Report Number : ICRR14090

IEG **ICR Review**
Independent Evaluation Group

1. Project Data:		Date Posted : 12/11/2013		
Country :	Egypt			
Project ID :	P091945		Appraisal	Actual
Project Name :	Eg-el Tebbin Power	Project Costs (US$M):	452.1	707.5
L/C Number :	L7359	Loan/Credit (US$M):	260.3	259.8
Sector Board :	Energy and Mining	Cofinancing (US$M):	0.0	128.2
Cofinanciers :		Board Approval Date :		02/16/2006
		Closing Date :	04/30/2011	04/30/2012
Sector(s):	Power (100%)			
Theme(s):	Infrastructure services for private sector development (100% - P)			

Prepared by :	Reviewed by :	ICR Review Coordinator :	Group :
Midori Makino	Fernando Manibog	Soniya Carvalho	IEGPS1

2. Project Objectives and Components:

a. Objectives:

The objectives of the project, as stated in the Loan Agreement (Schedule 2, p.11) "are to assist the Borrower in enhancing energy supply in a sustainable manner and strengthening the power sector performance ."

The Project Appraisal Document (page 7) states that "the project development objectives are to : (i) assist the GOE (Government of Egypt) in enhancing the provision of energy supply in a sustainable manner, through investment in new generation capacity, and (ii) help the GOE strengthen sector performance by engaging in policy dialogue and supporting measures aimed at improving financial performance, the functions of the regulator and energy efficiency ."

The statement of objectives in the Loan Agreement is used in this evaluation, while taking into account specific intermediate outputs specified in PAD, namely, financial performance, the functions of the regulator, and energy efficiency.

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

No

c. Components:

A. The El Tebbin Power Plant (*Planned: $449.6 million, Actual: $704.99 million - the Bank's finance was $259.6 million at appraisal*)
This component supported the construction of a 700 MW power plant comprising two units of 350 MW steam turbines and boilers using natural gas as the main fuel and residual oil (mazout) as the emergency back-up fuel on an existing site. This component includes (i) demolition of existing plant and site preparation works; (ii) two units of 350 MW steam turbine-generators; (iii) two units of steam generators (boilers); (iv) electrical equipment including transformers and switchyard; (v) auxiliary mechanical equipment including pumps and drives, heat exchangers and de -aerators,

and critical and non-critical piping and valves; (vi) a water and wastewater treatment plant; (vii) the implementation of the Environmental Management Plan (EMP), including environmental monitoring equipment; (viii) distributed control systems and instrumentation, (ix) engineering and project management services including design, procurement and construction supervision as well as commissioning, testing and start-up of the Project; (x) civil works, yard tanks and medium and low voltage switchgear; (xi) insurance; and (xii) transmission lines to interconnect to the national power grid.

B. Technical Assistance Component (*Planned: $2.45 million, Actual: $0.25 million - the Bank's finance was $0.7 million at appraisal*)
This component was to fund (i) an automated financial management system at the Egyptian Electricity Holding Company (EEHC) to ensure better monitoring and reporting of the financial position of the sector and to allow for the use of financial information as a decision-making tool for management; (ii) a review of the current tariffs relative to costs in order to develop options for future tariff changes, including the design and application of time-of-use tariffs; and (iii) energy efficiency improvements by (a) the design of a load management program, based on an assessment of data collected on consumption patterns of industrial and large commercial customers; (b) upgrade of Long Run Marginal Cost (LRMC) software; and (c) feasibility assessment of an "Interruptability" Scheme.

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

The power plant cost increased from $449.6 million to $705 million due to (i) a general increase in global steel prices; (ii) a general increase in power equipment prices due to strong demand from Asia; and (iii) a currency mismatch between the Bank loan and Bank-financed expenditures.. However, the amount of the Bank loan remained the same by reducing the Bank-financed procurement packages from twelve to four. The Borrower financed the remaining packages from the state-owned National Bank of Egypt (NBE) ($100.66 million), OPEC Fund ($27.55 million) and Cairo Electricity Production Company ($317.18 million). The project closing date was extended twice, first from April 30, 2011 to October 30, 2011 and then from October 30, 2011 to April 30, 2012. The ICR reported three reasons for this delay: (i) political and public unrest in Egypt; (ii) delay in the supply of spare parts for steam turbine generators; and (iii) additional time required to finalize closing out activities of the four Bank-financed contracts.

