PCR EVALUATION NOTE FOR PUBLIC SECTOR OPERATIONS

1. BASIC INFORMATION

a. Basic project data

Project title: Ain Sokhna 1300 MW Supercritical Thermal Power Plant

Project code: : P-EG-FAA-014	**Instrument number(s): ADB loan 2000130003680**	
Project type: Public Investment	**Sector: Energy/Power**	
Country: Egypt	Environmental categorization (1-3) : 1	
Processing Milestones	**Key Events**	**Disbursement and Closing date**
Date approved: 22/12/2008	Cancelled amount: USD 60 million	**Original disbursement deadline: 30/06/2015**
Date signed: 15/03/2009	Supplementary financing: None	**Original closing date: 30/06/2015**
Date of entry into force : 19/08/2009	Restructuring: N/A	**Revised disbursement deadline: 30/06/2017**
Date effective for 1st disbursement: 16/11/2009	Extensions (specify dates): 30/06/2017	**Revised closing date: 30/06/2017**
Date of actual 1st : 16/12/2009		

b. Financing sources

Financing source/ instrument (USD)	Approved amount (million USD) :	Disbursed amount (million USD) :	Percentage disbursed (%):
Loan:	390	374.2	95.9
Grant:			
Government:	270.5	253.8	93.8
Other (ex. Co-financiers):	701	648	92.4
TOTAL :			

Co-financiers and other external partners:

Execution and implementation agencies:

c. Responsible Bank staff

Position	At approval	At completion
Regional Director	Mr. A. Zejly	Mr. Jacob Kolster
Sector Director	Mr. G. Mbesherubusa	Mr. Alex Rugamba
Sector Manager	Mr. A.T. Diallo	Mr. Engedasew Negash
Task Manager	Mr. E. B. Nzabanita	Mr. Khaled El-Askari
Alternate Task Manager		Ms. Fatimata Gaba
PCR Team Leader		Mr. Khaled El-Askari
PCR Team Members		Ms. Fatimata Gaba Mr. Arkins Kabungo Mr. Ayman Algindy

d. Report data

PCR Date : 27/11/2016		
PCR Mission Date:	From: 15/05/2016	To: 27/05/2016

PCR-EN Date:	
Evaluator/consultant : Ananda Covindassamy	Peer Reviewer/Task Manager:

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.

Demand for electricity has been growing steadily at an average rate of 6% – 7% per year during the last decade. The demand is primarily driven by population and economic growths, and increased urbanization. The dominant electricity consumer sectors are industry, public utilities and services, the commercial and residential sectors. Electricity is one of the main sources of secondary energy in Egypt and access to reliable and affordable electricity services is critical to achieving the country's economic and social development goals as articulated in the GoE 6th National Development Plan 2007-2012. This translated into the need for systematic expansion of the power infrastructure. The Ain El-Sokhna Power Plant Project was conceived as part of the preparation of EEHC's 2002 - 2007 Power Generation Expansion Plan. The Plan aimed at adding about 7,000 MW of new thermal generation capacity to the national grid between FY 2007/08 and 2013/14 to meet the expected growth in the demand during that period. By the time the preparation of the Ain El-Sokhna project started, power projects with a total capacity of 4,400 MW were already under construction as per the Expansion Plan.

The Project was expected to be key in helping Egypt avoid the acute power shortage that would have occurred in 2014 and thereafter if the project had not started commercial operation, along with other measures taken by the government to avoid a supply gap. In addition, the project was designed to introduce and test in Egypt a new and more efficient power generation technology to save on plant fuel (coal) consumption.

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 project's objectives were to increase power generation at the least cost to avoid power shortages due to an expanding demand. The project expected outcomes are that power generation capacity is increased and more consumers are connected to the grid. The project intended beneficiaries are all Egyptian electricity consumers: There was no changes in the objectives, outcomes or beneficiaries.

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 expected outputs are the availability of 1,300 MW of base load generation capacity, the construction of the switchyard and ancillary facilities. As the Egyptian system is fully integrated and access to electricity is nearly 100%, all the population will benefit from the additional generation capacity, as direct consumer or through the benefits to the economy.

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

The main project components were:

- **The construction of a 1,300 MW coal fired super-critical power plant**
- **The construction of the switchyard**
- **The construction of ancillary facilities for coal handling and processing and ash disposal**

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 project development objectives were Highly Satisfactory, as they met a high national priority. The project addressed a major sector and macroeconomic issue of availability of power. The PCR rating was a Highly Satisfactory rating which is justified.

