Report Number : ICRR13960

IEG **ICR Review**
Independent Evaluation Group

| 1. Project Data: | | Date Posted : 06/06/2013 | | |
|---|---|---|---|---|
| Country : | Egypt | | | |
| Project ID : | P050567 | | Appraisal | Actual |
| Project Name : | Kureimat Solar Thermal Hybrid Project | Project Costs (US$M): | 327.6 | 423.5 |
| L/C Number : | | Loan/Credit (US$M): | 49.8 | 49.8 |
| Sector Board : | Energy and Mining | Cofinancing (US$M): | 151.3 | 243.0 |
| Cofinanciers : | JICA | Board Approval Date : | | 12/11/2007 |
| | | Closing Date : | 10/31/2011 | 10/31/2011 |
| Sector(s): | Renewable energy (100%) | | | |
| Theme(s): | Climate change (100% - P) | | | |

| Prepared by : | Reviewed by : | ICR Review Coordinator : | Group : |
|---|---|---|---|
| Ramachandra Jammi | Robert Mark Lacey | Soniya Carvalho | IEGPS1 |

## 2. Project Objectives and Components:

### a. Objectives:

According to the Global Environment Facility (GEF) Grant Agreement, (page 4), “The objective of the project is to increase the share of solar-based electricity in the Egyptian energy generation thereby contributing to the Recipient ’s objective of diversifying electric power production .” This is identical to the project development objective (PDO) stated in the Project Appraisal Document (PAD, page 8).

According to the PAD (page 9), the Global Environmental Objective (GEO) is "to reduce greenhouse gas emissions from anthropogenic sources by increasing the market share of low greenhouse gas emitting technologies ."

Given that this is a stand-alone GEF project (there are no IBRD funds involved), this project is assessed in terms of the GEO, which is consistent with the PDO’s aim of increasing the share of solar-based electricity in Egypt’s energy generation.

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

No

### c. Components:

**Component 1**: (*at appraisal: US$320.7 million; at completion: US$422.8 million*) The design, construction and initial operation of the proposed Integrated Solar Combined Cycle Plant included two sub -components:

- The solar portion of the power plant (*at appraisal: US$111.0 million; at completion: US$128.8 million*) included one contract for engineering, procurement, construction, testing, commissioning and two years operation and maintenance (O&M). The Solar Island was to consist of a parabolic trough solar field capable of generating 20 MegaWatts (MW) of solar heat at a temperature of 393°C, the related Solar Island Control System and the heat transfer fluid (HTF) system up to the HTF inlet and outlet flanges of the Solar Heat Exchanger (s).
- The combined cycle portion of the plant (*at appraisal: US$209.8 million; at completion: US$294.0 million*). The capital cost of the combined cycle portion of the included the Engineer, Procure and Construct contract for the

Combined Cycle Island. The Combined Cycle Island was to consist of one gas turbine with International Standards Organization Rating of about 74.4 MW, one heat recovery steam generator G), one steam turbine of about 76.5 MW (nominal), and solar heat exchanger(s) capable to absorb about 60 MW (thermal) solar heat plus all associated balance of plant equipment.

**Component 2** (*at appraisal: US$6.4 million; at completion: US$0.0 million*): Capacity building for the New and Renewable Energy Authority (NREA) through consulting services for construction management during the construction, and testing and operation of the plant. The capacity building would focus on:

**a.** detailed engineering designs with special attention to the interface between the solar and Combined Cycle Gas Turbine parts;
**b.** supervising the construction and environmental aspects of the power plant;
**c.** monitoring the commissioning and guarantee tests;
**d.** preparing the Operations and Maintenance (O&M) contract for the Combined Cycle Gas Plant on terms satisfactory to the Bank.
**e.** providing assistance during the 2 year guarantee period as well as assisting the National Renewable Energy Agency in monitoring and evaluation of the performance of the whole plant at least during the two years of the Operations and Maintenance period; and
**f.** providing training and transfer of know-how in combined cycle plant operation, with particular emphasis to dispatching and integration into the power system so that National Renewable Energy Agency staff can successfully take over the power plant after the respective operation and maintenance contracts expire.

