PCR EVALUATION NOTE FOR PUBLIC SECTOR OPERATIONS

1. BASIC INFORMATION

a. Basic project data

Project title: ABU QIR 1300 MW THERMAL POWER PLANT PROJECT		
Project code: P-EG-FAA-013	Instrument number(s): ADB Loan 2000130002630	
Project type: Investment	Sector: Energy	
Country: Egypt	Environmental categorization (1-3) : 1	
Processing Milestones	**Key Events**	**Disbursement and Closing date**
Date approved: 14 Nov 2007	Cancelled amount: None	Original disbursement deadline: 31 Dec 2013
Date signed: 15 Jan 2008	Supplementary financing: None	Original closing date: 31 Dec 2013
Date of entry into force : 5 Sep 2008	Restructuring: None	Revised disbursement deadline: 31 Dec 2015
Date effective for 1st disbursement: 27 Oct 2008	Extensions (specify dates): 31 Dec 2015	Revised closing date: 31 Dec 2015
Date of actual 1st : 4 Feb 2009		

b. Financing sources

Financing source/ instrument (MUA)	Approved amount (MUA) :	Disbursed amount (MUA) :	Percentage disbursed (%):
ADB Loan	242.00	234.16	96.7%
WDEPC	385.49	382.39	99%
IsDB	103.66	103.66	100%
AFESD	140.65	131.27	93%
KFAED	140.65	121.89	87%
OFID	19.59	19.59	100%
TOTAL :	**1001.48**	**946.59**	**95%**

Co-financiers and other external partners: Islamic Development Bank (IsDB), Arab Fund for Economic and Social Development (AFESD), Kuwait Fund for Arab Economic Development (KFAED) and OPEC Fund for International Development (OFID)

Execution and implementation agencies: Egyptian Electricity Holding Company (EEHC)/West Delta Electricity Production Company (WDEPC)

c. Responsible Bank staff

Position	At approval	At completion
Regional Director	Mr. K. Gadio	Mr. Jacob Kolster
Sector Director	Mr. G. Mbesherubusa	Mr. Alex Rugamba
Sector Manager	Mr. A. T. Diallo	Mr. Engedasew Negash
Task Manager	Mr. E. Nzabanita	Mr. Khaled El-Askari
Alternate Task Manager	n/a	Ms. Tanja Faller
PCR Team Leader	-	Mr. Khaled El-Askari
PCR Team Members		Ms. Tanja Faller, Ms. Kelello Ntoampe, Mr. Ayman Algindy & Ms. Amira Sobhi

d. Report data

PCR Date : August 2014		
PCR Mission Date:	From: 27 April 2014	To: 8 May 2014
PCR-EN Date: 18 November 2016		
Evaluator 1 : Ringo Star	Evaluator 2 : Abdelouahab Ghzala	

2. PROJECT DESCRIPTION

Summary from Appraisal Report including addendum/corrigendum or loan agreement, and taking into account any modification that occurred during the implementation phase.

a. Rationale and expected impacts:

Provide a brief and precise description on the project/programme rationale (concerns/questions raised), expected impacts and the intended beneficiaries (directly or indirectly impacted by the project/programme). Highlight any change that occurred during the execution phase.

With almost 100% access rate, reliability of affordable power supply has become, in Egypt, a crucial requirement for the effective delivery of health services, education and water supply throughout the country as the entire population relies on it for their day-to-day activities. Agriculture sector which employs, at appraisal time, about 35-40% of the workforce also depends on the continued supply of cheap electricity for irrigation. Any shortfall in supply was therefore to result in severe socio economic impacts, including significant loss of jobs and output across the main sectors of the economy.

To meet the projected load and energy demand, the Egyptian Electricity Holding Company (EEHC) has developed a generation expansion plan that aims at expanding the generation capacity to meet the 2011/12 demand and beyond, and to maintain the system reliability. The expansion plan was one of the priorities under the 6th (2007-2012) National Development Plan and the project was among the generation expansion plan.

The expected impact of the project was to maintain the current high level of electricity access to at least 99.3%. It was expected that 100% of new household and economic sector demand would be achieved by 2020.

b. Objectives/Expected Outcomes:

Provide a clear and concise description of the project objectives, expected outcomes, and intended beneficiaries. In so doing, highlight any revision/amendment.

The objective of the project was to increase the generation capacity of the Unified Power System (UPS) by about 4% by the year 2012 to meet the electricity demand on the UPS in the short to-medium term. The project was to contribute towards making available sufficient and reliable power to the various consumers including the households, agriculture, business and industries.

The project was to enable a 1300 MW additional generation capacity to the UPS by November 2012 (about 4% of total generation capacity), representing an increase generation capacity from 20452.2 MW in 2007 to 29,442.2 MW in 2012.

c. Outputs and intended beneficiaries:

Provide a clear and concise description the expected outputs and intended beneficiaries. In so doing, highlight any revision/amendment.

The physical infrastructure has been realised according to plan:

i. 2x650 MW steam turbine installed
ii. 2xsteam boilers and auxiliaries installed
iii. 2x800 MVA transformers installed
iv. 8 heat exchangers installed
v. 3 storage tanks installed
vi. Installation of a water treatment system and a desalination plant

The output of each generator was connected to 21/500 kV generator transformers.
The intended beneficiaries of the project will include all categories of existing and potential electricity customers from all over the country:

- ✓ the households for their domestic energy requirement;

- ✓ the agricultural sector which relies extensively on electricity for water pumping to irrigate farmlands;
- ✓ the industrial sector, which constitutes one of the key pillars of the economy and a major source of employment

As the Egyptian national grid is interconnected to the Middle East through the Jordanian grid and to the Maghreb through the Libyan grid, consumers in these regions will also benefit from the project, thus contributing to regional integration.

d. Principal activities/Components:

Provide a clear and concise description of the principal activities/components. In so doing, highlight any revision/amendment.

The project main components consist of:

1. Civil Works;
2. Supply and Installation of Equipment. This component is comprising:
    a. Steam Turbine Generators;
    b. Steam Generators (boilers) & Auxiliaries;
    c. Mechanical Equipment/Pipe Installation;
    d. Electrical Equipment/I&C Installation;
    e. Switchyard.
3. Environmental Monitoring;
4. Project Management/Wrap up Insurance.

3. PROJECT PERFORMANCE ASSESSMENT

RELEVANCE

a. Relevance of the project development objective:

Evaluation of the relevance ex-ante and ex-post (including during the implementation phase). The relevance of the project objective (during the evaluation ex-ante and the post-evaluation) in terms of alignment with country's development priorities and strategies, the beneficiary needs (including any changes that may have occurred during the implementation), applicable Bank sector strategies, the Bank country/ regional strategy, and general strategic priorities of the Bank. This criterion equally assesses the extent to which the project's development objective was clearly stated and focused on outcomes and the realism of the intended outcomes in the project setting.

The review confirms that the relevance of the project development objective is highly satisfactory (4).

The review found that the project was fully aligned with both the Bank's CSP for Egypt (2007 – 2012), country development strategies, sector strategies and the growing demand for energy.

The Bank's CSP 2007-2012, TYS 2013-2022: The Bank CSP, aimed at supporting infrastructure, including energy, with a view to drive private-sector led growth. In terms of the government's development strategy, the focus was to support socio-economic development and transformation in Egypt by making available reliable and affordable power supply for all the economic sectors and social services throughout the country. The Bank's 2007-2012 strategy for Egypt was to focus its support for the private sector, viewed as a key driver for growth and poverty reduction. The Bank notes that while Egypt's economy had been performing strongly (achieving real GDP growth of 4.4%p.a. between 2001/02 and 2005/06), it hadn't been achieving the growth rates (6% real) required to meet the Millennium Development Goals. The country's economy is classed as middle-income, with a high private sector share (61.5% in 2005/06) and high unemployment (above 10% between 2002 and 2007). The project is also relevant in taking forward lighting up and powering Africa and meet its energy needs.

Beneficiaries: The primary electricity consumers in Egypt are the industrial, residential and commercial sectors, public services and lighting. In addition, the government is also trying to gradually replace the use of liquid fossil fuels like diesel in the agricultural sector for water pumping with electricity. Nonetheless, it is worth noting that Egypt was suffering from electricity shortages, especially in the high demand summer seasons, which is negatively impacting the various consumer sectors. The power shortages vary between 2000 – 3000 MW. The Abu Qir project played a significant role in closing part of this supply gap when it started commercial operation in Dec 2012.

The relevance of the development objective is also cemented from the following extract from the *Egypt's Energy Sector: Regional Cooperation Outlook and Prospects of Furthering Engagement with the Energy Charter, 2015* that affirms the ever growing nature and complexity of energy demand: "Despite the fact that Egypt is the largest non-OPEC oil producer in Africa and the second largest gas producer in the continent, as well as the vital role it plays in regional and global energy markets, the country's energy status throughout the last four years reflects a reversal on all levels". The review found that benchmarked on similar Bank projects in Egypt, for instance the Kafr El-Dawar Damanhour Ext Damanhour (Old) Damanhour El-Seiuf Karmouz and the El Kureimat 3 Project, the development objective was fully aligned and generated additional power capacity with 1300MW additional capacity to the grid.