3. Relevance of Objectives & Design:

a. Relevance of Objectives:

Substantial

The project objectives were substantially relevant to the key objectives of the GOE and the Bank 's objectives at the project appraisal and remain relevant at project closing. The FY06-FY09 Country Assistance Strategy (CAS), which was extended until FY11, stated its objectives as (i) facilitating private sector development; (ii) enhancing the provision of selected public goods; and (iii) promoting equity (para 61). One of the focus areas of the 2nd objective was the power sector, with specific reference to the El Tebbin Power Project.

Given the political and economic uncertainties due to the collapse of the regime in Egypt in January 2011, the Bank Group presented an Interim Strategy Note (ISN) as an indicative program of support over an 18-month period from June 2012 through December 2013. The ISN states that "the Bank plans to continue supporting the Government efforts to secure reliable energy supply through conventional and renewable sources and introduce institutional reform" (para 53). The project supports the ISN's first pillar of improving economic management, and its second pillar of job creation.

Therefore, the relevance of objectives is substantial on the basis of their consistency with the CAS and the ISN. Misalignment between the project objectives and the actual project components are discussed in Section 8 below.

b. Relevance of Design:

Modest

The design had two elements. The first was to increase the energy supply by building El Tebbin Power Plant with 700 MW capacity. The second was to strengthen the power sector's performance by means of engaging in policy dialogue and improving financial performance, the functions of the regulator, and energy efficiency.

- The causal chain linking the building of the El Tebbin Power Plant with increasing the energy supply is complete

and logical. The demolition of the old power plant with three 15- MW steam turbines and two 23- MW gas turbines (erected in 1958 and 1979, respectively) and the construction of a more efficient 700 MW power plant support the fast- growing demand of electricity in Egypt.

- On the other hand, the linkage between the outcome of strengthening power sector performance and the project components is not clear. In particular, no specific project components aimed to strengthen the function of regulator are designed. Given the limited scope and time-frame, it was too ambitious to formulate the objective of strengthening power sector performance.

4. Achievement of Objectives (Efficacy):

(a) Enhancing the provision of energy supply in a sustainable manner, through investment in new generation capacity. **Modest.**

Output:

- The 700MW El Tebbin Power Plant was completed successfully by the project's closing date of April 30, 2012, but only 350 MW of that capacity is presently in operation because the Unit 1 steam turbine and generator had tripped and caught fire on October 26, 2012, which caused plant shutdown for both Units. The cause of the accident is under investigation at the time of this ICR review.

Outcome:

- Total generating capacity was increased nominally to 27,049 MW by June 2011 (originally planned to 26,679 MW by 2010). However, half of the 700 MW added through the project is out of commission at the time of this ICR Review.
- El Tebbin Power Plant demonstrated high efficiency (8,005 Btu per kWh, compared to EEHC's overall average of about 8,400 Btu per kWh).

The objective of enhancing the provision of energy supply in a sustainable manner has only partially been achieved since the 700 MW incremental capacity was intended to replace decades -old plants of about 90 MW (3 units of 45 MW each and 2 units of 23 MW each) in order to keep pace with accelerating growth in electricity demand.

Unit 2 has been fully operational since January 2013 after the repair but unit 1 is still under repair. The estimated cost of repair is not expected to exceed US$ 50 million and there are manufacturer's warranty and insurance arrangements in place to help cover costs once responsibilities have been assigned. According to the project team, the plant is expected to resume in full capacity in the second quarter of the calendar year 2014.

(b) Strengthening the power sector performance. **Modest**.

Though some of the final and intermediate outputs were observed as elaborated below especially for energy efficiency, there is only weak evidence that project activities achieved the objective of strengthening the power sector's performance.