The project's development objectives consisting to enhance socio-economic development in Egypt by providing infrastructure for increasing the generation capacity in the country in order to help meet the expected increase in the demand were highly relevant ex ante, as the effects of power shortages were clearly felt by consumers and by the economy when the project was designed. It was equally relevant at project completion, as the plant is part of a national capacity development plan, and the postponement or cancellation of the plant would have exacerbated the capacity shortage issue, which was still a concern at project completion time.

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 Programme 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 relevance of the project design was Highly Satisfactory as the introduction of the supercritical technology was a major step forward with positive impact on power generation efficiency.

The Ain El-Sokhna project was designed as a stand-alone green field project due to its size and complexity. The selection of the technology was based on a holistic planning approach that was followed during the development of the Power Generation Expansion Plan. The target was to maintain a balance between the

two key thermal generation technologies; namely the steam cycle and the gas turbines. Among the factors that favoured the use of the steam-cycle technology for Ain El-Sokhna project was its location by the sea where the environmental conditions could potentially have adverse impacts on the gas turbines due to excessive humidity and dust from the hilly/desert areas surrounding the project site. Nonetheless, the Ain El-Sokhna project was the first project in Egypt to be based on the more advanced super-critical boiler technology in order to attain higher efficiency that results in lower fuel consumption and emissions. Ain El-Sokhna was selected for the project location since it has an industrial zone that is growing and a flourishing tourism industry and related developments; both of which are driving the demand for electricity in the area. It is always desirable to try to locate power plants as close to demand areas (load centres) as possible in order to reduce the cost of and power losses due to long transmission. Access to the site is very good given that it is just next to the Ain El-Sokhna sea port so bringing heavy equipment to the site was convenient. The site is also close to the national transmission grid and natural gas network. Further, it is relatively close to other larger cities such as Cairo and Suez where demand for power is high. The financing plan of the project was based on parallel finance from four development institutions, including the Bank, in addition to counterpart funding from EDEPC. The project was broken down into several contracts – instead of EPC – to match the parallel co-finance arrangements in order to avoid the possible conflict among the procurement rules of the financers in case of joint co-financing. Consequently, the project included a component for project management that is essential for ensuring strong coordination among the contractors and financers.

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 project delivered all its outputs of construction and commissioning the supercritical coal fires steam plant. The effectiveness in delivering outputs is rated Satisfactory, because of the completion delay.

The power plant has successfully passed all commissioning tests and has been running under commercial operation without major problems. All project outputs have been fully produced. The power plant has successfully passed all commissioning tests and has been running under commercial operation without major problems but project implementation suffered from about one year delay due to reasons mostly of force-majeure nature and as could be anticipated for a project of this complexity.

d. Effectiveness in delivering outcomes:

Evaluation of the extent to which the project achieved its intended set of outcomes (including for Program 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 project delivered on the first outcome, albeit with a one year delay. The second indicator was not directly related to the project, so its effectiveness in this respect cannot be evaluated. Hence, overall, the effectiveness rating is Satisfactory, same as the PCR rating.

The outcome of increased installed electricity generation capacity of EEHC from 20,452 MW to 21,752

MW is project specific (the difference corresponds to the 1,300 MW of the project), but the second outcome of increased number of consumers with grid connection from 21.5 million consumers to 22.6 million consumers is not project specific, as the project does not include an access component and is sector specific.

The first outcome from the project has been achieved, albeit with one year delay. It is to be noted that the second outcome targets set at appraisal was not satisfactory since it was expected to measure the impact of the project alone, whereas a sector wide indicators was used, which was impacted by other projects in the sector. This explains the large discrepancy between the second outcome indicator of 31.5 million connections in service compared to the outcome indicator of 22.5 million.

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 project achieved its development objective to increase generation capacity to avoid a shortage of power which was a high risk for the economy. The project is therefore rated Highly Satisfactory. The Satisfactory rating of the PCR may underestimate the achievement of completing a large thermal plant using a new technology nearly on time.

The project managed to achieve its full developmental objectives by expanding the power generation infrastructure in the country to the benefit of the various consumer sectors. The project was instrumental in helping Egypt overcome the severe power shortage that was experienced during the summer of 2014. In addition, it introduced successfully a new improved technology in Egypt.

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 project delivered additional power as expected and the number of employed workers was as scheduled. The number of beneficiaries was therefore as anticipated and is rated Satisfactory.

The plant is connected to the national power system serving all electricity consumers in Egypt. It is not possible to identify specific categories of beneficiaries. With electrification reaching nearly 99% in Egypt, the national grid is serving almost the entire population, out of which 50% are women, and therefore any additional generation contributes directly to satisfying the demands of those people. The main electricity consumer sectors in Egypt are the industrial, residential, commercial, and public utilities and services.

