Ex Post-Evaluation Brief
Pakistan: Ghazi-Barotha Hydropower Station

Programme/Client	Ghazi-Barotha Hydropower Station (BMZ ID 1995 66 316)	
Programme executing agency	Water & Energy Development Authority (WAPDA)	
Year of sample/ex post evaluation report: 2011*/2011		
	Appraisal (planned)	Ex post-evaluation (actual)
Investment costs (total)	EUR 1,704.5 million	EUR 1,469.6 million
Counterpart contribution (company)	EUR 758.1 million	EUR 660.4 million
Funding, of which budget funds (BMZ)	EUR 112.5 million (EUR 92.0 million)	EUR 84.4 million (EUR 81.6 million)

* random sample

Project description: The project comprised co-financing of the construction of a hydropower station with 1,450 MW installed capacity (5 x 290 MW) on the upper reaches of the Indus. Its implementation, which lasted from 1995 to 2004, comprised the following main components: construction of a weir approx. 7 km below the Tarbela Dam at Ghazi to reroute outflows from the Tarbela Dam conduited via an approx. 52 km-long bypass canal to an upper reservoir near the power station at Barotha. Using a fall height of approx. 69 metres, five turbine generator units of the power station complex are supplied from there, each with a capacity of 290 MW. For the connection of the power station to the integrated Pakistani grid system, transformer substations and high-voltage powerlines with a total length of approx. 340 km were also financed as part of the project.

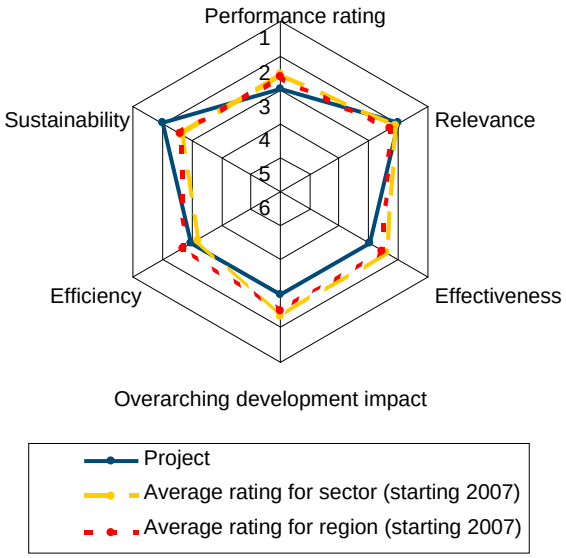
Objective: The overall objective of the project was the promotion of social and economic development through the electricity supplied and a contribution to climate change mitigation through prevented CO_2 emissions. The project objective was the reliable, efficient and environmentally friendly provision of 1,450 MW electrical capacity, up to 6,600 GWh/year of electrical power and its economically efficient use by consumers in the integrated system.

The primary target group comprised electricity users for production.

Overall rating: 3

Good achievement of objectives at the project level, but with shortcomings in wider development impact due to deficient sectoral framework.

Rating by DAC criteria



EVALUATION SUMMARY

Overall rating: Altogether, based on the good achievement of the project objective, but also accounting for shortcomings in overall objective achievement and the failure to meet efficiency criteria at sectoral level, the project is accorded the overall rating 3 (satisfactory).

Relevance: At project appraisal in 1995, the project addressed a serious bottleneck to development in Pakistan: the insufficient generation capacity and supply of electricity. It thus conformed with the priorities of the Pakistani Government and the German Federal Ministry for Economic Cooperation and Development (BMZ). Developing cost-effective generating capacity aimed at reducing current and expected capacity constraints and their negative effects on growth and development of the Pakistani economy. These results could have taken full effect with the implementation of announced sectoral reform measures. Had it predictable that the necessary reforms would not be implemented, other additional measures for reducing the shortfall could have been considered. Donor coordination in project cofinancing was very high. The relevance of the project altogether is assessed as good, not least considering the importance of an improved power supply in a volatile political climate (Sub-rating: 2).

