Turkey: Thermal Power Plant Orhaneli

Ex-post evaluation

OECD area of promotion	23020 / Thermal power plants	
BMZ project number	1985 65 434	
Project-executing agency	EÜAS / Turkish power generation company	
Consultant	Steag / Eltem	
Year of evaluation	**2003**	
	Project appraisal (planned)	**Ex-post evaluation (actual)**
Start of implementation	Q II 1986	Q III 1986
Period of implementation	36 months	69 months
Investment costs	EUR 329.43 million	EUR 333.36 million
Counterpart contribution	EUR 173.98 million	EUR 177.91 million
Financing, of which Financial Cooperation (FC) funds	EUR 26.79 million	EUR 26.79 million
Other institutions/donors involved	EUR 128.66 million	EUR 128.66 million
Performance rating	3	
• Significance / relevance	3	
• Effectiveness	2	
• Efficiency	4	

Brief Description, Overall Objective and Project Purposes with Indicators

The project encompassed the construction of a power plant with an installed capacity of 210 MW near the village of Orhaneli in the Northwest of Turkey. The project was part of a programme implemented by Turkey to increase the power generation based on local resources. The project´s objective was the generation of electric energy through lignite and its transmission to neighbouring high voltage transmission network. The overall purpose was the continuous operation of the power plant through careful planning of fuel supply and fuel combustion components (coal handling plant, furnace installations, soot blowers, grit arresters, etc.) which were to be used even in ongoing operation and despite difficult characteristics of the coal. Also, the power plant was to help fill a gap in the supply of electrical energy once it started operating. Indicators for achieving the goals were the timely provision of a sufficiently reliable 210 MW capacity and an annual full-load operation of 6,000 hours.

Project conception / Major deviations from the original Project Planning and their main Causes

The technical design of the thermal plant has not changed since the programme appraisal was done. It was possible to carry out expansions and upgrades in the general conception, i.e. the upgrade in form of a flue gas desulphurization plant. Upgrading the plant by means of a flue gas desulphurization plant became relevant much earlier than expected. Only a few months after the start of operations in November 1992 a temporary shut-down of the plant was ordered due to strong pressure of local environmental groups. Consequently, using FC-funds, the power plant was equipped with a flue gas desulphurization plant (FC project 1993 65 289).

After completion of the desulphurization plant and with the shut-down lifted, it became necessary to feed electrical power in order to cover the energy demand. The flue gas desulphurization plant reached an annual full-load of 6,300 hours which considerably surpassed the established indicator of 6,000. Despite the flue gas desulphurization plant the net efficiency rate of Orhaneli surpassed the average of the other Turkish lignite-fired power stations by three percentage points.

During the appraisal, the power station was to be operated by the electricity generating division of the project-executing agency, TEK. In the meantime and in the course of a sector reform, this division has become an independent company and has assumed as EÜAS the function of project-executing agency.

Key Results of the Impact Analysis and Performance Rating

The objectives of the project have been reached, overall and in terms of the established indicators. In the first three years of operation, the effective use of the power plant´s capacity was reduced temporarily because of environmental concerns due to a deficiency in the conception of the project (lack of a flue gas desulphurization plant). (Partial evaluation relevance: Rating 2).

Besides very small amounts, the lignite mined on-site cannot be used for purposes other than power generation, as far as economic efficiency and environmental soundness are concerned. A great part of the investments in the coal mine as well as a considerable part of the investments in the power plant (Soviet supplies of components for the power plant) had already been made during the project appraisal. After the programme appraisal the use of the thermal plant components from other existing projects for the construction of power plants and for power generation near the harbour through affordable imported coal in order to lower overall generation costs was temporarily considered. The decision processes confirm that it was cheaper to finish up the existing lignite-fired power plants instead of relocating and converting them to coal-fired power plants. The same applies to the Orhaneli project. By the project, a risk-reducing line of Turkish power generation was put in place, which, with the expansion of lignite-fired power plants slowing down by 2010-2015, will lead to a diversification of the sources of primary energy and to a 20% share of lignite in the capacity installed. Corrections of the expansion programme led, in part, to cost disadvantages and deviations from the cost optimum (Partial evaluation relevance and significance: Rating 3).

When compared to other lignite-fired power stations, the power plant financed by FC funds stands out due to high technical efficiency and low specific investment costs. Production efficiency is thus established. The formerly monopolistic project-executing agency TEK and its political environment, however, were, ever since the project appraisal, characterized by multiple inefficiencies which had such a negative effect especially on the implementation period, the cost-congruent tariffs, the earnings situation of the project-executing agency and the efficiency of the sector organization that despite some improvements in efficiency, a new, extensive and

market-oriented sector organization finally had to be introduced in 2001/2002. The project is not profitable micro-economically and the generation costs are much higher than the price charged by EÜAS. Allocation efficiency is thus clearly dissatisfactory. The lignite-fired power generation plants will be the most difficult part to privatize in the further reform process. As recommendations were not followed to increase energy tariffs considerably in real terms, expectations of reductions in subsidies for lignite were frustrated. Thus, we evaluate the efficiency of the project as overall slightly insufficient (Partial evaluation efficiency: Rating 4).

After weighing the above mentioned key criteria for the developmental evaluation of overall project success, we classify the project as having an **adequate degree of effectiveness** (**Rating 3**).

General Conclusions applicable to all Projects

Cross-project comments concerning contamination by sulphur dioxide and the upgrade in form of a flue gas desulphurization plant are as follows: The risk of a shut-down of the power station due to a lack of a flue gas desulphurization plant was not tackled sufficiently during the appraisal and the initial implementation phase. Moreover, efforts to reduce the risks were too late. A timely involvement of all actors and a differentiated appraisal of possible sulphur dioxide contaminations caused by the weather could have reduced the risk of a permanent shut-down.

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 assignment during the final evaluation to one of the various levels of success described below in more detail 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)?
- Were and are the objectives reached with a **reasonable amount of funds/resources** 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.