According to the PCR, the project created some 3,000 direct jobs over its construction phase and up to 250 permanent jobs. More than 90% of the construction jobs and 100% of the permanent jobs went to Egyptians varying between engineers, technicians, administration and other support staff to also casual labourers. In addition, on-the-job training has been provided as part of the scope of work for many contracts under the project, which helps build the skills of the employed persons, especially the young who lack the practical experience.
In addition to those direct jobs, the project helped create indirect jobs through the spill over effect (e.g. catering and transportation services for the workforce, local accommodation for the expatriates, etc.). It is estimated that between 40% - 50% of the total project cost was spent in the local economy helping boost local industries and services (steel/metal works, low and medium voltage equipment, and other goods such as pipes, cables, etc.).

Due to the nature and location of the project, the percentage of direct jobs for construction that benefitted women was negligible and there is no indication that a higher proportion of women would have benefitted the project. The improved living conditions for the households are expected to have positive impacts on women in particular who tend to assume the larger responsibilities in running their homes. They, as well as men, will also benefit from the improved health facilities as a result of improved electricity services. Industrial development will also benefit women, especially those industries that rely more on women such as the textile, food processing.

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.

The PCR did not identify unanticipated additional outcomes.

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 Programme Based Operations (PBOs), the timely release of the tranche(s) are assessed through this same criterion.

Project execution time was originally 75 months, extended to 99 months. The project timeliness rating is therefore Unsatisfactory. The Satisfactory rating of the PCR is not justified based on the timeliness ratio.

The project was delivered one year behind schedule and project closing date was extended by two years. The first milestone of project implementation was achieved by awarding the contract for the engineering consultant on 1 June 2008. The project schedule was developed so that the reliability runs of the two units would start 63 and 68 months from this award date respectively. However, the reliability runs of the two units actually started after 81 and 82 months respectively. These durations reflect delays of 18 and 14 months for the two units, i.e. project construction and commissioning took between 20% – 30% more time to be completed than planned.

According to the PCR, this delay is attributed to several factors; including external factors such as the general unrest that prevailed in Egypt following the Jan 2011 revolution, the Tsunami in Japan, and the severe floods in Thailand, where some of the project equipment were being manufactured. Internal project delays were caused by some of the contractors, because of either workforce management issues that were also related to the unrest in the country, or slow work progress by some contractors. In fact, without the very close follow-up on the progress of implementation by EEHC, EDEPC and the Project's Engineer (PGESCo) and the good cooperation from most of the contractors; the Ain El-Sokhna project could have possibly suffered from much longer delays.

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).

Considering uncertainty concerning final cost due to the lack of precedents in Egypt for the selected technology, despite the under-estimate of project cost which had a negative effect, the project performance is considered "Satisfactory" in term of resource use efficiency. The Highly Satisfactory rating of the PCR

assesses positively over-budgeting, which is a questionable practice.

Total project cost at completion is the equivalent of USD 1.44 billion, about 72.6% of the cost estimated at appraisal (about USD 2.0 billion). This sizable reduction in the actual cost, despite the implementation delay, is due to a group of factors; including a conservative cost estimate at appraisal, combined with very competitive contract prices for most of the components; but especially for the switchyard, environmental monitoring, and switchgear equipment. The generous cost estimate at appraisal is primarily due to the lack of local/regional market reference prices for the super-critical technology with the project being the first one of its kind in the region. The competitive contract prices are due to strong international competition, especially from new market players as well as from local equipment manufacturers and contractors in Egypt. The actual project cost translates as USD 1,110/kW, which is comparable to the market range for this technology.

Accurate cost estimates are important to ensure that sufficient financing is allocated to the project, but also that excessive funding is not frozen for long periods of time. The cost over-estimation of 27.4% froze USD 550 million for more than four years, which is regrettable.

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 quality of the economic analysis was "Unsatisfactory" due to methodological flaws. The Highly Satisfactory rating of the PCR is based on a flawed methodology and should be revised downward.

The PCR states that:"The Ain El-Sokhna project was appraised in December 2008 with anticipated completion date in 2014. The project was found economically viable with the base case assumptions. In 2008, the EIRR was estimated at 13% and the ENPV was EGP 6,648 million (USD 1,237 million). Although the project appraisal report documents the main assumptions and parameters used in assessing the project's economic viability, the PCR team could not locate the detailed financial model that was used in the analysis. The team had therefore to reconstruct the model and used the assumptions and results at appraisal to verify the reconstructed model to ensure consistency. The model was then used to analyse the project at completion, taking into consideration the current macro-economic, financial and commercial and O&M information and the Long Run Marginal Cost (LRMC), given the anticipated demand growth. Accordingly, the project at completion is highly economically viable with the EIRR at 36% and the ENPV at EGP 27,101 million (USD 3,011 million). The two key factors that have significantly and positively affected the economic benefits of the project are (i) a higher economic tariff which is a resultant of the LRMC; and (ii) a significantly reduced investment cost in USD despite of the construction delays." It is not possible to pass a judgement on the validity of the initial or revised cost benefit analysis as the detailed models are not available. However, when a plant is part of a global national least cost development plan it is not possible to assign a rate of return to a single plant, except for re-running the entire development plan, which was not done. Moreover, the reference to the tariff is disturbing, as an economic analysis does not take into account the tariff in any manner (the financial analysis does). Hence, there are reasons to suspect that the economic analysis at appraisal and in the PCR were not correctly done. However, as the project was part of the national least cost plan, it was economically justified and benefits exceeded costs.

