

## Rehabilitating Water Infrastructure in Conflict Areas: Iraq's Dokan and Derbandikhan Emergency Hydropower Project

### BACKGROUND

The Dokan and Derbandikhan hydropower plants are the two largest power plants in the Kurdistan Regional Governorate of Iraq. Both connect to the national power grid and each plant is part of a multipurpose scheme for electrical power production and irrigation. A combination of wars, sanctions, lack of maintenance, and underinvestment in energy infrastructure over several decades has severely affected the entire power system infrastructure in Iraq, including the Dokan and Derbandikhan hydropower plants. In the context of the World Bank's Second Interim Strategy Note for Iraq of 2005, which stressed the need to restore basic service delivery, the Government of Iraq requested World Bank financial support on the Dokan and Derbandikhan Emergency Hydropower Project.

### PROJECT DESCRIPTION

The Dokan Dam is located on the Lesser Zab River, approximately 220 km upstream of its confluence with the Tigris River. The site is located adjacent to the town of Dokan and about 300 km north of Baghdad. The Dokan Power Station became fully operational in 1979. The reservoir impounded by the Dokan Dam has a total design capacity at normal operating level of 6,870 million m<sup>3</sup>, of which 6,140 million m<sup>3</sup> is live storage and the remaining is dead storage. However, over time, water storage fell considerably due to years of sedimentation and substandard repair and maintenance. These and other factors contributed to long outages and unreliable performance.

Moreover, having been in operation for close to three decades, the power plant was in need for rehabilitation.

The Derbandikhan Dam is located on the Diyala River, upstream of its namesake town, approximately 420 km northeast of Baghdad. Construction of the Derbandikhan Power Station was completed in 1983, but operation commenced only in 1990 due to a delay in connecting an overhead line to the national grid. Only one unit was commissioned by the contractor, who had to vacate the construction site with the onset of the Second Gulf War; the other two units commenced operation without proper commissioning. The reservoir impounded by the dam has a total design capacity at normal operating level of 3,000 million m<sup>3</sup>, of which 2,500 million m<sup>3</sup> is live storage and the remaining is dead storage. Current storage volumes are considerably less due to sediments that have accumulated over 25 years. Early on, the Derbandikhan Dam suffered from a large slope failure on the right bank, approximately 100 m upstream of the dam itself. As a result, subsequent modifications were made, and monitoring indicated that additional slope movement was minimal.

Repair and subsequent rehabilitation of the two hydropower power plants became an urgent priority in order to increase generation capacity in the Kurdish region, and stabilize the national grid once rehabilitation was completed.

The Dokan and Derbandikhan Emergency Hydropower Project aims to help alleviate the current power supply shortfall in the Kurdish region through urgently needed repairs; strengthen the capacity of



#### IRAQ AT A GLANCE

Population: 18.5 million – 70% urban, 30% rural (1990)

Surface area: 438,320 km<sup>2</sup>

Life expectancy: 62 years (1990)

GNI per capita: Estimated to be lower middle income (US\$ 906–US\$ 3,595)

Human Development Index Ranking: N/A  
% below the basic needs poverty line: N/A

#### MORE INFORMATION

*Iraq Dokan and Derbandikhan Emergency Hydropower Project.* Project Information Document. World Bank, 2006.

*Technical Annex for a Proposed IDA Loan: Iraq Dokan and Derbandikhan Emergency Hydropower Project.* World Bank, 2006.

*Iraq Country Water Resources Assistance Strategy: Addressing Major Threats to People's Livelihoods.* MENA Region. The World Bank, 2007.

local operational staff; and prepare for subsequent rehabilitation of the Dokan and Derbandikhan hydropower plants to restore their original generating capacity.

The components of the project include: repairs for Dokan and Derbandikhan; an assessment of future rehabilitation needs of the Dokan and Derbandikhan hydropower stations and dams and the related environmental impact assessment; and engineering and other technical and operational support, including to the project management team.

## PROJECT STATUS

The project started implementation in 2007. Subsequently, the project management team has made significant progress in preparing bidding documents and draft contracts for most remedial works and repair activities financed through this initiative. Contracting activities for financed works are in progress.

## LESSONS LEARNED

Strong project ownership and commitment by the Government and the need for international expertise to assist in preparation and implementation are necessary for effective delivery of complex projects in conflict areas. The focus on immediate repairs and rehabilitation works of existing hydropower plants was justified by the urgent need to restore basic electricity services to the population. Equally important was that the scope of the project included technical assistance to support assessment of additional rehabilitation and investment needs required to ensure longer-term sustainability of the power plants and safety of the dams.

### RELEVANT PROJECT

#### Dokan and Derbandikhan Emergency Hydropower Project

Project ID: P099059

Timeframe: 2007–2010

Loan Amount: US\$ 40 million