**Component 3**: Environmental and Social Impact management component financed by the NREA (*at appraisal: US$0.45 million; at completion: US$0.45 million*). This component included the implementation of the Environmental Management Plan (EMP) which mitigated the potential environmental and social impacts associated with the construction and operation of the power plant.

Regarding Component 2, NREA decided not to contract out the construction management during the construction, and testing and operation of the plant as originally planned for the Combined Cycle Island, due to anticipated high costs. Instead, NREA created an internal cadre drawn from experienced Combined Cycle Gas Turbine operators from Egyptian generation companies.

In the initial conceptual design, the Solar Island was projected to have the equivalent of 30 MW capacity. However, after bidding was completed before Board approval, this was revised to 20 MW at the request of the Government. The capacity of the Combined Cycle Island, however, was not changed from its original projected size of about 140 MW gross.

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

**Project cost**. The final project cost was US$423.25 million, nearly 32 percent higher than the planned amount of US$327.6 million. This was mainly due to an increase in the capital cost of the combined cycle portion of the plant from the planned US$209.8 million (including contingencies) to US$294.0 million, an increase of 40 percent. The cost for component 2 was reduced to zero because it was taken up by an internal cadre created by NREA as explained in section 2c.

**Financing**. The sources of financing for this project are the Global Environment Facility (GEF), the co-financier Japan International Co-operation Agency (JICA), and the Government of Egypt. There is no World Bank Group financing involved. The increased project cost between appraisal and completion was mostly funded by the co -financier JICA (the co-financier originally was the Japan Bureau for International Cooperation but its Overseas Development Assistance departments were merged with JICA in 2008), whose contribution was 161% of the appraisal estimate (US$243.0 million at completion against US$151.3 million at appraisal). In addition to the Combined Cycle Island, the Agency also financed the Operations and Maintenance consultant for the Solar Island as well as a spare parts contract for the Combined Cycle Island, raising the overall financing for the project from JICA . Most of the funding for the Solar Island was provided by the Government as the Global Environment Fund (GEF) grant amount was insufficient for the purpose.

**Borrower contribution** . The Borrower's contribution was slightly higher at US$ 135.0 million compared to US$126.5 million at appraisal.

**Dates**. During implementation, both the Engineer, Procure, Construct (EPC) contractors were delayed by one year in meeting targets of commercial operation dates. The main reason was the delay in disbursement of the second tranche of co-financing from JICA, which led to suspension of the construction of the Combined Cycle Island for several months. This delay also impacted completion of work by the Solar Island Engineer Procure, Construct contractor due to the inability to carry out equipment acceptance tests without full functioning of the Combined Cycle

Island. The political unrest leading to the revolution in Egypt in early 2011 led to the contractors having to leave the country for several weeks, causing additional schedule delays. The cumulative effect of these events was to delay completion and acceptance of the full integrated plant from the October 2010 to June 2011. Nevertheless, the project closed on schedule on October 31, 2011.

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

**a. Relevance of Objectives:**

The project's objectives were in line with those of GEF's Operational Program 7 (OP7), which aims to reduce, over the long-term, the costs of energy technologies with low greenhouse gas emissions, and which are currently not cost-competitive. The ICR states that through this project, Egypt, GEF, and the Bank were jointly participating in what could be a very promising global experiment to encourage and accelerate global deployment of Concentrated Solar Power (CSP) through demonstration, learning and dissemination.

While the government's strategy is to continue to implement gas fired power plants, it has targeted 3% of its electricity needs to be met from renewable energy sources by 2010; and 20% by 2020. In this context, the underlying objective of increasing the share of solar-based electricity as a means to reducing GHG emissions is considered relevant.

To this end, the New & Renewable Energy Authority (NREA) was established in 1986 for developing renewable energy technologies in the country on a commercial scale. As an incentive for renewable energy, the Government had established a financial mechanism called the Petroleum Fund, where producers of non-fossil fuel electricity receive 2 Piasters (equivalent to 0.33 US cents)/kWh.

The ICR links the project's objectives to two pillars of the 2005-2009 Country Assistance Strategy: (i) enhancing the provision of public services; and (ii) facilitating private sector development. The project is also consistent with the priorities emerging as a result of the political revolution, which require an enabling environment for economic growth, job creation and youth employment. Several local industries were planned to be involved in the construction of both plants, with 60% of the Solar Island's value to be created locally.