Demand driven: In line with the call to light up and power the nation and close the energy demand gap, the national power utility, EEHC, put in place a power generation expansion plan for 2007 – 2011 that required the construction of nine new thermal power plants. This included the Abu Qir, set to generate a total capacity of 7000 MW. With a total capacity of 1300 MW, the Abu Qir power plant project represents 18.6% of the targeted capacity increase in that expansion plan. Demand for electricity has been growing steadily in Egypt

at about 7% per year as a result of economic and demographic growths. With universal access to electricity throughout the country through the national grid, electrification plays a significant role in supporting socio-economic development and service delivery. Thus the project was part of EEHC's 2007-2012 power sector investment plan to increase power supply in order to accommodate expected growth in demand.

Country Development Strategies: The project was designed for implementation during the period 2007-2011. When the project was designed the Government's objectives were outlined in Egypt's vision 2022 in a Government Development Plan the Fifth Five Year National Development Plan (NDP6, 2007-2012) covering the period 2002-2007. The long-term objectives of the NDP5 were to support the modernisation and development of the economy through private-sector led growth. The Abu Qir project is part of EEHC's power generation expansion plan for 2007-2012 which comprised of the construction of several power plants with the objective to meet the 2011/2012 electricity demand and to maintain the reliability of the system. The project contributed immensely to Vision 2022 as it translated onto the ground Strategic Pillar 1, Infrastructure Energy in the National Development Plans (NDP 5/6/7). This is consistent with the country strategy. The expansion plan involved investment in different type of plants: mainly combined cycle and steam power plants, but also wind farms and to a smaller extent hydro and solar plants. In the late 1990s Egypt discovered important gas reserves. The production of petroleum products declined by about 15% while production of gas increased by about 150% in the period 1998 to 2003/04. The Government's strategy was therefore to replace oil with gas to help reduce the energy problems in the country.

Sector Strategies: The Abu Qir project is consistent with the national energy policy objectives set at the time of its design. It aimed at contributing towards making available sufficient and reliable power supply for all productive and social sectors of the economy and therefore to enhance the efficient functioning of the private sector.

b. Relevance of project design (from approval to completion):

The evaluator should provide an assessment of the relevance of the project design regardless of the one provided in the PCR. The evaluator will also comment on the PCR conclusion for this section, and will provide an evaluation of the relevance of the project design. The latter assesses the soundness and the timing of eventual adjustments, or technical solutions to ensure the achievement of the intended results (outcomes and outputs), the adequacy of the risk assessment, environmental and social protection measures, as well as the implementation arrangements. For Project Based Operations (PBO), an assessment will be made on the relevance of the prior actions, the policy dialogue and the extent to which the operation could have been more pro-poor in its design.

The review refutes that the relevance of the project design is highly satisfactory (4) but judges it satisfactory (3) instead.

The PCR pointed out, correctly, that the design had taken into consideration the technical complexity of the project which involved the construction of two large power generation units 650 MW each, as well as the financing complexity as it involved five (05) international financing institutions, in addition to the government West Delta Electricity Production Company (WDEPC). It stated that a project implementation and management team comprising staff from WDEPC/EEHC and the consultant were put in place to effectively manage the project in order to ensure coordination and harmonization of the various project components, contractors, and financers.

The financing plan was designed such that most of the international financers were parallel financing different project components in order to avoid issues that may arise from for example the need for cross effectiveness, double procurement procedures except the two steam turbine generators that had been financed jointly by the African Development Bank (ADB) and the Islamic Development Bank (IDB).

However, the PCR did not outline, as relevance of project design, some issues encountered during the implementation of the project and listed in the consultant report entitled "Post Project Evaluation of the Bank's Assistance in the Energy Sector - Final Report – Abu Qir - February 2016" final report prepared by

the consultant 14 months after the preparation of the PCR, mainly:

i. the selected technology for the boilers of the project was not the most recent on the market;
ii. the poorly performing pumps and drives contractor that affected the amount of generated energy in the first year of operation;
iii. technical issues during the first year of operation (2013);and
iv. security issues following the 2011 revolution.

In its design, the Abu Qir project articulated a focus anchored on catalytic changes. Intermediate and ultimate outcomes were clear and appropriate based on prior and past experiences of the Bank. Prior actions for the project were met including setting up a multidisciplinary PIT team. The outcomes were efficacious on the ground and enhancing increased availability factor (relatively high load factor above 80%), above average thermal efficiency (41.4%), decreased costs, power stabilisation and light up and powering Egypt. Supervisions missions were set at one per year and a needs basis. It is important to note that had the project be accorded appropriate technology in its design, it probably could have been much instrumental in delivering its intended outputs and outcomes than it did under the available technology used.

The review identified loopholes in the M and E system in that there were no baselines and convincing sustainability mechanisms to deal with vulnerabilities. There was no evidence of dedicated monitoring and evaluation from the executing agency. They were delays arising from contractor performance, cost overruns of 14%, procurement deficiencies, dire implications arising from scarce fuel, Egypt's historic problematic area in power generation as well as macro level instability not being accommodated in the design. While the Appraisal Report avers that "Other conditions of sustainability include the availability of natural gas for the new plant and the presence in the Egyptian system of similar operating plants" (PAR p31), it does not provide the detailed and convincing pillars, indicators and mechanics of sustainability. For instance the mitigation measures on sustainability and how to induce FDI into the topical gas production industry given the prohibitive pricing cost and reform the legislative environment for passing on costs to ensure viability as a long term measure.

EFFECTIVENESS

c. Effectiveness in delivering outputs:

Evaluation of the extent to which the project achieved its stated results (obtained from the logical framework) based on the last Implementation Progress and Results Report (IPR) and by considering accurate reporting of direct or indirect evidence on intended and unanticipated outputs. In the absence of sufficient data (as direct evidence), indirect evidence (such as project outcomes and other pertinent processes/elements of the causal chain) should be used particularly in the evaluation of the extent to which the project is expected to achieve its stated results/ objectives. The absence of sufficient data to assess the effectiveness should be indicated (and clearly detailed in the PCR quality evaluation section). The PCR score should equally be indicated in this section.

The review shares the findings of the PCR that the effectiveness of the project in delivering outputs is satisfactory (3).

The review established that the two project outputs, namely steam power plant erected and high voltage substation constructed, were executed successfully and contributed to meeting new energy demand and increased generation capacity (1300 MW (8541.00 GWh per annum) supply to the UPS by November 2011) despite delays.

The review conducted a follow through tracking and confirmed the delivery of the key output, 2X650MW of the Abu Qir in the EEHC Annual 2012/2013 (p15). The website of the Delta Electricity company was also browsed to confirm physical outputs and was not found wanting. This finding was fortified by independent evidence on **http://www.ecgsa.com/abuqirthermalpowerplantintakestructure**.

Analysis shows that the Abu Qir was the flagship of the West Delta in 2012/2013 given it was the highest contributor with its 1300MW.

The review confirmed that the physical infrastructure has been realised according to plan and operational:

- 2X650 MW steam turbine installed and operational
- 2X steam boilers and auxiliaries installed
- 2X800 MVA transformers installed
- 8 heat exchangers installed
- 3 storage tanks installed
- Installation of a water treatment system and a desalination plant

Output Execution: The output execution rate was 100%. This is consistent with the IPR. The high voltage 500 kV substation was constructed and is operational. However, the overall delivery of outputs suffered from construction delays and technical issues (defective pumps) though they were resolved.

Adequacy, Quality, Coherence and Functionality: For a UPS project, the outputs were found adequate, coherent, functional and in harmony with the Results Framework and the Post Project Evaluation findings February 2016. Evidence from the PCR showed that the load and availability factors were on a notable increase 91% (a 3% variation was noticed with other lines of evidence adduced in this review) and 10-14% respectively. The EGP was up from 3.5% to 5%.

Civil works were accomplished as planned with cost efficiency and adequate risk mitigation measures in place. The following outputs were delivered; supply and installation of equipment, steam turbine generators & condensers, steam generators & auxiliaries, mechanical equipment/pipe installation, electrical equipment/Instrument & Control Installation, and a cost efficient 500 kV Switchyard. Environmental monitoring was in place accompanied by sound project management and a wrap-up Insurance signed.

Results of the financial and economic analyses at completion indicate that the project is financially viable, posting a Financial NPV of EGP 3,572.3 million. The review noted that the project posted economic benefits though with a relatively lower EIRR of 17.5% (against 22% at Appraisal) due to the increase in the project cost, technical constraints alongside low plant output and heavy fuel challenges. The ratio of planned over actual delay is 0.76 which is greater than 0.75 and satisfactory.

The review tracked and compared the effectiveness in the delivery of outputs in similar projects (Kakafr El-Duwar, Damanhour Ext 300, Damanhour)-in the same project environment and established that there is a match in performance. Consistent with past projects, the effectiveness is confirmed satisfactory and at par with previous similar projects over and above the Abur project contributing increased capacity to the grid. The project's was also delayed as in the case of the Kulmeirat Project 3 which had 18months delay despite having similar components.

d. Effectiveness in delivering outcomes:

Evaluation of the extent to which the project achieved its intended set of outcomes (including for Project Based Operations (PBOs) where complementary measures are necessary for their implementation, namely public awareness, policy dialogue and institutional arrangements for instance). The evaluator should make an assessment based on the results of the last project Implementation Progress and Results (IPR). The evaluator shall indicate the degree to which project outcomes (intended and unanticipated) as well as reasons for any eventual gap were discussed in the PCR.

The review agrees that the effectiveness of the project in delivering outcomes is satisfactory (3).

The project had two catalytic outcome indicators namely;

Outcome 1: Generation capacity increase and,
Outcome 2: Energy supply to the grid.

