

# IEG ICR Review

Independent Evaluation Group

<b>1. Project Data:</b>		<b>Date Posted:</b> 06/26/2015	
<b>Country:</b>	Iraq		
<b>Project ID:</b>	P099059	<b>Appraisal</b>	<b>Actual</b>
<b>Project Name:</b>	Dokan And Derbandikhan Emergency Hydro Power Project	<b>Project Costs (US\$M):</b>	40.0 / 41.47
<b>L/C Number:</b>	C4249	<b>Loan/Credit (US\$M):</b>	40.0 / 40.00
<b>Sector Board:</b>	Energy and Mining	<b>Cofinancing (US\$M):</b>	
<b>Cofinanciers:</b>		<b>Board Approval Date:</b>	12/12/2006
		<b>Closing Date:</b>	12/31/2010 / 12/31/2013
<b>Sector(s):</b>	Renewable energy (100%)		
<b>Theme(s):</b>	Other public sector governance (100% - P)		
<b>Prepared by:</b>	<b>Reviewed by:</b>	<b>ICR Review Coordinator:</b>	<b>Group:</b>
Richard L. Berney	Ramachandra Jammi	Christopher David Nelson	IEGPS1

## 2. Project Objectives and Components:

### a. Objectives:

The objective of the project as defined in the Financial Agreement (Page 4) is "to help alleviate the current power shortfall in the Recipient's territory through urgent repair works and prepare for the subsequent rehabilitation of the Dokan and Derbandikhan hydropower plants.

The Technical Annex to the President's Memorandum presents the objective of the project as "to: (i) help alleviate the current power supply shortfall in the Kurdish region through urgent repair work; (ii) strengthen the capacity of local operational staff; and (iii) prepare for the subsequent rehabilitation of the Dokan and Derbandikhan hydropower plants."

IEG's evaluation is based on the definition of the objectives in the Financial Agreement, as required.

### b. Were the project objectives/key associated outcome targets revised during implementation?

No

### c. Components:

**a) Repairs of the Dokan hydropower plant** (Appraisal US\$9.20 million; Actual US\$16.51 million) and **Repairs of the Derbandikhan hydropower plant** (Appraisal US\$15.40 million; Actual US\$18.85 million). These two components included replacement of the excitation system; rehabilitation and replacement of switchgears, metering, and protection equipment; replacement of instrumentation, monitoring and control systems; and spare parts for these systems. The project did not include any repairs on the actual electricity generating turbines, which were planned as a follow-up project.

**b) Assessment of Rehabilitation Needs, Environmental Assessment and Dam Safety, Engineering and Other Support** (Appraisal US\$9.25 million; Actual US\$6.11 million) This component included engineering and supervision services; an Environmental and Social impact Assessment; Support to the project management team and capacity

building.

#### **d. Comments on Project Cost, Financing, Borrower Contribution, and Dates:**

**Project Costs:** The project was estimated to cost US\$40 million. Actual costs were 3.7% higher. Physical investments, including price and physical contingencies, were expected to cost US\$30.75 million. Actual physical costs were 15% higher (US\$35.36 million). The cost of the assessment of needs for the phase two turbine rehabilitation, including an environmental assessment and a dam safety assessment, and Engineering and Other Support activities was reduced from the appraisal estimate of US\$9.25 million to US\$6.11 million.

**Financing:** The increase in dollar value of the SDR was sufficient to cover the increase in the cost of the project.

**Borrower Contribution:** There was no borrower contribution planned for the project.

**Dates:** The project was declared effective on October 30, 2007, ten months after Bank approval. The first restructuring was approved on August 24, 2010 to extend the project closing date until September 30, 2012 due to a number of requirements for change orders in existing contracts. The second restructuring was approved on August 28, 2012, following the Mid-Term Review, to extend the project closing date until December 31, 2013 and to revise the PDO and intermediate performance indicators (discussed in section 10a below on M&E).

### **3. Relevance of Objectives & Design:**

#### **a. Relevance of Objectives:**

**High.**

A result of multiple conflicts, the Iraq's electricity supply system had suffered severe damage. Several distribution and transmission lines were put out of commission, substations were destroyed, and the control panels at the Derbandikhan power station were ruined by explosives. Both the Dokan and Derbandikhan hydropower plants had suffered from lack of spare parts and funds to ensure proper maintenance. Their reliability was very low and their effective capacities had been as low as 50 percent.