Financial performance

- Financial ratios did not achieve the target; debt service coverage ratio was 1.1 in FY2011 (target >1.4) and current ratio was 0.5 in FY 2011 (target > 1). A new automated financial management system, which was planned to be installed to enable the use of financial information as a decision -making tool for management, was not implemented either. Although the tariff increase, which started before the project, continued until 2009, financial performance of EEHC has not improved.

Functions of the regulator

- The regulator has provided inputs to facilitate the TA on time of use tariff and prepared the cost of electricity supply studies. However, the Law to strengthen the regulator's role is still pending.

Energy efficiency

- Several outputs were observed: (i) time-of-use tariffs study was executed by TA and such tariffs were introduced for the first time in Egypt; (ii) the study on the development of a load management program was completed; and (iii) the software models for LRMC and demand response (load management and interruptible scheme) were concluded.
- The initial time of use electricity tariff structure became effective in January 2010 but the ICR reported that this tariff structure did not lead to significant reduction in peak power demand because the difference between peak and non-peak tariff was too small. The tariffs were revised in January 2012 to enhance the effectiveness in reducing peak demand, and a second round of discussions are taking place with the industrial customers who account for one third of electricity consumption.

- According to the project team, Ministry of Electricity has developed a National Energy Efficiency Action Plan approved by the Government in 2012 and is now establishing an Energy Efficiency unit responsible for implementation of the NEEAP and establishing energy efficiency regulations and targets .
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5. Efficiency:

Modest.

The power plant was successfully constructed to operate at its full 700 MW capacity as envisaged in PAD. However, the plant cost increased from $449.6 million to $705 million, and the project closing date was extended for one year from April 30, 2011 to April 30, 2012. The ICR reported that the final cost of El Tebbin project were similar to those of the thermal power plants constructed at the same or slightly later period in Egypt (Cairo West: 700MW for $729 million / Ain Sokhna 1300MW for $1700 million). However, it is not clear whether the power plant costs in the Egyptian market are comparable with those in other countries .

During the meeting with the project team, it was clarified that the methodology as well as the associated assumptions for ERR calculation in Egypt power sector have been reviewed and refined through the subsequent thermal power projects in Egypt, and the methodology used in the El Tebbin project is the latest one . The ICR estimated the ex-post economic rate of return (ERR) to be 18.4% compared to 19.9% at appraisal, using the new evaluation variables available at the ICR stage, such as revised project cost and higher economic cost of natural gas . The ICR also conducted sensitivity analysis for various scenarios and reported that even in the worst case, project economic return is always well above the hurdle rate of return .

It should be noted that the methodologies of ERR calculation between PAD and ICR are quite different, and ERRs in PAD and ICR are not easily comparable. The following discrepancies are observed between PAD and ICR .

- The PAD assumed 25 years plant operation life, whereas the ICR assumed 30 years.
- The ways to calculate economic benefit are different between the PAD and the ICR . The economic benefit for the future years is much higher in the ICR than in the PAD .
- O&M costs have been reduced in the ICR significantly compared to the PAD but no explicit explanation was made.
- Change in plant availability due to plant outage and heat rate degradation, both of which were considered in PAD, were not taken into account in the ICR .

Using the ICR methodology, adding the estimated US 450 million cost of repair (to the actual project economic capital cost US$608 million) and the 2 year disruption of Unit 1, the ERR decreases to 15.6 percent.

Using the PAD methodology and assumptions, the ERR including the fire scenario decreases to 10.8 percent. This ERR is substantially lower than the original 19.9 percent.

The project's efficiency is rated modest, considering the the loss of net benefits due to the closure of Unit 1 because until there is firm evidence that Unit 1 is back in operation and yielding its expected net benefits, the ICR 's ERR calculation is theoretical. The ERR would need to be updated upon Unit 1's re-commissioning.