Outcome Delivery: The review observed a direct causal link between the effective execution of outputs and the resultant delivery of outcomes that ultimately resonated with the Bank's strategy in Egypt. The outcomes were translated into realty and are functional. **Multiple independent lines of evidence converged and confirmed both outputs and outcomes functionality.**

The review established that the Abu Qir thermal efficiency compared with the other power plants in West Delta (Kakafr El-Duwar (31%), Damanhour Ext 300 (25%), Damanhour Old-30%), has the highest efficiency (41.4%) of any of the steam turbine power plants in the region and has a higher probability of contributing to decreased fuel costs (and generating costs) in the region. The energy efficiency of a conventional thermal power station, considered salable energy produced as a percent of the heating value of the fuel consumed, is typically 33% to 48%.

The EEHC Annual Report 2011/12 very important results that included a notable reduction of the average fuel consumption rate for thermal power plants from 217.3 gm/KWh gen. to 209 gm/KWh gen, increase in peak load from 19738 MW to 25705 MW, increase in energy generated from about 125 Twh to 157 TWh and increase in the number of customers from 23.8 million customers to 28.1 million customers and a fall in network losses from 11.24% to 10.79%.

According to Performance Statistics of Power Plants (EEHC Annual 2011/2012 released in the 2011/2012, the availability factor of the Abu Qir was 88% compared Cairo West 53% and Shabab 99%.

The review found that the project was fully operational and feeding the national grid. This confirmed translation of benefits of the projects in increasing availability of electricity, close the gap of 2000MW and

driving transformation. The target to produce 30803 MW was met fully. The project contributed 30803 MW twice target and 7494 GWh/yr (slight variation from target), to the grid capacity. The review noted that this value added to the Bank's visibility in Egypt, its cumulative energy sector investments over the years and its Strategy 2007-2012. The strategy envisions a supportive framework to expand the electricity infrastructure in Egypt and expansionary and growth policies and is consistent with the Government of Egypt's Vision 2022 and the National Development Plan 2002 -2007 and Infrastructure-Energy (Strategic Pillar I).

The review established that there were constraints relating to delivery of outcome 2. The impact of the observed constraints were not strong enough to complete disturb the trajectory of the project. The PCR stated that the amount of energy generated by the project during its first year of operation (2013) was less that its full potential because the turbine generators could not be fully loaded due to some technical problems with the steam generators feed pumps. However, it was encouraging to see that the challenges were addressed with positive expectations of the plant to achieve the full energy generation target in 2014. The review finds the evidence from the PCR and the PAR link the components contribution to the ultimate outcomes in line with macro-economic indicators.

The review found admissible evidence to endorse the functionality and quality of outcomes based on the findings of the World Economic Forum, Executive Opinion Survey 2011–2012**.** The review was able to confirm that that the quality of electricity supply as measured by business executives' perceptions in Egypt in response to the survey question.

e. Project development outcome:

The ratings derived for outcomes and output are combined to assess the progress the project has made towards realizing its development objectives, based on the rating methodology recommended in the Staff Guidance Note on project completion reporting and rating (see IPR Guidance Note for further instruction on development objective rating).

The review confirms the conclusion of the PCR that the project progress towards realizing its development outcome (DO) is satisfactory (3).

The intended project outputs and outcomes were found satisfactory and logically coherent. Based on the computation of the DO in line with the Guidelines, the DO is satisfactory on account both outputs and outcomes as argued by the review. This is consistent with Staff Guidance Note on Project Completion Reporting and Rating 2012. The review concurs that the project's performance in delivering outcomes would have arguably been higher had outcome not been constrained. The satisfactory performance of the DO is logically and systematically consistent with the strong design of the project and relevance at country level.

The project achieved all its targeted outputs and outcomes, mainly the construction of 2x650 MW steam turbine generating units with all auxiliaries and high-voltage substation for connecting the plant to the national grid, hence enhanced power stabilisation and contained disruptions and outages. It thus contributed to the electricity vision-Vision 2022, Infrastructure Pillar 1 and the integrated strategy for electricity through 2027 among others. However, the outputs suffered from one year delay during construction and technical constraints. Risks noted by the review include maintenance and sustained operations of the utility. The greatest sustainability challenge is the supply and availability of fuel and gas.

Findings from the International Energy Agency Africa Energy Special Outlook Report further confirmed and showed that in North Africa, more than 99% of the total population has access to electricity, with Egypt being the powerhouse in electricity generation.

World Bank data, endorsed the functionality and quality of outcomes.

On a comparative note with the a similar additional power generation project in Egypt, (the El Kureimat

Project, Al Shabab Power Plant) the review confirmed the DO of the Abur Qir project was at par in achieving an satisfactory outcome and contributed almost twice to the comparator. The risks were found similar to other projects, for instance routine maintenance and vulnerability to exogenous factors, soaring prices of gas. The review, though, notes the 1.8% GDP drop in 2011 due to the turning point moment-the revolution's impact.

f. Beneficiaries:

Using evidence, the evaluator should provide an assessment of the relevance of the total number of beneficiaries by categories and disaggregated by sex.

The review finds that the project is inclusive. By injecting power into the national grid, which already covers almost the whole country, the project benefits the entire Egyptian population. The main electricity consumption sectors are the residential, industrial, commercial, public buildings and services and agriculture.

About 50% of the beneficiaries are women. The project created a about 3600 jobs for the nationals of Egypt (3000 estimated at appraisal), comprising 2800 jobs for the manual labour jobs that usually benefit low-income families, and 800 non-manual jobs that typically benefit the low-to-middle income category. Because of the nature of construction activities and environment, the number of women who directly benefited is negligible.

Other beneficiaries include the National Power Utility. In fact, both EEHC and WDEPC benefited from the project through the practical experience gained by their staff through the planning, design and implementation of the project. Women comprise about 11 – 15% of the technical and administrative staff of both EEHC and WDEPC. The team who managed the Abu Qir project at EEHC and WDEPC comprised several women who contributed very positively to the project, and also gained practical experience through its implementation. The project also added new highly-efficient power generation facility to the assets of West Delta Electricity Production Company (WDEPC) that should help provide good financial return to the company.

Egyptian contractors and service providers have been gaining a lot of practical experience through their participation in the implementation of large power plant projects in Egypt (and in other countries). In the case of Abu Qir, Egyptian contractors participated, either solely or jointly with foreign contractors, in the execution of 12 contracts out of the 19 contracts of the whole project. Many of these contracts did not involve just construction works, but also provision of goods, materials and equipment; most of which was manufactured in Egypt. The review benchmarked this component and confirmed that the project had similar beneficiation with past satisfactory projects but actually created more than twice the number of jobs and more women benefited.

g. Unanticipated additional outcomes (positive or negative, not taken into consideration in the project logical framework):

This includes gender, climate change, as well as social and socio-economic- related issues. Provide an assessment of the extent to which intended or unanticipated additional and important outcomes have been taken into consideration by the PCR. The assessment should also look at the manner the PCR accounted for these outcomes.

None were found.

EFFICIENCY

h. Timeliness:

The timeliness of project implementation is based on a comparison between the planned and actual period of implementation from the date of effectiveness for first disbursement. For Project Based Operations (PBOs), the timely release of the tranche(s) are assessed through this same criterion.

The review disagrees with the PCR's textual interpretation of the project timeliness rating as unsatisfactory (2) and interprets timeliness correctly as satisfactory (3) as per PCR dates and in line with the Staff Guidance Note Aug 2012.

The project was initially planned for a period of 53 months with a completion scheduled for end of November 2011.The ratio of planned implementation time (as per PAR) and actual implementation time from date of effectiveness is 0.76 (4.4/5.8), several delays occurred in the implementation, more specifically with the delivery of outputs. Accordingly, based on the rating methodology recommended in the Staff Guidance Note on project completion reporting and rating (August 2012), the review does not confirm that the performance of Timeliness is unsatisfactory (2) as rated by PCR and assesses it as satisfactory (3).

Compared to the original project schedule foreseen at appraisal, project implementation suffered from a delay of about 1.4 years during construction (16 months for unit 1 and 22 months for unit 2). The delay was due to slightly longer procurement cycle for the two steam turbine and the bid for the steam turbine generators was based on a schedule for the manufacturing and delivery of the steam turbine generators. This delay was 4 months less compared to similar projects on average. The review bases its rating using PCR dates rather than SAP dates by which the rating becomes less than 75% and unsatisfactory.

i. Resource use efficiency:

Provide and assessment of physical implementation (based on outputs delivered) against resources used (based on cumulative commitments) at completion for all contributors to the project (the Bank, Government, and others). This criterion would normally not apply to PBOs, as there is often no direct link between the outputs and the amount of contribution (in which case the rater would indicate N/A).

The review disputes that the resource use efficiency is highly satisfactory (4) and instead finds it satisfactory(3)

The ratio of the median percentage physical implementation of the project outputs and commitment rate is 87%. Accordingly, the review does not confirm that the performance of the Resource use efficiency is highly satisfactory (4) as rated by PCR and rates it as satisfactory (3).

The project delivered its outputs with a cost overrun of about 14%, increasing from USD 1,322.7 million estimated at appraisal to USD 1,518 million at completion. The cost drivers were due to the time at which the plant was procured in 2007 – 2009 during which the prices of oil and other main materials were exceptionally high and the prevalence of high global demand on large-size power equipment, especially from the Far East, which left the market in Egypt with relatively short supply as evidenced by the project receiving a single bid for a large package that was tendered internationally. The review noticed a difference in the reported total cost of the project in the PCR and the Appraisal Report.

