>
<b>Developmental failures: Ratings 4 to 6</b>	
<b>Rating 4</b>	<b>Overall slightly insufficient degree of developmental effectiveness</b>
<b>Rating 5</b>	<b>Clearly insufficient degree of developmental effectiveness</b>
<b>Rating 6</b>	<b>The project is a total failure</b>

## Criteria for the Evaluation of Project Success

The evaluation of the "developmental effectiveness" of a project and its classification during the ex-post evaluation into one of the various levels of success described in more detail below concentrate on the following fundamental questions:

- Are the **project objectives** reached to a sufficient degree (aspect of project **effectiveness**)?
- Does the project generate sufficient **significant developmental effects** (project **relevance** and **significance** measured by the achievement of the overall development-policy objective defined beforehand and its effects in political, institutional, socio-economic and socio-cultural as well as ecological terms)?
- Are the **funds/expenses** that were and are being employed/incurred to reach the objectives **appropriate** and how can the project's microeconomic and macroeconomic impact be measured (aspect of **efficiency** of the project conception)?
- To the extent that undesired **(side) effects** occur, are these tolerable?

We do not treat **sustainability**, a key aspect to consider for project evaluation, as a separate category of evaluation but instead as a cross-cutting element of all four fundamental questions on project success. A project is sustainable if the project-executing agency and/or the target group are able to continue to use the project facilities that have been built for a period of time that is, overall, adequate in economic terms, or to carry on with the project activities on their own and generate positive results after the financial, organisational and/or technical support has come to an end.