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	Yes	19.9%	99.5%
ICR estimate	Yes	10.8%	99.7%

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

6. Outcome:

The project's achievement of its first objective of enhancing the provision of energy supply in a sustainable manner through investment in new generation capacity is rated modest; the achievement for its second objective of

strengthening power sector performance is also modest. Relevance of objectives is rated substantial, and that of design modest. With efficiency rated modest, overall outcome is assessed as moderately unsatisfactory.

a. Outcome Rating : Moderately Unsatisfactory

7. Rationale for Risk to Development Outcome Rating:

Technical and Operational Risk

- The power plant uses proven technology and its components were sourced from reliable manufacturers. EEHC/Cairo Electricity Production Company (CEPC) have extensive experience in operating the power plants similar to the El Tebbin facility. However the power plant is currently shut down due to a recent fire incident. The detailed root cause remains to be investigated, and the plant reliability in the future needs to be carefully examined.

Government Ownership/Commitment

- The Government made an effort to balance the political economy of sector reforms since the Bank's re-engagement under the project. The Egyptian Electric Utility and Consumer Protection Authority (EEUCPRA) was established in 2000 as a sector regulator, but it has not yet been vested the authority for designing and applying electricity pricing. Pricing and subsidy reforms still remain as major challenges.

Financial Risk

- While there have been recent tariff increases in November 2012 and in January 2013, the financial performance of the power sector continues to be vulnerable, given the ad hoc tariff increases, continuous obligation to pay IPPs, and further huge capital investment requirements to keep up with the growing demand of electricity.
- Shortage of natural gas is another risk. During the first year of full operation, the plant already used Heavy Fuel Oil (HFO) for about three percent of operating time, exceeding the planned two percent limit. As the firing HFO costs more than the firing natural gas, any shortage in natural gas would further deteriorate the already precarious financial situation of EEHC.

Political Risk

- Political and public unrest in Egypt also makes any sector reforms more difficult to implement. While there are some recent progress on tariff revisions and energy efficiency initiated by the government, the vulnerable financial situation of the power sector makes it more uncertain to supply energy in sustainable manner in the future.

a. Risk to Development Outcome Rating : Significant

8. Assessment of Bank Performance:

a. Quality at entry:

- The Bank identified the reforms needed in the power sector in Egypt and designed the project to facilitate such reforms.
- The Bank had not been involved in the Egyptian power sector since the cancellation of the Kureimat Power Loan in 1992. Given this fact, the Bank carefully designed the project by (i) ensuring that the components and pace reforms are government owned; and (ii) avoiding lending conditions or rigid covenants, and facilitating parallel policy dialogue through project implementation.
- The Bank deliberately examined the risk of the project at entry. At the request of the GOE, the Bank accepted a two-envelop procurement system, while requiring certain special provisions to ensure the integrity of the process and properly address complaints. This hybrid system, which took into account Egyptian power industry practice, turned out to be highly successful.
- On the other hand, as noted in ICR report, the second PDO of strengthening the power sector performance was overly ambitious, given the country's context and the project time-frame. The project components did not support to achieve this second PDO.
- The project components, especially with regards to improving the financial performance and the functions of the regulator, did not support to achieve this second PDO. Lack of close attention to such activities would compromise on the sustainability of the plant constructed under the project.

Quality-at-Entry Rating : Moderately Unsatisfactory

b. Quality of supervision:

- As the ICR reported, as this was the first project for the GOE to work with the Bank after a long absence, there had been certain incidences where practices did not satisfy the Bank 's guidelines. The Bank identified such issues and raised them with senior GOE officials, and configured a corrective action plan with the Borrower.
- The Bank restructured the project as needed, and addressed the cost overrun in timely manner so as not to change the project design. The Bank also facilitated Closing Date extensions to address the implementation disruption due to political protests in Egypt during 2011.
- The ICR however stated that the Bank failed to monitor "the outcome of TA to enhance contribution by the electricity regulator to design and apply electricity pricing and TA on energy efficiency ." (page 24).