The project was conceived as a "first aid" measure intended to help arrest further degradation at these two plants deemed critical to the power supply in the Kurdish region of Iraq. Performing "first aid" was expected to allow sufficient time for more thorough rehabilitation of the major capital components of these power plants to be planned, financed and executed. The preparation of the project coincides with the preparation of the Government's Master Plan for the electricity sector 2006-2015. Enhancement of the power sector remains one of Iraq's key priorities. The Government's latest National Development Plan for 2013-2017 "aims to raise power production to meet the rising demand in the country."

The project was, and has continued to be a high priority for the Bank and the Government. Under the Second Interim Strategy for FY2006-2007, the Bank focused the bulk of its investment operations on restoring basic infrastructure and social services. This strategy note states that according to public opinion polls, the restoration of basic services, especially electricity, was the Iraqi population's top concern. Under the current CPS (2013-2016), the Bank plans to help Iraq improve the quality and delivery of its core infrastructure services through a combination of investments and institutional development. Specifically, under existing programs, the Bank will continue its work on the rehabilitation of Dokan and Derbandikhan and the Hartha Power Plants, which was initiated under the current project.

#### **b. Relevance of Design:**

**High**

The project was envisioned as phase one of a two-phase plan to fully rehabilitate both hydropower plants and guarantee that the operational life of both power plants is extended with 20 years. Phase one was to rehabilitate all the power plant's peripheral equipment and phase two was to rehabilitate the generator turbines. The design was kept simple and project components contributed directly to the project objectives. The three components were well structured and implementation arrangements had early stakeholder participation. The outcome target of available generation capacity was an appropriate quantitative indicator, but it would have been useful to include actual production (in MW(MegaWatt)-hours) as a second outcome indicator.

### **4. Achievement of Objectives (Efficacy):**

**Help alleviate the current power shortfall in the Recipient's territory : *Substantial***

**Outputs:**

- Excitation (a technical term denoting the application of voltage to an electric device to produce a magnetic field) and control systems were replaced,
- Switchgear, dam intake structures, hydro-mechanical and substation equipment were repaired for both power

plants.

**Outcome:**

- The availability of generation capacity at Dokan was expected to be increased to 80%. Against this, power availability for June 2014 was 77%. Unit 4 out of service since February 2014 due to a defect in the speed governor system, covered under warranty. The defect was expected to be repaired by July 2014, following which Dokan was expected to perform above 80% availability.
- The availability of generation capacity at Derbandikhan was expected to increase to 80%. Against this, the measured power availability for June 2014 was 100 percent.
- The improvement in availability of the generating capacity of these two plants has resulted in 148 MW of additional capacity being made available to the power grid in the Iraq's Kurdish region.

**Prepare for the subsequent rehabilitation of the Dokan and Derbandikhan hydropower plants .**

**Substantial**

**Outputs:**

- Operational problems at Derbandikhan and Dokan have been identified and are included in the scope of full rehabilitation. (This includes re-design of the hydraulic system and the resolution of cavitation problems for Derbandikhan). The design and costing for the rehabilitation of the generator units of the two power plants has been completed
- The related bidding documents for implementing this second phase of the rehabilitation program are ready for processing.

**Outcome:**

- Phase two of the rehabilitation program is ready for implementation as envisaged.

**5. Efficiency:**

**Modest**

Although sufficient data was available at appraisal for completing a cost-benefit analysis, no such analysis was carried out. There was, however, an analysis done showing the rehabilitation of the hydro power plants was the least-cost option compared to acquiring new Combined Cycle Gas Turbines (CCGT). The ICR Team was unable to repeat this analysis for the completed project because the original material for this analysis was not included in the project documents. However, the project was implemented with only a small cost overrun for the physical investments, which suggests that it was still significantly more cost effective than the alternative of a CCGT plant.

However, implementation took six years instead of the three expected at appraisal. In light of the country's continued shortfall in the availability of electricity, the delay in project completion had a high economic cost.