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).

With an overall IP rating of 3.6, implementation progress is rated "Highly Satisfactory".

According to the PCR, all project covenants have been complied with. Procurement under the project went rather smoothly. Funds from the various project co-financers were available in a timely manner, and no delays in disbursement were encountered. Financial management of the project was found acceptable by the Bank. Some loan savings amounting to USD 60 million of Bank financing were cancelled after being frozen for four years, which should have been avoided.

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.

With a positive and higher but still modest FIRR at completion the project financial sustainability is rated "Satisfactory".

The project was found financially viable at appraisal in 2008. The FIRR was estimated at 7% and the FNPV was EGP 6,324.99 million (USD 1,177 million). At completion, the PCR mission assessed the financial viability of the project taking into consideration the current macro-economic, project cost, financial and commercial and O&M information and the new tariff levels. The team used the financial model at appraisal for the 2016 financial sustainability assessment. The FIRR at completion is 11% with a FNPV of EGP 14,034 million (USD 1,559 million). Although the plant has not been operating as per original load factor due to fuel unavailability, the project is still financially sound with a FIRR at completion greater than the one at appraisal. The two major factors that have significantly and positively affected the financial sustainability are the new level of tariff, which is 112% higher than the 2008 tariff, and (ii) the significantly reduced investment cost in USD despite the construction delays.

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 project rating concerning strengthening of capacities is rated "Highly Satisfactory" as EDEPC is a sound and well managed institution. In addition, successful know-how transfer was effected.

Given that the Ain El-Sokhna Power Project introduces a new technology (super critical boilers) in the power sector in Egypt, capacity building of EDEPC staff was paramount during the implementation of the project. All contracts included as part of the scope of work training of EDEPC staff on the operation and maintenance of the equipment/facilities covered by those contracts. The training was mostly conducted on the project site, but also included sessions in the contractor's manufacturing/training facilities. In addition,

the project includes a simulator that helps operation staff receive the necessary on-the-job training before actually resuming their duties on the power plant itself. These provisions collectively aimed at ensuring that proper capacity building was provided to EDEPC staff to guarantee successful completion of the project and subsequently operation of the power plant. As a result, EDEPC staff reported that contrary to their initial anticipation, they were able to quickly comprehend the new technology and as such they were able to run the plant smoothly without major problems. Moreover, based on the success of Ain El-Sokhna, EEHC decided to implement more projects based on the same advanced technology, and used Ain El-Sokhna project for experience sharing and as a training platform for the staff of those new projects as well.

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 project rating in term of Ownership and partnership is rated "Highly Satisfactory" in reflection of the excellent cooperation between the Beneficiary, lenders and contractors.

The ultimate responsibility for the implementation of the project rested with EEHC/EDEPC, with extensive support from the Project Engineer (PGESCo) for both project management and supervision. These parties had to work in close tandem to ensure full coordination among not only the large number of contractors involved, but also other stakeholders such as the project financers, local government authorities and other government central/local agencies. According to the PCR, "One particular case worth highlighting here is the issue of a contractor that for reasons external to the project went bankrupt and was therefore unable to continue fulfilling its role in the project. The straightforward action from EEHC/EDEPC in such a case would have been to terminate the contract with that particular contractor and award the remaining work to another one. However, after due consultation with all relevant stakeholders, including the Bank, the decision was taken to try to support the contractor as much as possible to enable them to complete their job in order to avoid the delay that would have happened if the remaining work were to be awarded to another contractor. This action nonetheless was accompanied with strong technical and financial measures to mitigate the associated potential risks. Finally, it worked reasonably well for the project and the contractor was able to complete its job." The Bank also played a very good role in this case by accepting to reimburse EDEPC for eligible expenditures under this contract, which significantly helped the cash flow of the company and hence of the overall project.

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 project rating in term of environmental and social sustainability is "Satisfactory", same as PCR..