The review established that in relation to other similar projects in the past the cost overrun of 14% was three

times less than the cost overrun of 43% in the Kulmerait Project 3 which the review randomly picked to appreciate the magnitude of the overrun. In addition, the Abu Qir contributed nearly twice (1.7times) to additional energy capacity to the national grid in comparison to the former.

j. Cost-benefit analysis:

Provide an assessment of the timeliness of the development outputs, and the extent to which costs of the costs have been effective and have been provided in the most efficient manner. The PCR rating should be discussed. The evaluator should verify whether the benefits of the project (achieved or expected) exceed its actual costs. To achieve this, evidences will mainly be based on a comparison between Economic Rates of Return (ERR) calculated at appraisal, the mid-term review and completion. When commenting PCR ratings, the degree of utilization of valid sources for evidence justifying the rating assigned should be taken into consideration. The evaluator should ensure of the validity of assumptions and that the same model was used for the calculation of others ERRs. For PBOs for which this calculation model does not apply, an assessment could be done with regards to the contribution of policy reforms to economic growth. In the absence of sufficient evidence, an appropriate rating should be assigned.

The review concurs that the cost benefit analysis for the project is satisfactory (3).

According to the analysis, the Abu Qir power plant yielded positive financial and economic returns. Egypt has been facing an emerging energy supply shortfall since 2011/12. Therefore, the direct benefits of the project are the economic value of the incremental energy delivered to consumers from the new plant. This value is computed using estimates of willingness-to-pay for the various consumer groups.

The economic and financial analysis used for the appraisal of the Abu Qir project have been updated to reflect the actual project costs, operation and maintenance costs as well as actual plant outputs from the data of the first year of operation.

The updated economic rate of return (EIRR) of 17.5% is lower than the initial 22% calculated at appraisal. The ex-post EIRR is estimated at 13.2%. It is lower than the EIRR of 17.5% calculated in the PCR because of reduced output level, and it does not take into account some economic costs for which there is a lack of data, such as the impacts of the fuel supply shortages.

As per the report "Post Project Evaluation of the Bank's Assistance in the Energy Sector prepared in February 2016, i.e., 14 months after the preparation of the PCR, the ex-post EIRR of the project was estimated at 13.2%. It is lower than the EIRR of 17.5% calculated in the PCR because of reduced output level, and it did not take into account some economic costs for which there was a lack of data, such as the impacts of the fuel supply shortages.

Although an updated FIRR of 7.8% against the estimated one at appraisal of 11.7% and a NPV of EGP 3,572.3 million, the project remained economically viable. It has achieved its developmental objectives in meeting part of the increase in demand for electricity in the country, thus supporting socio-economic development.

k. Implementation progress:

The assessment of the Implementation Progress (IP) on the PCR is derived from the updated IPR and takes into account the all applicable IP criteria assessed under the three categories : i) Compliance with covenants (project covenants, environmental and social safeguards and audit compliance), ii) project systems and procedures (procurement, financial management and monitoring and evaluation), and iii) project execution and financing (disbursement, budget commitments, counterpart funding and co-financing).

The review disagrees that the implementation progress is highly satisfactory (4) and downgrades it to satisfactory (3).

Overall, the project complied with covenants, systems and procedures and execution and financing in a satisfactory manner. Constraints encountered were with audit reports, delays and extensions.

The PCR notes that the project has complied with all covenants and first disbursement did not delay project implementation. This is not necessarily so given the limitations indicated above. Advance procurement was used with some very large packages in order to account for the lead time required for procuring such packages and align the timing of contract signature with that of first disbursement as possible. Procurement documents were generally in good quality and were in line with Bank requirements. The project routinely submitted monthly progress reports outlining the status of project implementation and flagging issues that required attention from any of the stakeholders involved. The PIU follows good financial management rules and regulations.

However, the external audit identified some shortcomings, e.g. related to the capitalisation of fixed assets, that were to be addressed by the PIU. In terms of implementation progress, the project was almost complete and most of the contractors have completed their main work. Commercial operation of the first unit started in December 2012, which was about 16 months behind schedule. Among the top reasons for this delay was the low performance of some contractors.

Despite of extensive efforts by WDEPC and the engineering consultant to recover the delay and put those contractors back on track, some of the issues were complicated and were exacerbated by the political instability in Egypt after the 2011 revolution; thus leading to the reported delay.

SUSTAINABILITY

l. Financial sustainability:

Provide an assessment of the extent to which funding mechanisms and modalities (eg. Tariffs, user fees, maintenance fees, budgetary allocations, other stakeholder contributions, aid flows, etc.) have been put in place to ensure the continued flow of benefits after completion, with particular emphasis on financial sustainability. For PBOs, the assessment should focus on financial sustainability of reforms, as well as the Bank's policy dialogue to promote financial sustainability of the reforms.

The review concurs that the financial sustainability of the Abu Qir project is satisfactory (3).

Indicative pillars of financial sustainability were found to be in place. The removal of energy subsidies (Energy Charter), increased thermal efficiency above industry yardsticks (41.4% against the 36%-), decreased costs (Post Project Evaluation) and sound cash flow indications (Annex B) and expected increases in electricity prices 2014-2018. The review cautions and cannot guarantee financial sustainability as these measures are only sufficient and not robust. The review proposes that a detailed assessment of financial sustainability would be necessary at post evaluation.

The sensitivity analysis did not identify any major risks to either the financial or the economic sustainability of the plant. Similar to the EIRR, the financial rate of return decreases from 11.71% estimated at appraisal to 7.8% with a financial NPV of EGP 3,825.1 million. The financial viability is mostly sensitive t to the plant's fuel costs as well as plant generated energy (utilization factor). For example, a reduction in the plant utilization factor to 85% would lower the financial IRR to 6.8%. This is very unlikely to actually occur however since, as indicated earlier, Egypt is currently facing a severe power shortage that all the available capacity is almost fully utilized, especially the new high-efficiency plants.

Subsidies Removal: The review established that based on the Energy Charter 2015, 22% of energy subsidies were removed as a practical measure to enhance sustainability. **Cuts in electricity subsidies** in Egypt are anticipated to result in cost reflective tariffs and improve the financial sustainability of the sector and the use of lower cost generation will allow the government to achieve this more quickly (Post Project Evaluation Report 2016).

The review found that there are constraints to financial sustainability. The **availability of sufficient natural gas** to run the plant at full capacity, imported at a very huge and prohibitive cost. Hence the review notes the risk as stated in the PCR namely the lack of the availability of sufficient natural gas to run the plant at full capacity as the country has been suffering from temporary natural gas shortages because of lack of new investments in the sector during the past few years. This has affected the power sector, as the largest consumer of gas.

Cost overrun: The review finds that the project's cost overrun of almost 14% due to exceptionally high prices of oil and other main materials during the construction is major limitation also.

Non-Technical losses: A concern raised in the EEHC Annual Report 2012/2013 is non-technical losses, electricity theft being the main contributor of the increase in the network loss from 11.2% in 2011/2012 to 17.1% in 2012/2013.

Due to the fact the fuels are largely imported, their costs to the power sector are higher than that of natural gas, and as such they increase the electricity generation cost. Passing cost increases on to consumers was found to be constrained by the regulatory reforms and presented huge sustainability challenges.

Low cost recovery and weak financial performance of sector institutions. The other challenge confronted is the lack of viability. Based on the evaluation report, Egypt has historically paid $2.65 per million British thermal units (Btu) for natural gas produced by foreign operators. This price has been a major impediment for foreign investors willing to develop the gas fields given that current price in Europe is around $7per million Btu. No information is given on tariffs, user fees, maintenance policy or budgetary allocations.

m. Institutional sustainability and strengthening of capacities:

Provide an assessment of the extent to which the project has contributed to the strengthening of institutional capacities – including for instance through the use of country systems – that will continue to facilitate the continued flow of benefits associated with the project. An appreciation should be made with regards to whether or not improved governance practices or improved skills, procedures, incentives, structures, or institutional mechanisms came into effect as a result of the operation. For PBOs, this should include an assessment on the contributions made to building the capacity to lead and manage the policy reform process; the extent to which the political economy of decision making was conducive to reform; the Government's commitment to reform; and how the design reinforced national ownership.

The review confirms that the institutional sustainability and strengthening of capacities is highly satisfactory (4).

The project has been directly implemented by West Delta Electricity Production Company (WDEPC), one of the six power generation companies in Egypt under the Egyptian Electricity Holding Company (EEHC). WDEPC is a well-established institution and owns the human resources that enable it to carry out its mandate successfully. In addition to the Abu Qir project, WDEPC has, at appraisal time, a portfolio of eight (08) thermal power plants with a total capacity of 2,608 MW comprising a mixture of power generation technologies, which widens the practical experience and knowledge base of the technical staff of WDEPC.

EEHC provided direct input into the project and support to WDEPC, primarily during the early project design phases but also subsequently throughout implementation. EEHC carries out the planning and provides main input to the design of all thermal power generation projects in the country, which helps in sharing the experiences from those projects among the different subsidiary companies - such as WDEPC - that finally implement and run those projects.