Quality of Supervision Rating :	Moderately Satisfactory
Overall Bank Performance Rating :	Moderately Unsatisfactory

9. Assessment of Borrower Performance:

a. Government Performance:

- The GOE extended its support to finance the cost overrun in a timely manner so as not to change the project design. The project succeeded in obtaining additional loan from the state -owned bank, and the OPEC Fund for International Development.
- The GOE engaged in power sector reform during the initial stage of the project and increased the tariff toward its economic cost. Such effort of the GOE for power sector reform was placed on hold since 2009 but following the 2008/9 economic crisis and the Egyptian revolution that started in 2011, the government revised the tariffs in November 2012 and in January 2013, together with a tariff increase of up to 50 percent for energy-intensive users, which was implemented in January and in July 2012.
- Although the EEUCPRA was established as the sector regulator, the new law which clarifies the role of the regulator is still note passed.

Government Performance Rating	Moderately Satisfactory

b. Implementing Agency Performance:

- Despite the project complexity, EEHC/CEPC successfully managed 18 procurement contracts and executed project implementation with the support of Power Generation Engineering and Services Company (PGESCO). The PAD rated the overall project risk for procurement as high . The project was completed with only one year delay, while facing implementation disruptions following political protests during 2011.
- Facing the project cost increase, EEHC/CEPC promptly arranged the additional local finance and coordinated with the Bank to revise the project financing plan to accommodate the project cost increase .
- However, such project cost increase was not anticipated by EEHC /CEPC during the planning stage. Part of the cost increase was due to currency mismatch (while the Bank loan was in US dollars, Bank-financed contracts were in Euro), but EEHC/CEPT did not take any measures to hedge such mismatch .
- No consultant to assist in design and implementation of a new automated financial management system was appointed. EEHC did not introduce the new automated financial management system . EEHC continued to use its existing system in preparing its financial statements . However, it should be noted that all the audit reports were on time and unqualified, though occasionally restated .
- No TA component committee reports were generated, as envisaged in the PAD .

Implementing Agency Performance Rating :	Moderately Unsatisfactory
Overall Borrower Performance Rating :	Moderately Unsatisfactory

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

a. M&E Design:

- The results framework defined outcome indicators for each PDO component and determined data needs, and the frequency and responsibility for data collection. However, the outcome indicators could have been defined more concisely. It was not clear how much energy efficiency the project intended to achieve. Similarly, the extent of regulatory reforms and the regulator's role were not clear.
- As the ICR indicated (page 12), the project could have included an outcome indicator for plant efficiency, since efficient power plant operations contribute to sustainable energy supplies as envisaged in the PDO. In fact, the plant achieved the high efficiency (actual generation heat rate of about 8,005 Btu per kWh, compared to EEHC's overall average of about 8,400 Btu per kWh in fiscal 2010).

b. M&E Implementation:

- There was no issue in monitoring the power plant construction component. Reports were prepared and submitted by the Borrower in timely manner and the contents were satisfactory.
- However, the monitoring of TA components was not implemented as the PAD originally envisaged. EEHC did not implement a new automated financial statement system, and financial statements were prepared with the existing system. The electrical regulator's operations report and TA components committee reports were not prepared during the project implementation, either. Instead, data in the regulator's website was used to collect its updated activities.

c. M&E Utilization:

- Reports were reviewed and used for monitoring the progress of the plant construction as well as Egypt's power generation capacity, efficiency and information on electricity demand and sales.
- As the electrical regulator's operations report and TA components committee reports were not produced, no utilization was observed for these data. EEHC financial report was submitted and reviewed by the Bank, and this data was used to determine tariff requirements in 2012-2013 according to project team.