The project submitted routinely environmental and social monitoring reports that described the monitoring activities and the results of monitoring. In total 29 of those reports were submitted to the Bank. The parameters monitored were based on the ESMP including air quality; water quality; noise; flora and fauna; land use, landscape and visual impacts; soil and hydrology; traffic and transport; solid waste management; archaeology; occupational health and safety; and the socio-economic environment. Two air quality monitoring stations were permanently installed at selected locations in the project site and covered some of the necessary monitoring parameters. The results were compiled in the E&S monitoring reports. Furthermore, the project was subject to an independent environmental audit that was carried out for the

Bank. The result of these monitoring/follow-up activities indicated that the project was in general complying with the requirements of the ESMP without significant environmental damage. Nonetheless, the Bank and other project financers from time to time made some suggestions for improvement that were reasonably addressed by EDEPC. The project was not the subject of any complaint related to environmental or social issues, although, as it is the case with many large projects, demand for employment by the local people was an issue that in some cases slightly disrupted work on site as people gathered around the site demanding work. EDEPC did its best to try to address those demands to the extent possible. Finally, there was no resettlement due to the project and therefore no need for compensation since the project land was not in use prior to the project and was formally allocated to EDEPC for the purpose of 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 Bank performance was "Highly Satisfactory". The PCR rating of "Satisfactory" is too conservative, as there is no indication the Bank could have done a better job.

The Bank has shown good support throughout the project starting from the appraisal phase when the Bank agreed to increase its proposed loan in order to help the project achieve financial close. Subsequently throughout implementation, the Bank generally responded to project requests and needs in a timely manner. In particular, the Bank support in the case of the contractor that faced financial difficulty during implementation was very effective and positive. It certainly helped the project move forward without significant delay. In addition, the Bank responded favourably to the request of the project to use some of the potential loan savings for financing some additional small works under the project that aim at improving the reliability of the operation of the power plant. Procurement under the project went smoothly and the Bank provided good advice and support on the use of Advance Procurement Action in order to help start procurement of the main project components that usually have long lead time ahead of loan approval in order to meet the target schedule of the project. The Bank was proactive during the implementation of the project by carefully investigating issues faced during implementation and providing support to EDEPC/EEHC on how to address them. The project was field-supervised by the Bank at least twice a year by a multi-disciplinary team as needed. In addition to those supervision missions, the Bank's presence on the ground through EGFO played an important role in monitoring of project activities and providing first-hand support and response to project needs in a timely manner. In addition, the project was subject to a special independent audit on its environmental and social aspects. The findings and recommendations of the audit were useful in helping the project achieve better compliance with its ESMP.

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 Borrower's performance is rated "Highly Satisfactory". In light of the difficult political and geographical challenges during project implementation, the Satisfactory rating of the PCR is too conservative.

EDEPC/EEHC were very supportive to the project, which was a high national priority. Availability of counterpart funding was adequate throughout the project and did not cause in delays. EDEPC/EEHC

managed the project very well, despite the completion delay. EDEPC was particularly efficient in managing the consequences of local political instability following the 2011 uprisings in Egypt, of the tsunami in Japan (where the turbine generator was manufactured); the severe floods in Thailand (where some electronic equipment were produced); and even a flooding incident at the project site. The PMU was very well-staffed with highly qualified personnel covering various expertise as needed for a project of such complexity. The PMU kept all project stakeholders, including the Bank, fully informed of project progress and arising issues. The project also submitted routine monthly progress reports throughout its implementation. The most critical challenge for EDEPC was in fact the occasional demonstrations at the project site by the local people asking for work in the project. EDEPC tried to accommodate as much of those demands as was practically possible and in a transparent manner.

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 performance of Other stakeholders is rated "Satisfactory".

The main other stakeholders that affected project performance were the various contractors on the project. Despite of a thorough procurement process that was based on international competition for procuring those contractors, it is inevitable on such a large and complex project that some of the contractors do not deliver their work up to the quality and time schedule of their contracts. Such issues could potentially impact the entire project if the work of those contractors is on the project's critical path. EDEPC and PGESCo had to continuously deal with such issues in order to minimize the delay to the overall project schedule due to poor performance of some of the contractors.

5. SUMMARY OF OVERALL PROJECT PERFORMANCE

a. Overall assessment:

Provide a summary of the project/programme'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 post project performance evaluation (e.g. PPER, PER or PRA) is complete.

The project was very complex and innovative. Its satisfactory completion below budget and with minor delay should be recognized as a positive achievement for all stakeholders. The overall project rating is therefore Highly Satisfactory. The PCR rating of Satisfactory does not produce clear indications concerning what should have been done differently.