In general, the power sector is among the most attractive employers in Egypt, and therefore is able to attract good calibres. The sector provides continuous on-the-job training to its fresh comers in order to ensure successful continuation of the business. While the review acknowledges that the project uses country systems, it does not finding convincing evidence from the literature to prove that institutional mechanisms are without shortcomings and loopholes.

n. Ownership and sustainability of partnerships:

Provide an assessment of whether the project has effectively involved relevant stakeholders, promoted a sense of ownership amongst the beneficiaries (both men and women) and put in place effective partnerships with relevant stakeholders (eg. local authorities, civil society organizations, private sector, donors) as required for the continued maintenance of the project outputs. For PBOs, the assessment should measure the extent to which the Government's capacity to conduct consultations during policy dialogue and the extent to which the Bank supported the Government in deepening the consultation processes.

The review agrees that the ownership and sustainability of partnerships is satisfactory (3).

The implementation of the Abu Qir project involved the intervention of various players, both within the public sector, but also within the private sector either as contractor or service providers. The main party responsible for the coordination among those different stakeholders was WDEPC as the project's main implementation agency, with great support from EEHC and the project's consultant (PGESCo). In particular,

and critical to the successful completion of the project, was the coordination with the Transmission Company for connecting the plant to the grid, with the oil and gas sector for connecting the plant to the gas grid and subsequently for making available sufficient quantities of fuel for running the plant, and with the various different government institutions responsible for issuing the various permits required for project implementation, and subsequently for monitoring the actual performance of the project vis-à-vis the safeguards that may be required under some of the permits (e.g. environmental permit). The key limitation was found in that the coordination with the other financiers of the project was not developed.

o. Environmental and social sustainability:

Provide an assessment of the objectivity of the PCR rating on the project's implementation of environmental and social mitigation/enhancement measures with regard to the Environmental and Social Management Plan (ESMP), the capacity of country institutions and systems, as well as the availability of funding to ensure the environmental and social sustainability of the operation. This criterion would normally only apply to Environmental Category I and II projects.

The review goes along with the findings of the PCR that environmental and social sustainability is satisfactory (3).

The Abu Qir project complied with the requirements of the ESIA and its ESMP both during project construction, and subsequently during implementation. The project included a component for procurement and installation of some of the environmental equipment necessary to be installed at the site for continuous monitoring of critical environmental aspects such as plant gas emissions. The equipment has been procured, installed and continue to operate successfully. WDEPC provided annual reports to the Bank on the monitoring of the various environmental and social aspects of the project, and implementation of the ESMP. The reports did not flag any issues that were of critical breach of any environmental aspect, as was also witnessed during the Bank's field supervision of the project.

One concern however is the increase of using heavy fuel oil as a fuel during the first year of plant operation due to the shortage of natural gas (the primary fuel). The utility had to resort to this solution given the power shortage in the country in addition to the necessity of operating the plant during the warranty period in order to discover any manufacturing or construction defects. The Government of Egypt is taking good measures to address the gas shortage problem in the country by re-stimulating FDI in the oil and gas sector for new developments, and in the short-term exploring the means for importing natural gas to fill the demand gap.

Based on the World Economic Forum 2012, the review confirms that in terms of environmental and social sustainability and that Egypt is among the top 8 countries (South Africa, Morocco, Mauritius, Kenya, Algeria, Tanzania, Namibia) with a stringent and strong enforcement of environmental regulatory regime, relatively low Co2 emissions and ratified international environmental treaties and therefore creating an enabling environment for compliance as attested by the project.

4. PERFORMANCE OF STAKEHOLDERS

a. Bank performance:

(Preparation/approval, ensure of Quality at Entry (QAE) : quality of the supervision, completion) : Provide observations on the objectivity of the PCR ratings and feedback provided by the Borrower, and if necessary, re-assess the Bank's performance throughout the project cycle (design, implementation, completion) by focusing on evidence from the PCR in relation to 7 criteria defined in the PCR Guidance Note.

The review concurs with the findings of the PCR that the performance of the Bank is highly satisfactory (4).

The Bank showed great flexibility during the implementation of this project that was very beneficial in either steering the project in the right direction or preventing some possible bottlenecks that could have impacted progress. In particular, the Bank agreed to change the payment terms of one of the very large contracts under the project in order to overcome the non-readiness of the financial resources of the IsDB, the co-financer of the contract. This flexibility was very important for the successful uninterrupted execution of the contract, and the overall project. At the onset, the Bank provided the necessary guidance and information to the PIU on the various Bank rules and procedures through both a project launching mission and routine support from EGFO.

The adequacy and quality of bank supervision missions was good. Over the 6.5 years since this loan became effective, the Bank carried out 11 field and two desk supervisions, with an average of slightly more than two supervisions per year. Procurement documents submitted to the Bank were reviewed and cleared in a timely manner as necessary, which supported project progress. Apart from some slight changes to the list of goods and services and adjustment to the project time schedule, to all of which the Bank has responded positively, no major changes to the project design or objectives were required.

The review found that in collaboration with other development partners, the Bank built fruitful harmonisation and cooperation in line with the Paris Declaration 2005 with the energy sector in Egypt to ensure sustainable economic development for the benefit of all Egyptians.

The report specified that the Bank has been very proactive in anticipating and resolving difficulties that have affected the project. The Bank's assistance in the design and implementation phases has contributed to the capacity building of the executing agency and other stakeholders.

Benchmarked against other related projects, for instance the Kulmerait Project 3, the performance of the Bank was found highly satisfactory in this project due to the quality of supervision.

b. Borrower performance:

Provide observations on the objectivity of the PCR ratings, and if necessary, re-assess the Borrower's performance throughout the project cycle (design, implementation, completion) by focusing on evidence from the PCR in relation to questions defined in the PCR Guidance Note.

The review finds that the performance of the borrower is satisfactory (3) rather than 4 as claimed by the PCR.

Borrower commitment was noted high and the project was well implemented as attested by the level of outputs and outcomes achievements. This is consistent with past projects in Egypt.

Conditions precedent to entry into force and for the first disbursement were met among other conditions. EEHC and WDEPC have good and long experience with the implementation of thermal power plants, including the technology used for the Abu Qir project, they were able to handle this project with success. Starting from the preparation phase when the feasibility and environmental studies prepared for the project were of good quality and included sufficient information to enable the Bank process the project, and ending with the actual project implementation itself.

The engineering consultant recruited to manage and supervise the project had experience in the Egyptian power generation field, and therefore played a critical role in the successful implementation of the project. All loan covenants were complied with, and in a timely manner that did not cause any implementation delays. Counterpart funding, which is the largest share at 38%, was timely available. The project submitted routine progress reports to the various stakeholders, including the Bank, which were very informative and outlined the main issues that required close attention. The borrower was very supportive to Bank missions, and facilitated the missions' work, which helped make them successful. Bank recommendations, either through the missions or through follow-up by EGFO, were usually taken into consideration by the borrower. There was some delay, however, in addressing some of the recommendations made by the external auditors of the Bank loan, but they were not critical. Overall, the borrower showed good competence in managing and executing the project. WDEPC did its best to try to accommodate the demands of the local population around the project area, especially in terms of availing job opportunities for them through the project.

However, there was some delays and shortcomings in addressing some of the recommendations made by the external auditors.

c. Performance of other stakeholders:

Provide observations on the objectivity of the PCR ratings, and if necessary, re-assess the other shareholders' performance throughout the project cycle (design, implementation, completion) by focusing on evidence from the PCR in relation to relevant questions specific to each stakeholder (co-financiers, NGO, contractors and service providers).

The review is in congruency with the findings of the PCR that the performance of other stakeholders is satisfactory (3).

In fact, as per the PCR, the performance of most other stakeholders involved in the project was good. In particular, co-financers showed great flexibility in responding to the changing needs of the project either in terms of providing additional financial resources to cover part of the cost overrun or responding to changes in the financing plan that were necessary for example to accommodate the fluctuations in the exchange rates among the various currencies involved (resource vs contract currencies, etc.). Co-financing of the large steam turbine generators contract by the Bank and IsDB was very successful. The IDB showed flexibility in accepting to follow Bank procurement rules for this package. The EHCC holds capacity to execute the project as confirmed by evidence.

Likewise, the performance of most contracts, including both Bank and non-Bank financed, was good and they were able in many cases to fulfil their scope of work in time and with quality as required in their contracts. A few number of contractors (3 out of 19), however, faced difficulties in performing their scope of work either in terms of keeping to the time schedule, with some contractors running into long delays, or in terms of facing technical issues related to the correct functioning and performance of their part of the work (equipment, facilities, etc.). Nonetheless, external factors such as the political instability and security issues that were generally experienced in the country following the 2011 revolution contributed to some site delays, the impact of which on the progress of the various contractors varied depending on the stage of execution of each contract. Finally, the transmission and gas companies successfully fulfilled their roles in this project by timely providing the necessary ancillary infrastructure that was essential for the proper operation of the power plant.

5. SUMMARY OF OVERALL PROJECT PERFORMANCE

a. Overall assessment:

Provide a summary of the project's overall performance based on the PCR 4 key components (Relevance, Effectiveness, Efficiency and Sustainability). Any difference with the PCR and the reasons that have resulted in them should be mentioned. For cases with insufficient evidence (from the PCR and other documents) available, the evaluator should assign a partly satisfactory rating (to be revised) until a REPP is complete.

The review converged and concluded that the overall assessment of project performance is satisfactory (3)

The performance of the project was tested against multiple unconnected lines of evidence and found congruent, providing a stronger basis for reliability and credibility of its satisfactory results. The project achieved its developmental objectives in meeting part of the increase in demand for electricity in the country, thus supporting socio-economic development.

