

Sri Lanka: Second Expansion of Sapugaskanda Diesel Power Station

Ex-post evaluation

OECD sector	23061 / electricity generation	
BMZ project ID	1995 67 066	
Project-executing agency	Ceylon Electricity Board (CEB)	
Consultant	Mott Mac Donald	
Year of ex-post evaluation	2004	
	Project appraisal (planned)	Ex-post evaluation (actual)
Start of implementation	Q 1 1997	Q 3 1997
Period of implementation	21 months	26 months
Investment costs	EUR 51.13 million	EUR 51.36 million
Counterpart contribution	EUR 27.10 million	EUR 27.33 million
Financing, of which Financial Cooperation (FC) funds	EUR 24.03 million	EUR 24.03 million
Other institutions/donors involved	none	none
Performance rating	2	
• Significance/relevance	2	
• Effectiveness	3	
• Efficiency	1	

Brief Description, Overall Objective and Project Purposes with Indicators

The project was appraised in 1996 and consisted in the second expansion of the Sapugaskanda Diesel Power Station operated by the Ceylon Electricity Board (CEB). Four additional 10-MW diesel generator sets were installed, increasing the installed capacity from 120 MW to 160 MW. The measure was a component of the most cost-effective expansion plan of the Sri Lankan electricity sector, which has been struggling with supply bottlenecks since the mid-1990s and is in urgent need of additional generating capacity.

The project objective consisted in the efficient utilisation of the additional 40 MW of generating capacity provided by the second expansion of the Sapugaskanda Diesel Station. The overall objective was to contribute to the country's economic development through economically efficient electricity supply chiefly for productive consumers (target group) and by improving the security of supply.

The following indicators were defined to measure achievement of the overall objective:

- Power sales and peak loads corresponding to the projected demand and load in the first four years after entry into operation.
- Observance of the principle of annual adjustments of tariffs to cost increases on the basis of replacement values (of fixed assets).

- Share of productive electricity utilisation of more than 60%.
- Average availability of the existing power plants is more than 80%.

The following indicators were defined to measure achievement of the project objective:

- Utilisation of the diesel generator sets of the second expansion stage to approximately 75% from the first to 4th year of operation (corresponding to 6500 full load hours or annual energy generation of 260 GWh) and approximately 55% after the 4th year of operation (corresponding to 5000 full load hours or annual energy generation of 200 GWh).
- Operational availability of the four diesel gensets from the second expansion to more than 90%.

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

The second expansion stage was awarded to the consortium MAN-Siemens as a follow-up contract on a turnkey basis with MAN acting as general contractor. This consortium had already been awarded the first expansion stage financed by the ADB upon international competitive bidding. The contract was awarded directly on the basis of the same unit prices as in the first expansion, using some of the supplies and services provided during the first expansion stage (such as the switchyard and transformers). The implementation consultant Mott Ewbank Preece, which had already been contracted by the CEB for the first expansion stage, verified and confirmed that the prices were reasonable.

The measures actually executed largely corresponded with the planning. However, they were implemented with some delay. Because the start of the measures was delayed and the implementation period could not be observed the four diesel sets went into operation about one year behind schedule.

Key Results of the Impact Analysis and Performance Rating

During the first four years of operation (2000-2003) the indicators for the project objective could be met only to a limited extent. Although the four units of the second expansion stage together were run with over 6500 full load hours in each year of operation, in 2 years (2001 to 2002) the energy output and capacity utilisation were just under 260 GWh and 75%, respectively. During this period the availability for operation also fell below the 90% threshold. The main cause of the partly insufficient capacity utilisation was the repeated occurrence of technical failures which caused the CEB to operate all eight generator sets of the first and second expansion stage with a maximum load of only 9 MW each from March 2001. Therefore, since the year 2001 only 8 x 9 MW is available for full load operation so that it would be hard to achieve 75% capacity utilisation on the basis of 10 MW even if there were no further outages caused by failures in addition to the planned maintenance periods.