Relevance: **The project contributed to address a major sector and national issue of shortage of electricity and disruption to economic activities resulting thereof. The addition of 1,300 MW of base load capacity was very welcome and was a high priority.**

Effectiveness: **The project retained design introduced state of the art high efficiency modern technology in Egypt and contributed to address the electricity demand effectively, although one year behind schedule.**

Efficiency: **the project efficiency is demonstrated by the implementation well within budget and the addition of least cost generation capacity to the system. Delay in commissioning, however, was a negative point, although it is not surprising for a project of the size and complexity of Ain El Sokhna.**

Sustainability: **The sustainability of the project is satisfactory and has been reinforced through the recent**

power tariff increases. The financial sustainability of EDEPC is also acceptable, as demonstrated by its capacity to provide its share of project financing.

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.

The M&E system was well designed and functioned well. It is rated Satisfactory.

The M&E system for the project was particularly carefully designed, including the M&E of the social and environmental aspects. It produced quality monthly progress reports and permitted a close monitoring of project implementation in all its aspects. The good quality of the M&E system is evidenced by the conclusion of the social and environmental audit of the project. It is also recognized in the PCR. The M&E system was effectively used by all stakeholders, including the Bank.

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 Lessons Learned identified in the PCR are the following:

"Africa should not lag behind in the adoption of modern proven technologies in order to quickly benefit from advancement in technology. For example, the super-critical power generation technology has been well established worldwide more than half a century ago. However, the Ain El-Sokhna project is the first to use this technology in Africa, partly because of the small installed capacities in many parts of the Continent, but also due to the typical fear of new technologies by many utilities. The experience from Ain El-Sokhna project has so far been very positive, with the operator reporting that technical staff became familiar with the new technology rather quickly and in fact find it easier and more flexible to operate than older technologies. This has to do with a strong training program that was organised to EDEPC O&M staff by the various contractors as part of their scope of work under the project. " This lesson is well taken, but the Egyptian case may not apply directly to Sub-Sahara countries, which have much smaller systems, and a less developed industrial basis, making the maintenance of large complex technologies a challenge.

"Typically, project risks increase with its complexity as in the case of large infrastructure projects. This makes risk assessments and mitigation plans very critical components of proper project preparation studies. Nonetheless, dealing with un-anticipated risks (e.g. force majeure) during project implementation is equally important. Traditional solutions (e.g. contract termination) may not necessarily be the most optimum in such circumstances. All efforts need to be exerted by all concerned entities (project executing agency, contractors, engineer, and financiers) to find the most optimum solutions. This requires project PMUs to be adequately trained and empowered to be able to handle such risks. The support of the Bank is also critical in such cases as an important stakeholder and development partner in the projects." This recommendation is valid, as project owners and managers should consider the best interest of the project rather than interpreting narrowly the legal terms of contracts.

"Large infrastructure projects tend be co-financed by a relatively large number of financers, including

DFIs and commercial banks. Structuring the financing plans, and therefore procurement arrangements, in such projects based on parallel-financing arrangements (instead of joint-financing) could help simplify implementation. This however requires strong project management and coordination among the co-financers by project executing agencies and PMUs. The support of a project management engineer/agency may also be critical in such cases." This recommendation contradicts recent trends towards EPC approach by recommending parallel financing of contracts. The opposite approach of harmonizing tendering and financial management procedure, rather than splitting construction contracts seems preferable, as the reduction of technical and delay risks is more important than rigid adhesion to bureaucratic procedures. In fact, institutions tend toward more flexibility to accept exceptions to their guidelines in the interest of the project and risk reduction.

"The Ain El-Sokhna project was procured in 18 packages (contracts), which had the advantage of providing EDEPC and the Engineer greater control over the project's technical design and implementation schedule, but also caused challenges in terms of contract management and coordination among the contractors, which subsequently affected the implementation schedule. There is a need to carefully design the procurement strategy and packaging to facilitate project coordination and smoothen implementation." The key lesson is that the increase in the number of contracts leads to the well-known conclusion that more coordination problems and delay may occur, hence the trend to reduce the number of separate contracts, co-financing preferably to parallel financing, and recourse to EPCs preferably to the Project Engineer (PGESCo type) approach, as in fact, the Project Engineer bears no responsibility in effective coordination, holding schedule and overall performance of the plant.

b. <u>Recommendations</u>:
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.

"Optimal use of the power sector infrastructure based on the merits of the different technologies available is critical for improving the overall performance of the sector and its sustainability. High-level coordination and information sharing among all such entities is therefore paramount for achieving the optimal conditions for asset utilisation and providing full benefits to plant owners and to the consumers." Recommendation well taken.

"Continuous training to be provided by the Bank to PMUs on Bank rules and procedures. PMU staff greatly benefit from routine training by the Bank on its rules and procedures related to procurement, financial management, disbursement and environmental and social management. In the case of Ain El-Sokhna project, the PMU could have benefited from more training on Bank environmental and social policies and requirements in particular. The presence of staff covering those areas of expertise in the Bank's field offices can critically facilitate the delivery of such trainings to PMUs. Otherwise, the trainings can be programmed with project supervisions for efficiency." Recommendation well taken.