Overall, the project added additional capacity to the national grid (1300MW) as confirmed in the EEHC Annual Report 2012/2013, induced changes to the energy sector and the wider economy and met its end targets. The performance of the Abu Qir project mirrored the satisfactory performance of the Bank's past portfolio of projects in Egypt and had a higher availability factor (88%), higher thermal efficiency of 41.4% over the industry yardstick of 36%-40%. It surpassed the efficiency of similar thermal power stations ((Kakafr El-Duwar (31%), Damanhour Ext 300 (25%), Damanhour Old-30%). Also this was the flagship power plant with comparatively decreased costs as highlighted earlier.

The installed capacity of the plant is 1,300MW as planned. The contribution of energy generation in 2013/14 was 4%, as targeted. The plant contributes 4% of the installed capacity. The peak demand in Egypt has increased from 18,500MW in 2006/2007 to 27,000 MW for the year 2012/2013, and it is expected to reach 54,200 MW by the year 2027.

The review noted that net electricity production by the plant was in the region of 7,494GWh/year in 2013/14 against a forecast of 8,541 GWh/year. This was 88% of the planned energy generation. 2013 was the first year of operation the amount of energy produced was less than expected because of the technical problem with defective pumps. The project met growing demand. Access to the grid was estimated at 99.3% in 2007 and has reached the target value of a 100% in 2012 according to World development indicators and Global Energy Observatory.

In comparison with the three relatively long established power plants (20 years average), the project had a **relatively higher thermal efficiency** of 41.4% against a local industry average of 30%. The project was reported as being managed well and maintaining a reasonable availability (88%) and significantly reduced outages.

Its implementation was executed in congruency with its project design which was informed by the past energy sector projects and provided economies of learning in design, procurement and capacity strengthening. The project substantially realized its expected outcomes and increased generation capacity in response to the growing electricity demand and thus contributed to improved availability of power to the various consumers including the residential, industrial, commercial, public buildings and services and agriculture. As noted the

project had social positive impacts by way of contribution to economic growth and better living conditions, effective delivery of public services; jobs (3600) and wealth creation.

Relevance: The project was able to contribute 1300 MW and feed the national grid capacity, resulting in increasing availability in Dec 2012. The development objective remained fully aligned with the Bank CSP, applicable sector strategies, country development strategies and the needs of the beneficiaries. The review also found out that the design of the project to achieve intended outputs and outcomes remain sound and appropriate throughout the implementation of the project.

Effectiveness in delivering outputs and outcomes: The review found satisfactory delivery of both outcomes and outputs. The power gap and growing demand were basically addressed by the project.11 supervision were conducted and this was deemed adequate and reasonable and correlated with the exciting execution outlook of the project.

Efficiency: The review concludes that despite that the ratio of actual to planned implementation being 0.76% (considered satisfactory), there were delays in the delivery of outputs resulting the duration affecting its performance.

Sustainability: The review established that the project put in place mechanisms for financial, institutional and ownership and partnerships sustainability and environmental sustainability, though were only sufficient and not robust. Routine maintenance operations (O and M) are in place. Although there is quality at entry and the mechanisms put in place to sustain the flow of benefits derived from the project, the review found that the effectiveness and efficiency of the project in delivering intended results suffered from deficiencies and constraints from the procurement, contractors' side and audits. A major concern is the availability of fuel and the legislative cap on the electricity market segments. Removal of subsidies and intended cost recovery measures signal a journey towards sustainability in the opinion of the review. The Africa Competitiveness Report 2013 as articulated earlier has shown that Egypt is among the top 8 countries with stringent regulatory regime on environmental and social sustainability and signatory to international treaties.

Cost Benefit Analysis conducted revealed gainful financial and economic returns as shown earlier.

b. Design, implementation and utilization of the M&E (appreciation of the evaluator):

Provide an assessment of planned and actual cost of the design, implementation and utilization of the M&E system. Design : To which extent the project M&E system was explicit, adequate and realistic to generate and analyse relevant data ; Implementation : To which extent relevant data was collected – Elements of M&E implementation and effectiveness in the PCR ; Utilization : degree of utilization of data generated for decision-making and resource allocation – elements of M&E utilization in the PCR.

i. Both the PIU and project consultant are very familiar with Bank procurement rules and procedures. Procurement documents are generally of good quality. Nonetheless, the Bank was not in agreement with one procurement decision by the PIU, which finally led to the PIU deciding to withdraw that package from Bank financing.
ii. The PIU follows good financial management rules and regulations. However, the external audit identified some shortcomings that were to be addressed by the PIU.
iii. The project is routinely submitting monthly progress reports that outline the progress of the project and report on key technical and financial data that are useful for follow-up, monitoring and evaluation.

6. EVALUATION OF KEY LESSONS LEARNED AND RECOMMENDATIONS

a. Lessons learned:

Provide a brief description of any agreement/disagreement with all or part of the lessons learned from the PCR after analysis of the project performance with regards to each of the key components of the evaluation (Relevance, Effectiveness, Efficiency, and Sustainability). List the PCR main new and/or reformulated pertinent (and generic) lessons learned for each of these components here. It is recommended that no more than five lessons learned are discussed. Key questions and targeted audience must also be specified for each lesson learned.

The review agrees with the useful lessons and recommendations provided and properly formulated in line with OECD-DAC guidelines and the provisions of the Staff Guidance Note. While endorsing the lessons and recommendations, the review reformulated them in part to provide more utility to the Bank Group vision in lighting up and powering Africa.

The key lessons found by the review are summarised below;

i) **Adequacy and Quality of Supervision:** The bank exercised quality and adequate supervision that yielded results. 11 missions and 2 desk based supervisions were conducted with actionable decisions to resolve on the ground implementation issues. The plan was to undertake one mission annually over the 6 years. The review beliefs this strengthened the quality of delivery.

ii) **Project packaging and procurement design:** EEHC has adopted the multi-package system for procuring its power plant projects instead of the EPC/turn-key system. Based on the practical experience from EEHC projects, it is fully acknowledged that through the careful packaging of the project, some gains can be achieved including cost reductions and larger contribution by the local industry/contractors. On the other hand, the packaging system comes with its own risks, primarily the large number of interfacing between the various contractors. The packaging system therefore requires a much stronger project management team and engineering consultant to ensure that it yields its benefits. Advance contracting was properly utilized in the design of this project in order to account for the long lead time required for the design and manufacturing of some of the large and complicated equipment.

iii) **Rigour in the selection of contractors:** Large sophisticated infrastructure projects require special expertise in both the design and construction. Procuring the contractor(s) for such projects must be based on a very careful and well-throughout-of selection criteria that is on the one hand fair and provides for wide competition, and on the other helps in identifying the contractors who have the necessary experience and capability to carry out the job properly.

iv) **Effective project planning:** The target date for completing a project or bringing it into service can sometimes put pressure on the project planners to shorten its implementation time schedule. As such, quite often projects are planned over very-ambitious time schedules that either require ample additional resources, which add to the project cost, or cannot be practically achieved, thus leading to project delays. Careful project planning that takes into consideration the relationship between

the implementation schedule and amount of required resources is very important for proper project planning, including accurate cost estimation.

b. Recommendations:

Provide a brief description of any agreement/ disagreement with all or part of the recommendations from the PCR. List the PCR main new and/or reformulated recommendations (requiring more actions by the Borrower and/or the Bank) here.

The summary of recommendations identified by the review are as follows. The 5th recommendation was added by the review.

i) **Optimal operation of the power plant:** It is key that the plant is operated and maintained in the most optimal way to ensure that performance does not deteriorate rapidly. Most importantly, securing enough primary fuel (gas) is important for the efficient and environmental-friendly operation of the power plant. On the other hand, purchase of spare parts for the critical and most-used parts of the equipment was included in the project. This is an important project design feature that is highly recommended for such large infrastructure projects, especially those that rely on sophisticated equipment and machinery such as power plants.

ii) **Dedicated human resources capacity development:** The successful and safe operation of complicated projects such as large-scale power plants requires highly trained human resources. EEHC and its affiliated companies provide on the-job-training for new job entrants to ensure that their human capacity is always up to the job. One important technique for such a training is through the use of simulators that closely mimic the real equipment, hence enable the trainees to practice without facing any real operational risks. It is recommended that EEHC considers acquiring a modern simulator for its new sub-critical steam power plants to be used as a training tool for this type of technology.

iii) **Thorough documentation of contractors' performance:** The performance of the various contractors who get involved in large infrastructure projects should be thoroughly documented in the developers' project completion report(s) in order to ensure that such vital information is passed-on to other developers and used when selecting the contractors for new projects. This is particularly important in the case of the power industry where a utility may comprise a few companies, each of which develops projects on its own. Sharing project experiences among those companies should help the whole utility improve the performance of its projects.

iv) **Quality of Project Oversight:** Providing adequate and quality oversight enhanced project success. The review recommends this to be adopted at parallel levels as it could identify dedicated capacity from the EEHC**.**

v) **Financial Sustainability**: Develop key pillars of financial sustainability (revenue streams, cost recovery, viable tariff determination anchored on support regulatory reform) to ensure sustained benefits of the project.

7. COMMENTS ON PCR QUALITY AND TIMELINESS

The overall PCR rating is based on all or part of the criteria presented in the annexe and other: The quality of the PCR is rated as highly satisfactory (4), satisfactory (3), unsatisfactory (2), and highly unsatisfactory (1). The timeliness of the PCR is rated as on time (4) or late (1). The participation of the Borrower, co-financier, and the bank's external office(s) are rated as follows: Very Good (4), Good (3), Fair (2), Poor (1).