The ICR's calculation of the project's Economic Rate of Return (ERR) is not useful for estimating project benefits. First, the use of tariffs as a proxy for the value of output is appropriate only for calculating Financial Rates of Return (FRR). The calculation of the ERR, should use an estimate of the "willingness to pay." Second, a comparison with the cost of an equivalent sized expansion project does not take into account the difference in the life expectancy of the two operations. An electricity expansion project would normally have the same life expectancy of a new plant, which is between 20 and 30 years. The investments made in this project were "first aid" to ensure that output would be increased until the full rehabilitation could be implemented. Third, the payback period is independent of the discount rate.

**a. If available, enter the Economic Rate of Return (ERR)/Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation :**

	Rate Available?	Point Value	Coverage/Scope*
Appraisal	No		
ICR estimate	No		

\* Refers to percent of total project cost for which ERR/FRR was calculated.

**6. Outcome:**

The project's results chain was logical and complete, and all project activities were relevant to achievement of the desired project outcomes. Relevance of project objectives and design is rated high. Efficacy of both objectives was substantial. Efficiency was, however, only modest, primarily because, although it was an emergency project, implementation took twice as long as originally planned.

**a. Outcome Rating:** Moderately Satisfactory

**7. Rationale for Risk to Development Outcome Rating:**

The project was envisioned as phase I of a two-phased plan to fully rehabilitate both hydropower plants and guarantee that the operational life of both power plants is extended with 20 years. Such a follow-on operation would be critical to fully reap the benefits of the current operation. End-of-life maintenance issues continue to impact major capital components.

The provision of spare parts for up to 10 years along with the increased technical capacity of operations staff, as developed through over 200 days of training, is expected to ensure that adequate maintenance can be performed at both hydropower plants.

The project hydro power plants distribute their electricity through the national grid. As a result, good relations between the Kurdistan Regional Government (KRG) and the central government in Baghdad remain a key factor for their effective operation. Country and political risks beyond the influence of KRG's Ministry of Energy can jeopardize the operation. Friction, such as a recent oil dispute in which the KRG was not allowed to sell oil to the state-owned market facility, can reduce the ability of KRG to finance maintenance and rehabilitation work on the hydropower plants.

**a. Risk to Development Outcome Rating :** Significant

## **8. Assessment of Bank Performance:**

### **a. Quality at entry:**

The project was prepared as an IDA Emergency Recovery Credit. At the time, the context was inherently risky: country risk, procurement and financial management risks were rated as high at entry. The risk management measures prescribed during preparation proved to be effective, and contributed to the project's achievements. The technical documents prepared at the time were comprehensive of all required work, and remained essentially unaltered throughout the project lifetime. Safeguard measures were adequate for managing environmental and social risks associated with the project.

**Quality-at-Entry Rating:** Satisfactory

### **b. Quality of supervision:**

There were 15 supervision missions in the project's seven years. The task team was responsive and proactive when difficulties were encountered in procurement, including extending the project closing date when a major contract had to be rebid, and strengthening the project's financial management, by encouraging the hiring of an external auditor when this became critical for ensure on time audits. These factors were favorable for project implementation.

**Quality of Supervision Rating :** Satisfactory

**Overall Bank Performance Rating :** Satisfactory

## **9. Assessment of Borrower Performance:**

### **a. Government Performance:**

The Government fulfilled its obligations adequately. There was some difficulty with ratification immediately following Board approval, which resulted in nine months' delay before effectiveness. However, following effectiveness, transactions proceeded smoothly.

The Ministry of Energy showed early and strong commitment to the project by appointing an interim project management team (PMT) with an experienced director, procurement specialist, environmental specialist, as well as financial management and technical specialist support. This team worked closely with Bank staff to complete project preparation.

The Government officially designated PMT, by a Ministerial order, assigning it with the full responsibility and autonomy to implement the project in accordance with Bank guidelines, including contract management, supervision and quality control, reporting and administration of project funds, as well as making payments to suppliers, consultants and contractors.

**Government Performance Rating** Satisfactory

**b. Implementing Agency Performance:**

The PMT executed the project entirely within its budget, despite the difficult country and security context in which it was operating, and despite the emergency nature of the project. The only notable shortcoming attributable to the PMT was the delay in producing the first financial audit, which was subsequently resolved by hiring an external auditor.

**Implementing Agency Performance Rating :** Satisfactory

**Overall Borrower Performance Rating :** Satisfactory

**10. M&E Design, Implementation, & Utilization:**

**a. M&E Design:**

The intermediate outcomes were fully appropriate for following the project implementation. The final outcome indicator was limited to measuring the available generation capacity of the power plants under rehabilitation. It would have been useful to include a measure of actual electricity production as a second measure of outcome.