"Project executing agencies should pay due attention to Bank recommendations, e.g. on financial management issues, and implement them in a timely manner. The presence of a Financial Management specialist in the Bank field office would have enabled much closer follow-up on financial management issues instead of the typical twice-a-year supervision missions which are still not frequent enough to push for swift actions to be taken by the executing agency." Recommendation well taken.

"Procurement of the various project contractors should be based on thorough due diligence of their past performance and experience in similar projects. Proper documentation of the performance of the contractors is important to be used as a reference for future procurements." Recommendation well taken.

"All project documents, starting from those used for project appraisal, should be centrally archived by the Bank. Digital archiving should as much as possible mirror the traditional paper archiving for ease of access. It is also recommended to use one central repository for digital document archiving instead of using scattered systems for efficiency." Recommendation well taken.

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 quality of the PCR is Satisfactory, except for the economic cost-benefit evaluation. The PCR was prepared immediately after completion of the works, before the disbursement closing date. The timeliness of the PCR is therefore Highly Satisfactory.

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	3.5	4	The project addressed a major sector and macroeconomic issue of availability of power.
Relevance of project development objective	4	4	
Relevance of project design	3	4	The introduction of the supercritical technology was a major step with positive impact
EFFECTIVENESS	3	4	
Development objective (DO)	3	4	Development objectives respond to a critical priority for the economic development of Egypt.
EFFICIENCY	3.65	3	

Timeliness	3	2	
Resource use efficiency	4	3	Procurement and contracting were effective, but Cost estimates were too generous and froze financial resources for four years
Cost-benefit analysis	4	2	Methodology for cost benefit analysis is not adequate, although the economic justification for the project is good.
Implementation progress (IP)	3.6	4	
SUSTAINABILITY	3.25	3	
Financial sustainability	3	3	
Institutional sustainability and strengthening of capacities	3	4	The quality of management of the Beneficiary is strong and highly successful transfer of know how was implemented
Environmental and social sustainability	3	3	
OVERALL PROJECT COMPLETION RATING	3	3	
Bank performance:	3	4	The Bank invested a lot of resources and effort to ensure the success of the project
Borrower performance:	3	4	In light of the severe political and geographical challenges which affected the project, the performance of the Borrower was above Satisfactory.
Performance of other shareholders:	2	3	
Overall PCR quality:		3	

9. PRIORITY FOR FUTURE EVALUATIVE WORK: PROJECT FOR PERFORMANCE EVALUTION REPORT, IMPACT EVALUTION, 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) Cluster evaluation (institutional support)

c) 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:

- Task Manager/ Responsible bank staff interviewed/contacted (in person, by telephone or email)
- Documents/ Database reports

Attachment:

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

Appendice 1

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	
	Relevance of project design (from approval to completion)	3	4	The introduction of the supercritical technology was a major step with positive impact
OVERALL RELEVANCE SCORE		**3.5**	**4**	The project addressed a major sector and macroeconomic issue of availability of power.
EFFECTIVENESS*	**Effectiveness in delivering outcomes**			
	Outcome1 power generation capacity is increased		4	
	Outcome2 more consumers are connected to the grid		3	
	Effectiveness in delivering output			
	Output1 Construction and commissioning the supercritical coal fires steam plant		4	
	Output2			
	Development objective (DO)			
	Development objective rating	**3**	**4**	Development objectives respond to a critical priority for the economic development of Egypt.

Criteria	Sub-criteria	PCR work score	IDEV review	Reasons for deviation/comments
	Beneficiaries			
	Beneficiary1Power consumers		**3**	
	Beneficiary2 3,000 employees during construction		**4**	
	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	3	4	The quality of management of the Beneficiary is strong and highly successful transfer of know how was implemented
	Gender		3	Benefit to all consumers, including 50% women
	Environment & climate change	3	3	
	Poverty reduction		3	
	Private sector development		n/a	
	Regional integration		n/a	
	Other (specify)			
EFFECTIVENESS OVERALL SCORE		3	4	Project delivered expected outputs and outcomes below budget and with limited delays
EFFICIENCY	Timeliness (based on the initial closing date)	3	3	
	Resource used efficiency	4	3	Procurement and contracting were effective, but Cost estimates were too generous and froze financial resources for four years
	Cost-benefit analysis	4	2	Methodology for cost benefit analysis is not adequate, although the economic justification for the project is good.
	Implementation progress (from the IPR)	3.6	3	
	Other (specify)			
OVERALL EFFICIENCY SCORE		**3.65**	**3**	
SUSTAINABILITY	Financial sustainability	3	3	
	Institutional sustainability and strengthening of capacities	3	4	The quality of management of the Beneficiary is strong and highly successful transfer of know how was implemented
	Ownership and sustainability of partnerships		4	
	Environmental and social sustainability	3	3	