The review finds the quality of the PCR satisfactory.

The PCR was submitted late, 17 months after project completion and therefore late.

The PCR has addressed most of the key aspects adequately. It summarized well the project lifetime and gives a good impression of project deliverables. It also covered some cross cutting issues such required capacity building, gender aspects and environment constraints. However, the coordination with the other financiers of the project was not developed. Most of ratings were based on the actual facts adduced in its account and performance of the key actors involved. The performance of the bank and borrower was highly satisfactory and satisfactory respectively.

However, the PCR did not specify whether WDEPC is provided with an M&E system that had been used during the project preparation and implementation. The review endorses the lessons and recommendations as useful.

8. SUMMARY OF THE EVALUATION

This is a summary of both the PCR and IDEV ratings with justification for deviations/comments. Appropriate section of the PCR Evaluation should be indicated in the last column in order to avoid detailed comments. The evaluator must provide a reasonable explanation for each criterion the PCR rating is not validated by IDEV. Consequently, the overall rating of the project could be "equally satisfactory".

Criteria	PCR	PCREN	Reason for disagreement/ Comments
RELEVANCE	**4**	**4**	The development objective remained fully aligned with the Bank CSP, applicable sector strategies, country development strategies and the needs of the beneficiaries.
Relevance of project development objective	4	4	The DO was aligned fully with the CSP, sector strategies, NDP and the needs of the beneficiaries.
Relevance of project design	4	3	The design was consistently conducive to achieving results and continued appropriate throughout implementation with some modifications. The project's contribution towards the desired change was catalytic. Shortcomings were noted in the M and E system, cost overrun, construction delays, varying contractor performance.
EFFECTIVENESS	**3**	**3**	
Development objective (DO)	3	3	Both outputs and outcomes were found satisfactory and logically consistent. There is adequate O and M in place.
EFFICIENCY	**3**	**3**	
Timeliness	2	3	There were delays in the delivery of outputs resulting the duration affecting its performance. The ratio of planned to actual implementation time based on the PCR is 76%, hence it is satisfactory (3) as per Staff Guidance Note, August 2012.
Resource use efficiency	4	3	The ratio between physical implementation and commitments remains positive is .87. However, while the project delivered its outputs it suffered a cost overrun of about 14%, hence it used more resources than planned due to inflationary cost drivers. The review could not verify the basis upon which the median of the physical implementation of outputs and commitment rate was derived but confirms the interpretation as valid.

Criteria	PCR	PCREN	Reason for disagreement/ Comments
Cost-benefit analysis	3	3	The Abu Qir power plant yielded positive financial and economic returns. Its thermal efficiency of 41.4% compared to 25-30% was attractive.
Implementation progress (IP)	4	3	Constraints encountered were with audit reports, delays and extensions.
SUSTAINABILITY	**3**	**3**	
Financial sustainability	3	3	The project put in place instruments for financial sustainability (to be measured at post evaluation) considered sufficient to safeguard the continuation of benefits for instance removal of subsidies. However the fact that fuels are largely imported, their costs to the power sector are higher than that of natural gas, and as such they increase the electricity generation cost. Such cost increases are not passed on to consumers as the market is regulated pauses a sustainability threat. An enabling environment in price regime reform could enhance FDI in gas production.
Institutional sustainability and strengthening of capacities	4	4	Institutional sustainability mechanisms were put in place for instance capacity building, training and retaining staff through improved conditions and competitive remuneration. O and M was built in the project for routine maintenance.
Ownership and sustainability of partnerships	3	3	The review is concerned that the coordination with the other financiers of the project was not developed. In addition, the review did not find enough evidence to the effect that the project effectively involved all relevant stakeholders to enhance significant ownership.
Environmental and social sustainability	3	3	The project complied in line with the Bank's ESA/ESMP and ensured that environmental safeguards were in place to enhance the implementation of the ESMP in the Loan Agreement.
OVERALL PROJECT COMPLETION RATING	**4**	**3**	
Bank performance:	4	4	The Bank showed great flexibility during the implementation of this project
Borrower performance:	**4**	3	There were some delays and thus a shortcoming, in addressing some of the recommendations made by the external auditors.
Performance of other shareholders:	3	3	The political instability and security issues that were generally experienced in the country following the 2011 revolution contributed to some site delays, the impact of which on the progress of the various

Criteria	PCR	PCREN	Reason for disagreement/ Comments
			contractors varied depending on the stage of execution of each contract. The performance of the Executing Agency was satisfactory. No evidence was found on DPs performance.
Overall PCR quality:		3	Good. Overall, the review found the PCR well written and documented.

9. PRIORITY FOR FUTURE EVALUATIVE WORK: PROJECT FOR PERFORMANCE EVALUATION REPORT, IMPACT EVALUATION, COUNTRY/SECTOR REVIEWS OR THEMATIC EVALUATION STUDIES:

- **Project is part of a series and suitable for cluster evaluation** ■
- **Project is a success story** ☐
- **High priority for impact evaluation** ☐
- **Performance evaluation is required to sector/country review** ☐
- **High priority for thematic or special evaluation studies (Country)** ☐
- **PPER is required because of incomplete validation rating** ☐

Major areas of focus for future evaluation work:

a) **Performance evaluation is required for sector/ country review**
b) **Financial sustainability**
c) **M and E system put in place by the EA**
d) **Cluster evaluation (institutional support)**
e) **Sector evaluation (budgetary support or public finance management reforms)**

Follow up action by IDEV:
Identify same cluster or sector operations; organize appropriate work or consultation mission to facilitate a), b) and/or c).

Division Manager clearance **Director signing off**

Data source for validation:

- Documents/ Database reports
- Project Completion Report
- Supervision Report, Mission number : 0014 , Date of Mission : 03.06.2013
- Project Results Assessment Report
- Appraisal Report
- Country Strategy Paper 2002-2004
- Country Strategy Paper 2006-2009
- ICR World Bank June 2013

Attachment:

- PCR evaluation note validation sheet of performance ratings
- List of references

PROJECT COMPLETION REPORT EVALUATION NOTE
Validation of PCR performance ratings

PCR rating scale:

Score	Description
4	**Very Good** – Fully achieved with no shortcomings
3	**Good** – Mostly achieved despite a few shortcomings
2	**Fair** – Partially achieved. Shortcomings and achievements are roughly balanced
1	**Poor** – very limited achievement with extensive shortcomings
UTS	Unable to score/rate
NA	Non Applicable

Criteria	Sub-criteria	PCR work score	IDEV review	Reasons for deviation/comments
RELEVANCE	Relevance of the project development objective (DO) during implementation	4	4	The DO is fully aligned to the CSP, country development strategies, development priorities, sector strategies and beneficiary needs. The project is appropriate and relevant to the country's development priorities, catalyses economic development and reduce poverty.
	Relevance of project design (from approval to completion)	4	3	The PCR did not outline, as relevance of project design, some issues encountered during the implementation of the project and listed in the consultant report entitled "Post Project Evaluation of the Bank's Assistance in the Energy Sector - Final Report – Abu Qir - February 2016" final report prepared by the consultant 14 months after the preparation of the PCR. Limitations included the absence of baselines and convincing financial sustainability pillars.
OVERALL RELEVANCE SCORE		**4**	**4**	
EFFECTIVENESS*	**Effectiveness in delivering outcomes**			
	Long Term Outcome:			The project's contributed 1300 MW to the national grid, met additional demand for energy and enhanced 88% availability.
	Outcome 1: Generation capacity increase	3	3	The project started partial commercial operation in Dec 2012, and is fully operational and feeding the national grid.
	Outcome 2: Energy supply to the grid	3	3	The turbine generators were constrained by technical problems with the steam generators feed pumps hence technical deficiencies and breakdowns were limiting factors.
	Effectiveness in delivering outputs			

	Output 1: Steam power plant erected	3	3	Two steam turbine generation units, each of 650 MW rated capacity, have been constructed and are operational, though they have suffered from construction delays and technical issues, http://www.pgesco.com/projects/abu-qir-power-plant-2x650-mw/.
	Output 2: High voltage substation constructed	3	3	The 500 kV substation has been constructed and is operational. It was tested, passed the test and rolled out.
	Development objective (DO)			
	Development objective rating	**3**	**3**	Both intended outputs and outcomes were satisfactory and on track indicating a higher likelihood of achievement. The review confirmed output functionality through multiple independent lines of evidence. The outputs and outcomes resonated and were congruent with the Appraisal report. The 2 steam turbines are operational and their outputs performance reported in credible reports as cited. The project is relevant to the countries development goals of making available adequate energy at minimum cost to promote economic growth and is in line with the TYS.
	Beneficiaries			
	Beneficiary1: The industrial, residential and commercial sectors,	NA	NA	
	Beneficiary2: Public services and lighting and the government	NA	NA	
	Unanticipated outcomes (positive or negative not considered in the project logical framework) and their level of impact on the project (high, moderate, low)			
	Institutional development	NA	NA	
	Gender	NA	NA	
	Environment & climate change	NA	NA	
	Poverty reduction	NA	NA	
	Private sector development	NA	NA	
	Regional integration	NA	NA	
	Other (specify) Organisational Constraints	NA	NA	
EFFECTIVENESS OVERALL SCORE		**3**	**3**	
EFFICIENCY	Timeliness (based on the initial closing date)	2	3	The project implementation suffered from a delay of about 1.4 years during construction due to slightly longer procurement cycle for the two steam turbine and the bid for the steam turbine