M&E Quality Rating : Modest

11. Other Issues

a. Safeguards:

- The project was classified as category "A" due to its size, location and potential environmental and social impact according to OP4.01 on Environmental Assessment. Accordingly, prior to appraisal, an Environmental Social Impact Assessment (ESIA) report was developed by an independent third party consulting firm, and two sets of public hearings were held. The Environmental Management Plan (EMP), which formed part of ESIA, stipulated detailed mitigation measures and institutional and monitoring plans. Key personnel were assigned in the project: environmental and social team members in the Bank, and an environmental manager in the PMU.
- Monitoring of environmental and social aspects was carried out by the PMU through the Environmental Progress Report. The ICR stated that "these reports were largely satisfactory and timely." (page 13).
- During the initial stage, the delay in implementing the requirements of the EMP and the risky practices by the local subcontractors were observed by the first supervision mission, which resulted in the unsatisfactory rating. However, a corrective action plan was agreed upon and, as the ICR reported, "the safeguards aspects were later markedly improved, leading to satisfactory rating in all subsequent missions". (page 14)
- The ICR also indicated that "above-limit ambient air quality data for TSP and PM10 were occasionally recorded; this was substantially due to events of sandstorm and surrounding industrial activities, and not a result of plant stack emissions" (page 9). Accordingly, no further action to resolve this issue was reported.

b. Fiduciary Compliance:

Financial Management

- Throughout the project, the audit reports were submitted on time and to the satisfaction of the Bank. All of the audit reports were unqualified. The ICR stated "the project's financial management arrangements were consistently found to be satisfactory." (page 15)

Procurement

- The GOE requested to use a two- envelope procedure instead of the simultaneous opening of the technical and financial envelopes in this project. The Bank agreed with this request, provided that the Borrower followed certain special provisions to ensure the integrity of the process and proper addressing of complaints . The process was successful at the time of procurement, resulting high competition, reasonable price, and no complaints from bidders.

Disbursement

- CEPC adopted primarily the direct disbursement method through the project . No fiduciary compliance issue with respect to disbursement is reported in ICR.

c. Unintended Impacts (positive or negative):

Not reported.

d. Other:

12. Ratings:	ICR	IEG Review	Reason for Disagreement /Comments
Outcome:	Moderately Satisfactory	Moderately Unsatisfactory	Relevance of the project's two main objectives is substantial, while relevance of design is modest due to the unclear linkage between the project components and the objective of strengthening power sector performance. Both PDOs were only modestly achieved. Fully half of the 700 MW capacity installed under the project has not been in operation since October 2012 due to a fire, for which the cause and the sharing of rehabilitation costs have not yet been determined. Efficiency is rated modest because the benefits of the plant in full capacity cannot be realized until it is re-commissioned.
Risk to Development Outcome:	Significant	Significant	
Bank Performance :	Moderately Satisfactory	Moderately Unsatisfactory	The second PDO was overly ambitious, given the country's context and the project time-frame. The project components did not support the achievement of the second PDO.
Borrower Performance :	Moderately Satisfactory	Moderately Unsatisfactory	The TA component was not implemented as envisaged. The law clarifying the role of the regulator is not passed, and financial performance of the sector is not improved.
Quality of ICR :		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:

The first lesson is drawn from Client Feedback, while the rest are taken from ICR with some adaptation .

- Project cost estimates at the project design stage are vital but equally important is a careful study of how to manage the risk of cost overruns. In the El Tebbin Power Project, while the Bank provided loan in US dollars, the procurement contracts were placed in Euros. The appreciation of the Euro against the US dollar, in the absence of any hedging measurement, resulted in huge project cost increases in US dollar terms .
- The mis-alignment of PDOs with the project scope and time-frame can lead to poor project results. The PDO for the TA component was overly ambitious and its design was hard to achieve from the start .
- Sector reforms are challenging and can be hard to sustain . Though the GOE initiated sector reforms, such efforts were suddenly put on hold facing the global economic downturn in 2008.

14. Assessment Recommended? ● Yes ○ No

Why? The timing of the ICR review affected the outcome rating, as repairs of unit 1 have not been finalized.

15. Comments on Quality of ICR:

The ICR is written in a candid manner. It covered all the issues in a manner consistent with the guidelines, provided appropriate evidence to judge project performance, and was internally consistent . It also took into account the latest fire incident which occurred after the project closing . However, some shortcomings are observed. Costs of the TA components were not reported in Annex 1. It used assumptions that were not comparable with those in PAD to calculate ERR. It contained typos and misstatements in Annex 3, including years and the project name.

a.Quality of ICR Rating : Satisfactory