Criteria	Sub-criteria	PCR work score	IDEV review	Reasons for deviation/comments
*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	3	4	The Bank made special efforts to adjust project management to political changes, default of one contractor and tsunami
	Use of previous lessons learned from previous operations during design and implementation	3	3	
	Promotion of stakeholder participation to strengthen ownership	2	3	The Borrower maintained dialogue with local communities for employment
	Enforcement of safeguard and fiduciary requirements		3	
	Design and implementation of Monitoring & Evaluation system		3	
	Quality of Bank supervision (mix of skills in supervisory teams, etc)		4	Frequent supervision by competent staff and valuable comments provided to Borrower
	Timeliness of responses to requests		4	Bank quick and flexible adjustment to changing context
OVERALL BANK PERFORMANCE SCORE		**3**	**4**	The Bank supported an excellent project design well adapted to country and sector needs and was engaged and supportive during implementation
BORROWER PERFORMANCE	Quality of preparation and implementation		**4**	Borrower showed flexibility and willingness to take the risk of a new technology in Egypt
	Compliance with covenants, agreements and safeguards		**3**	
	Provision of timely counterpart funding		**3**	
	Responsiveness to supervision recommendations		**3**	
	Measures taken to establish basis for project sustainability		**3**	
	Timeliness of preparing requests		**3**	
OVERALL BORROWER PERFORMANCE SCORE		**3**	**4**	Borrower made special effort to compensate for political disturbances, tsunami, near failure of a contractor.
PERFORMANCE OF OTHER STAKEHOLDERS	Timeliness of disbursements by co-financiers		**3**	
	Functioning of collaborative		**3**	

	agreements			
	Quality of policy dialogue with co-financiers (for PBOs only)		**3**	
	Quality of work by service providers		**3**	
	Responsiveness to client demands		**3**	
OVERALL PERFORMANCE OF OTHER STAKEHOLDERS		**2**	**3**	Contractors showed engagement and flexibility in adapting to force majeure events
The overall rating is given: Very Good, Good, Fair and Poor. (i) Very Good (HS) : 4 (ii) Good (H) : 3 (iii) Fair (US) : 2 (iv) Poor (HUS): 1				

DESIGN, IMPLEMENTAION AND UTILIZATION OF MONITIRING AND EVALUATION (M&E)

Criteria	Sub-criteria	IDEV Score	Comments
M&E DESIGN	M&E system is in place, clear, appropriate and realistic	4	M&E system was well detailed and designed.
	Monitoring indicators and monitoring plan were duly approved	3	
	Existence of disaggregated gender indicator		
	Baseline data were available or collected during the design	3	
	Other, specify		
OVERALL M&E DESIGN SCORE		**3**	
M&E IMPLEMENTA-TION	The M&E function is adequately equipped and staffed	3	
OVERALL M&E IMPLEMENTATION SCORE		3	
M&E UTILIZATION	The borrower used the tracking information for decision	3	
OVERALL M&E UTILIZATION SCORE			
OVERALL M&E PERFORMANCE SCORE		**3**	

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	
2. Extent of objectivity of PCR assessment score	4	
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	
4. Extent of identification and assessment of key factors (internal and exogenous) and unintended effects (positive or negative) affecting design and implementation	4	
5. Adequacy of treatment of safeguards, fiduciary issues, and alignment and harmonization	3	
6. Extent of soundness of data generating and analysis process (including rates of returns) in support of PCR assessment	2	Methodology of economic analysis flawed
7. Overall adequacy of the accessible evidence (from PCR including annexure and other data provided)	3	
8. Extent to which lessons learned (and recommendations) are clear and based on the PCR assessment (evidence & analysis)	3	
9. Extent of overall clarity and completeness of the PCR	3	
Other (specify)		
PCR QUALITY SCORE	3	
PCR compliance with guidelines (PCR/OM ; IDEV)		

1. PCR Timeliness (On time = 4; Late= 1)	4	
2. Extent of participation of borrower, Co-financiers & field offices in PCR preparation	3	
3. Other aspect(s) (specify)		
PCR COMPLIANCE SCORE	3	
*** rated as Very Good (4), or Good (3), or Fair (2), or Poor (1)		

References

Egypte_-_Ain_Sokhna_PCR_FR.

Egypt_-_Ain_Sokhna_PCR.

Egypt_-_AR_Suez_Power_Plant

Egypt_Ain_Sokhna_PCR_FINAL_EN.

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EN_PR10727.

FR_PR10727.

RE Urgent Request for Project Documentation.