				generators.
	Resource used efficiency	4	3	The ratio of the median percentage physical implementation of the project outputs and commitment rate is 87%. The project posted an above average thermal efficiency of 41.4%.
	Cost-benefit analysis	3	3	Satisfactory.
	Implementation progress (from the IPR)	4	3	Constraints encountered were with audit reports, delays and extensions.
	Other (specify)			
OVERALL EFFICIENCY SCORE		**3**	**3**	
SUSTAINABILITY	Financial sustainability	3	3	Financial sustainability measures put in place were not robust to ensure continued flow of project benefits. External shocks, gas pricing viability and the regulatory regime were noted as threats.
	Institutional sustainability and strengthening of capacities	4	4	Strengthening institutional capacity, improved operational conditions and staff retention mitigation were in place to enhanced continued flow of project benefits on exit.
	Ownership and sustainability of partnerships	4	3	Most relevant stakeholders were engaged to ensure ownership and sustainability. The review found no basis to prove that all relevant stakeholders were involved.
	Environmental and social sustainability	3	3	Principally, the project addressed the ESMP in line with the Bank's policy.
OVERALL SUSTAINABILITY SCORE			3	
*The rating of the effectiveness component is obtained from the development objective (DO) rating in the latest IPR of the project (see Guidance Note on the IPR). The ratings for outputs and outcomes are determined based on the project's progress towards realizing its targets, and the overall development objective of the project (DO) is obtained by combining the ratings obtained for outputs and outcomes following the method defined in the IPR Guidance Note. The following method is applied: Highly satisfactory (4), Satisfactory (3), Unsatisfactory (2) and Highly unsatisfactory (1).				

Criteria	Sub-criteria	PCR Work score	IDEV review	Reasons for deviation/comments
BANK PERFORMANCE	Proactive identification and resolution of problems at different stage of the project cycle	4	4	The Bank exercised great flexibility. The 11 regular supervisions was of good quality with acute corrective measures in tandem with project's performance targets.
	Use of previous lessons learned from previous operations during design and implementation		3	The CSP informed the design and implementation. The project drew experiences from the previous interventions.
	Promotion of stakeholder participation to strengthen ownership	NA	NA	
	Enforcement of safeguard and fiduciary requirements	NA	NA	

Criteria	Sub-criteria	PCR Work score	IDEV review	Reasons for deviation/comments
	Design and implementation of Monitoring & Evaluation system		3	The review confirms that the Bank had a RLF although no baselines were not found. 11 supervision missions and 2 desk supervisions were reported. The review finds 6 reports
	Quality of Bank supervision (mix of skills in supervisory teams, etc)		4	The supervision skills mix was found diverse and appropriate (Mechanical Engineer, Electrical Engineer, Instrument and Control Engineer, Civil Engineer, Finance Expert, Procurement Expert and Environmentalist). 11 supervision missions were adequate over the 6 years.
	Timeliness of responses to requests		4	Satisfactory. The bank exercised greater flexibility and efficiency.
OVERALL BANK PERFORMANCE SCORE		**4**	**3**	
BORROWER PERFORMANCE	Quality of preparation and implementation		**4**	
	Compliance with covenants, agreements and safeguards		**4**	The borrower complied with covenants.
	Provision of timely counterpart funding		**4**	The borrower fast tracked its counterpart contributions resulting in timely delivery.
	Responsiveness to supervision recommendations		**4**	The borrower was at all times very responsive to and receptive to supervision missions and responsive to Bank recommendations
	Measures taken to establish basis for project sustainability	NA	**NA**	
	Timeliness of preparing requests		**4**	
OVERALL BORROWER PERFORMANCE SCORE		**4**	**4**	
PERFORMANCE OF OTHER STAKEHOLDERS	Timeliness of disbursements by co-financiers	NA	NA	
	Functioning of collaborative agreements	NA	NA	
	Quality of policy dialogue with co-financiers (for PBOs only)	NA	NA	
	Quality of work by service providers	**3**	**3**	Satisfactory
	Responsiveness to client demands		3	Satisfactory
OVERALL PERFORMANCE OF OTHER STAKEHOLDERS		**3**	**3**	
The overall rating is given: Very Good, Good, Fair and Poor. (i) (HS) : 4 (ii) (S) : 3 (iii) (US) : 2 (HUS): 1				

DESIGN, IMPLEMENTATION AND UTILIZATION OF MONITORING AND EVALUATION (M&E)

Criteria	Sub-criteria	IDEV Score	Comments
M&E DESIGN	M&E system is in place, clear, appropriate and realistic		The review did not find an established and dedicated WDEPC M and E system nor its specification in the PCR that had been used during the project preparation and implementation. Accordingly, the review proposes that matter should be covered at project post-evaluation stage.
	Monitoring indicators and monitoring plan were duly approved		
	Existence of disaggregated gender indicator		
	Baseline data were available or collected during the design		
	Other, specify		
OVERALL M&E DESIGN SCORE			
M&E IMPLEMENTA-TION	The M&E function is adequately equipped and staffed		
OVERALL M&E IMPLEMENTATION SCORE			
M&E UTILIZATION	The borrower used the tracking information for decision		
OVERALL M&E UTILIZATION SCORE			
OVERALL M&E PERFORMANCE SCORE			

PCR QUALITY EVALUATION

Criteria	PCR-EVN (1-4)	Comments
QUALITY OF PCR		
1. Extent of quality and completeness of the PCR evidence and analysis to substantiate the ratings of the various sections	3	The PCR is well written and clear. It covered most of the key areas and summarized well the project deliverables. Whilst it provided evidence and analysis for all the ratings, it was found wanting in that it did not comprehensively cover the financial sustainability aspects of the project and was silent on the actuality of a dedicated and functional M&E system within the Executing Agency.
2. Extent of objectivity of PCR assessment score	3	The assessment of the scores are collectively congruent with context, text and evidence of the performance of the actors involved. They are confirmed with multiple independent lines of evidence as systematically outlined in this review, As a result the ratings are objective and factually motivated with precise measured indicators.
3. Extent of internal consistency of PCR assessment ratings; inaccuracies; inconsistencies; (in various sections; between text and ratings; consistency of overall rating with individual component ratings)	3	Overall, the review found no inconsistencies in the PCR. Its record of project and loan data converges with SAP/EVRD. The review observed a calculation error in the computation of resource efficiency (100%) instead of (87%) resulting in the overstatement of the resource use efficiency ratio. This is presumed unintentional based on the consistency level of objectivity maintained throughout the ratings.
4. Extent of identification and assessment of key factors (internal and exogenous) and unintended effects (positive or negative) affecting design and implementation	NA	
5. Adequacy of treatment of safeguards, fiduciary issues, and alignment and harmonization	3	The PCR covered some cross cutting issues such as required capacity building, gender aspects, borrower compliance with environmental (ESMP) and fiduciary issues. However, the coordination with the other financiers of the project was not developed.
6. Extent of soundness of data generating and analysis process (including rates of returns) in support of PCR assessment	3	The analysis process is satisfactory. The review found the FIRR and EIRR well documented and presented.
7. Overall adequacy of the accessible evidence (from PCR including annexure and other data provided)	3	The findings are based on available reports including implementation and supervision mission reports.
8. Extent to which lessons learned (and recommendations) are clear and based on the PCR assessment (evidence & analysis)	3	Summarised in the OECD-DAC framework, the review found the lessons and recommendations useful and applicable in improving future project design. The lessons and recommendations are

Criteria	PCR-EVN (1-4)	Comments
		relevant in enhancing the Bank Group's high 5s-light up and power Africa. However, financial sustainability could have been adequately treated.
9. Extent of overall clarity and completeness of the PCR	4	The PCR is clear, complete, adequate and conclusive.
Other (specify) Risk identification and mitigation		Strengthen sustainability aspects of the project.
PCR QUALITY SCORE	3	The PCR is of good quality, consistent and solid. Very few minor errors could have been observed.
PCR compliance with guidelines (PCR/OM ; IDEV)		
1. PCR Timeliness (On time = 4; Late= 1)	1	The PCR was completed 17 months after the completion of the project.
2. Extent of participation of borrower, Co-financiers & fields office in PCR preparation	3	The review confirms that while the PCR covered the performance of the borrower, its attention on the performance of the other co-financiers was scanty.
3. Other aspect(s) (specify)		
PCR COMPLIANCE SCORE	3	Good.
*** rated as Very Good (4), or Good (3), or Fair (2), or Poor (1)		

Literature Consulted

1. Project Completion Report
2. IPR
3. Supervision Reports 10-14 March 2013
4. Appraisal Report
5. AIDE MEMO
6. Country Strategy Paper
7. Egypt Country Strategy
8. Other-Energy International Agency Report 2013, Africa Competiveness Report
9. Abu Qir 1300 MW Thermal Power Plant Project, PCR- AfDB – August 2014
10. Abu Qir 1300 MW Thermal Power Plant Project, PAP-AfDB – June 2007
11. Post Project Evaluation of the Bank's Assistance in the Energy Sector - Final Report – Abu Qir - Technopolis Group February 2016

Lines of Evidence

1) http://www.pgesco.com/projects/abu-qir-power-plant-2x650-mw/
2) http://www.ecgsa.com/abuqirthermalpowerplantintakestructure
3) http://www.moee.gov.eg/english_new/EEHC_Rep/2011-2012.pdf.
4) http://data.worldbank.org/indicator/IC.ELC.TIME,

5) http://www.powerengineeringint.com/articles/print/volume-17/issue-11/regulars/world-news/international.html.