Likewise, only some of the criteria for measuring achievement of the overall objective were satisfied. The share of productive electricity utilisation was just over 60% and the average availability of the power plants has exceeded the limit of 80%, but electricity sales of CEB and peak loads increased more slowly on average for the year after the second expansion stage went into operation than was expected at the time of project appraisal (sales: 6.6% against 8%; peak load 4.1% against 7%), and cost coverage was not ensured in the past years. This has been compounded by the problem of continued high grid losses.

The operation and maintenance of the diesel sets give no cause for complaint. The operating personnel is adequately qualified. The budgets provided by the CEB for operation and maintenance are sufficient.

As far as the environmental impacts of the second expansion stage of the Sapugaskanda Power Station are concerned, it complies with the standards for noise and SO₂ stipulated in the supply contract. Measurements of pollutant emissions (dust, SO₂, NO_x) are conducted quarterly by the Industrial Technology Institute and the results are transmitted to the environment agency. As expected, emissions are well below Sri Lankan standards. The operating licence for the second expansion stage was issued by the environment agency in April 2002. The used oil sludge from the two expansion stages is incinerated in the new incineration plant financed under the first expansion stage. Concentrations of pollutants (SO₂, dust) are still not being measured in the vicinity of the power plant.

The CEB, which was still an economically sound enterprise at the time of project appraisal, slid into financial difficulties from the year 2000, the end of which cannot yet be determined. Since 2000 the enterprise has been accumulating annual deficits which are undermining its liable equity and, thus, its credit worthiness. The company's liquidity could only be ensured by means of short-term credits in a considerable volume. Although it did succeed in reducing losses and overdraft loans in the last two years, its liquidity position remains precarious. The financial position of the CEB has worsened because of massive cost pressure (rapid increase of thermal generation capacity in comparison with hydro power) which has not been passed on to the consumers in full. Notwithstanding these facts, in the past the CEB has not had to resort to state subsidies.

For the CEB the commercial advantage of the second expansion stage is that it avoids purchases of electricity from private generators. It is currently paying nearly EUR 82 per MWh on average for electricity purchased on the basis of long-term supply contracts; for emergency power purchases it even has to pay more than EUR 110 per MWh. With EUR 82 per MWh as long-term opportunity costs, the project achieves a commercial profitability of 13.81%. Therefore, compared with average FC funding costs of a nominal 10.9% and an expected RoE of 8% the project is profitable for the CEB.

A rough indicator of the overall economic profitability of the project is its internal rate of return, which results from equating the usefulness of the project with the avoided cost of electrical energy from private generators under long-term contracts. Since the variable fuel costs of private electricity generators do not include customs duties and the fixed costs are settled by way of a supply tariff fixed in foreign currency (USD) the economic costs avoided roughly match the average electricity rates fixed in the supply contracts. Under this assumption the overall economic return of the second expansion stage is 16.57%. If payments for emergency electricity purchases or even the economic cost of power cuts were included as opportunity costs, profitability would be even better. Hence there is no doubt that the project represents an economically advantageous solution.

With regard to the sub-criteria of the success evaluation it can be said that while the effectiveness of the project is impaired by risks to individual indicators of the achievement of the project objective, it is adequate (rating 3) because operation of the diesel generators will probably be sustainable at reduced nominal capacity. Since the second expansion stage of the Sapugaskanda Diesel Power Station represents an economically sound addition to the electricity generating capacities and contributes to an economically efficient electricity supply largely in conformity with the overall objective and the operational appraisal criteria, the relevance/significance of the project is satisfactory (rating 2). Because the expansion stage represents an extremely cost-effective solution with a high commercial and overall economic

benefit, the efficiency of the project must be regarded as good (rating 1). After considering the above criteria, we classify the project overall as having a satisfactory degree of developmental effectiveness (rating 2).

General Conclusions applicable to other Projects

None

Legend

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

Criteria for the Evaluation of Project Success

The evaluation of a project's "developmental effectiveness" and its classification during the final evaluation into one of the various levels of success described in more detail above 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, organizational and/or technical support has come to an end.