Two additional development Indicators were added at restructuring. The first of these indicators (the design and costing for assessed subsequent rehabilitation completed along with the associated bidding documents) is fully consistent with the project objectives, as defined in the Financing Agreement. However, the second added development indicator (the percentage of relevant staff trained in operation, maintenance and rehabilitation who pass the end program assessment) should be considered as an intermediate output, not a development outcome.

**b. M&E Implementation:**

The progress reports received by the ICR team confirm that monitoring was implemented in accordance with agreed indicators. The PMT submitted consolidated progress reporting on a quarterly basis incorporating financial management reports, reports on physical progress, and updated procurement and disbursement schedules. Monitoring the single indicator tracking available technical capacity was easy to facilitate as staff working on each hydropower plants are used to monitoring this measure historically.

**c. M&E Utilization:**

The findings of the M&E were appropriate for the measurement of outcomes, and have been useful in directing corrective actions.

**M&E Quality Rating:** Substantial

**11. Other Issues**

**a. Safeguards:**

The project was classified as a safeguards category "B", according to the Bank's Operational Directive 4.01, to address potential local issues. Three safeguard policies were triggered: Environmental Assessment (OP/BP 4.01), Safety of Dams (OP/BP 4.37), and Projects on International Waterways (OP/BP/GP 7.50) . was approved on the basis that the urgent repairs were not expected to alter the water flow in the rivers or to have downstream implications.

The environmental safeguards performance of contractors at each plant was regularly supervised and reported upon in accordance with the EMP (Environmental Management Plan). No accidents or detrimental events with environmental impacts were reported during the life of the project.

**b. Fiduciary Compliance:**

The financial management (FM) rating was downgraded to Marginally Unsatisfactory due to an overdue audit report for the period from the date of effectiveness of the Credit. The selection process for hiring an external auditor had taken longer than expected, because the first call for proposals had to be cancelled due to an inadequate number of proposals submitted. Once the PMT signed a contract with an independent auditor and committed to addressing the requirements for overdue audit reports by May 2010, the FM rating was upgraded to MS. However, an Interim Financial Report was flagged overdue by less than 30 days at the time of submittal of the final ISR. It has since been

received by the Bank. There is no mention of any qualified audits in the ICR.

**c. Unintended Impacts (positive or negative):**

**d. Other:**

12. Ratings:	ICR	IEG Review	Reason for Disagreement /Comments
<b>Outcome:</b>	Satisfactory	Moderately Satisfactory	This outcome rating was influenced by the excessively long implementation period for an emergency repair project, which caused efficiency to be rated as only modest.
<b>Risk to Development Outcome:</b>	Significant	Significant	
<b>Bank Performance:</b>	Satisfactory	Satisfactory	
<b>Borrower Performance:</b>	Satisfactory	Satisfactory	
<b>Quality of ICR:</b>		Satisfactory	

**NOTES:**

- When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.
- The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

**13. Lessons:**

- **In an emergency situation , project design should be kept simple and manageable .** In this project, the components were kept simple, and designed as the first stage of a longer term rehabilitation effort of the identified hydropower plants.
- **Again, in an emergency situation , appropriate capacity should be ensured in the implementing agency , and physical proximity to the project site where possible , is valuable .** In this project, even with attention being paid to capacity and proximity, there were unforeseen delays arising from procurement and financial management processes.

**14. Assessment Recommended?**     Yes     No

**15. Comments on Quality of ICR:**

The ICR was well written and covered all the projects important points, including both its achievements and its problem areas. It is internally consistent and result focused. However the quality of the economic analysis is weak. It would have been better to avoid attempting to establish an *ex-poste* economic rate of return (ERR), since the methodology used had several problems.(see comments in section 5).

The lessons section presented in the ICR is based on evidence, but is formatted as a table in a manner that leads to some confusion in lesson recommendations. For instance the first recommendation is "presence of the PMT in Baghdad may help to overcome ratification delay in a phase two project" and the second "consider the benefits arising from placing the project management in close proximity to the project site" appear to be contradictory. In the fourth

esson, the “fact” is not directly related to the lesson, and the recommendations are excessively long and complex.

**a.Quality of ICR Rating:** Satisfactory