Relevance of objectives is rated ***substantial***.

**b. Relevance of Design:**

The project sought to demonstrate that solar-powered electricity can be integrated with a gas-powered plant and help Egypt increase the share of renewable sources in electricity production, while reducing GHG emissions. To demonstrate the feasibility of the combined gas and solar powered plant, a GEF-funded 20MW concentrated solar power (CSP) plant was chosen to be combined with a 140MW gas-powered plant.

Relevance of Design is rated ***substantial***.

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

*Global environmental objective (GEO): To reduce greenhouse gas emissions from anthropogenic sources by increasing the market share of low greenhouse gas emitting technologies. Rated Substantial.*

The goal of integrating a high temperature solar field with a conventional combined-cycle plant was successfully achieved. At project completion, the solar portion of the power plant was completed and made operational with an electricity generation capacity of about 20MW. The solar output as a percentage of the total energy produced in the hybrid plant was 4.1% against the targeted 4.0%. The contribution of solar-based power was estimated at 35.1 Gwh per year against a target of 33.4 Gwh per year. Though the project's contribution in terms of solar-based electricity is small compared to the installed electricity generation capacity in the country, it succeeded in demonstrating a new technology with prospects for scale-up.

The solar Island has already exceeded warranted levels by 5-10%. The ICR reports that there is some evidence of corrosion in mirrors, but that this is not conclusive based on the information available and would need to be monitored in the coming months and years. Currently there is little impact of corrosion on the power generation.

According to the ICR (page 21), at project completion, the project's contribution to savings in CO2 emissions was estimated at 8,710 to 15,410 tons of CO2 emissions per year (which compares favorably with expected emission reductions from a 20 MW plant based on a standard factor of 0.4 tons per year of CO2 emissions per Gwh). The

targeted reduction of CO2 emissions per year based on the original capacity of 30MW (which was reduced to 20MW prior to Board approval) was 20,000 tons.

**5. Efficiency:**

The ERR for the entire project was 11.95% compared to 13.00% projected at appraisal. The ERR at completion benefited from the fact that the electricity price that was used (which was the average export price to Jordan) rose by 60% from US cents 7.00/kWh to US cents 11.18/kWh over the project implementation period. The project was completed on schedule, but there was a significant cost overrun of 32 percent for the entire project. The major portion of the cost overrun was due to the 40% increase (from US$209.8 million to US$294.0 million) for the combined cycle island. Further, the need to separate the project into two separate components and procurement contracts to meet the requirements of two financing sources, resulted in extra administrative efforts and mitigation measures.

The solar plant was completed at a cost of US$ 128.8 million, about 15 percent higher than the estimated cost of US$111.0 million. The delay in the construction of the combined cycle island impacted the completion of work by the Solar Island contractor in respect of their ability to carry out equipment acceptance tests without full functioning of the combined cycle island. The political unrest leading to the revolution in Egypt in early 2011 led to the contractors having to leave the country for several weeks, causing additional schedule delays. The cumulative effect of these events was to delay the completion and acceptance of the full integrated plant from October 2010 to June 2011. Nevertheless, the project was completed on schedule on October 31, 2011.

Taking all the above factors into account, the efficiency of the project is rated *modest*.

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

| | Rate Available? | Point Value | Coverage/Scope* |
|---|---|---|---|
| Appraisal | Yes | 13% | 100% |
| ICR estimate | Yes | 11.95% | 100% |

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

**6. Outcome:**

Relevance of objectives is rated *substantial* based on country needs and priorities in the energy sector. Based on the clarity of the results framework, project design is rated *substantial*. Planned outputs and outcome were achieved with some shortcomings and achievement of the project's development objective is rated *substantial*. Efficiency is rated modest given the cost overruns and delays in commissioning the plants arising from financing and procurement delays. Overall project outcome is rated *Moderately Satisfactory*.

**a. Outcome Rating :** Moderately Satisfactory

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

At project completion, the integrated plant was still in the initial stages of commercial operation. Technical, financial and institutional issues need to be overcome before the plant can operate at full capacity.