Effectiveness: The production indicators for the Ghazi-Barotha power station since commissioning in 2004 indicate that the generation targets at project appraisal were surpassed by a large margin on average. The available capacity of 1,450 MW has been available in all operating years. The average annual electricity generated exceeded the expected figure of 6,600 GWh/year. At an average of 93.6%, the time availability of the generator/turbine units can be rated as good. The only shortcomings in project effectiveness were delays in implementation that resulted in the later commissioning of the power station. Project objective achievement at user level has, however, only been met in part due to high non-technical grid losses and inadequate cost recovery from rates (lack of incentives for economical electricity use). Effectiveness is therefore only assessed as satisfactory altogether Sub-rating: 3.

Efficiency: At project level, the production efficiency of the power station can be rated as very good. It was the most cost-effective extension option at project appraisal and remains valid in retrospect due to the extremely favourable power generation costs in comparison with thermal power stations. In both economic and financial terms, the profitability of the project is excellent. This aspect is therefore allotted the Sub-rating 1.

At system level, however, there are serious deficits in allocative and production efficiency in the Pakistani electric power sector. None of the minimum sectroal efficicency (operational appraisal) criteria for power generation projects were met in economic terms. Cost recovery of tariffs has been insufficient for years, presently amounting to less than 55% of long-run marginal costs, and falls well short of the required minimum of 65%. System losses have exceeded 20% for years and the time availability of the thermal power stations falls well

short of 75%. No decisive improvements in these indicators can be expected in the short to medium term. Efficiency at system level is therefore given the Sub-rating 5.

Overall, we give the Sub-rating 3 for efficiency.

Overarching developmental impact: Achievement of the overall objective of contributing to economic and social development as well as climate change mitigation falls short of expectations due to systemic shortcomings. As a result of the above mentioned deficits in the sectoral framework, the project contribution to these objectives could not take full effect, despite the good assessment at project level. However, when assessing overarching impacts account must also be taken of the significant role of Ghazi-Barotha for national power generation. A hypothetical scenario without the project would have meant a far worse national power supply mix (assuming a capacity similar to a thermal power station) with the emission of large quantities of greenhouse gases. Altogether, we assess the overarching developmental impacts of the project as falling short of expectations but with substantial beneficial results (Sub-rating: 3).

Sustainability: In view of the technical qualification of the operator, WAPDA, there are no great risks that it cannot adequately perform the tasks of power station operation and maintenance as well as environmental impact monitoring. From a commercial point of view, the issue of circular debt in the Pakistani power sector poses a general risk to its financial operations. Concerning Ghazi Barotha hydropower station, however, WAPDA can be expected to provide sufficient financial resources for operation and maintenance thanks to the low operating costs and the very cost-effective electricity generation.

The impacts of climate change on water levels of the Indus could pose risks to a sustainable operation of the station. The possible resultant increased melting of the Himalayan glaciers would raise water outflow in the short term, but in the longer-term glacier meltdown could reduce the Indus outflow and thus reduce electricity generation from the power station. Sedimentation in the reservoirs and weirs situated upstream of the power station could also pose another problem for operational capacity. Overall, though, these risks are assessed as manageable. Altogether, project sustainability is assessed as good (Sub-rating: 2).

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

Projects (and programmes) are evaluated on a six-point scale, the criteria being relevance, effectiveness, efficiency and overarching developmental impact. 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 result that clearly exceeds expectations
2	Good result, fully in line with expectations and without any significant shortcomings
3	Satisfactory result – project falls short of expectations but the positive results dominate
4	Unsatisfactory result – significantly below expectations, with negative results dominating despite discernible positive results
5	Clearly inadequate result – despite some positive partial results, the negative results clearly dominate
6	The project has no impact or the situation has actually deteriorated

Ratings 1-3 denote a positive or successful assessment while ratings 4-6 denote a not positive or unsuccessful assessment

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. Ratings 1-3 of the overall rating denote a "successful" project while ratings 4-6 denote an "unsuccessful" project. It should be noted that a project can generally be considered developmentally "successful" only if the achievement of the project objective ("effectiveness"), the impact on the overall objective ("overarching developmental impact") and the sustainability are rated at least "satisfactory" (rating 3).