Technical:. There are two sets of technical issues. The first relates to maintenance associated with gas turbine air inlet filters and gas turbine combustor operations as well as solar heat exchanger tube sheet leakage. NREA has actively pursued solutions to these problems, but they remain unresolved. The second set of issues relates to corrosion arising from the sulfuric acid content in the ambient air, which can potentially degrade the plant's equipment. This problem can be partly mitigated by improving the air quality in the region in conjunction with the provincial Government. Meanwhile, anti-corrosion measures have been adopted by NREA with close cooperation of Solar Island contractors for components. JICA, the co-financier for the Combined Cycle Island, is monitoring the technical issues and considers that they can be resolved with help from other generating companies in Egypt.
Financial: Although NREA's financial performance has improved during the project period, it is still unable to cover its costs.
Institutional: The Government has taken the decision to transfer this asset to the Upper Egypt Generating Company as it is not in NREA's mandate to operate and maintain conventional power plants, even if they are hybrids with a renewable energy component. This is a welcome step given the extensive experience within the Upper Egypt Generating Company in operating combined cycle power plants. However, the process of asset transfer is likely to

take several months.

Overall, considering that the financial, technical and institutional issues are in the process of being resolved, the risk to achieving full power electricity generation and good performance in the short term is rated *significant*.

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

**8. Assessment of Bank Performance:**

**a. Quality at entry:**

The Bank ensured that the project objectives and parameters were consistent the government's priorities and Bank's assistance strategy for the country. Mitigation measures were put in place for technical and commercial risks that were identified during preparation.

Based on the previous work in this area, this project was planned to demonstrate the integration of a parabolic trough solar field with an otherwise conventional fossil-fired combined-cycle power plant. Numerous papers and conceptual design studies supported this approach, and the excellent operation of the parabolic trough Solar Energy Generating Systems (SEGS) plants in the Mojave Desert of California since the mid-1980's provided a firm foundation for this step. The plan was evaluated by a team of independent Concentrated Solar Power (CSP) experts, and reviewed by a large experienced segment of the CSP community.

The site selected was an uninhabited flat desert area, possessing high intensity direct solar radiation (reaching 2,400 kWh/square meter/year), proximity to the extended unified power grid and natural gas pipelines, and proximity to water sources (primarily the Nile River). Four sites had been initially considered (Red Sea Coast, Sinai Peninsula, West Desert and Kureimat) and the Kureimat site was selected due to the minimal additional infrastructure required because of the proximity to the El Kureimat Power Plant 750 MW Combined Cycle power plant.

The project was designed to contribute to the objectives of GEF 's Operational Program 7 which aimed to reduce, over the long-term, the costs of energy technologies with low greenhouse gas emissions, and which are currently not cost-competitive. The technology that was chosen was to integrate conventional combined cycle gas turbines with solar thermal technology, with a view to introducing such renewable energy in developing countries. The ICR states that numerous papers and conceptual design studies supported this technical design, and the sound operation of the parabolic trough Solar Electric Generation Systems (SEGS) plants in the Mojave Desert of California since the mid-1980's provided a firm foundation for this approach.

The project design specifically included formalized on-the-job training for staff during the contracted O&M period of two years for the Solar Island to help build technical capacity in this area within the Government and support future CSP development in Egypt.

The key technical challenge was rightly identified as the integration and performance of the Solar and Combined Cycle Islands. Further, in order to meet the requirements of the financing sources, the Government had to separate the project into two separate components, resulting in two procurement contracts (one for the Solar Island and one for the Combined Cycle Island). The resulting integration and performance problems were perceived as involving "high" risk, and mitigation measures were incorporated through (i) provision in the procurement process for data exchange between the two winning bidders; (ii) hiring of a construction management consulting firm for the supervision and integration of the Solar and Combined Cycle Islands; and (iii) hiring an experienced operator for O&M (Operation & Maintenance) of the Combined Cycle Island with responsibility to coordinate operation with the O&M operator of the Solar Island. To mitigate performance risks, incentives were provided through: (i) linking the heat production of the Solar Island to the solar irradiation available, failing which penalties would be imposed on the Solar Island contractor; and (ii) the Combined Cycle Island would be checked for electricity production as a function of solar heat supplied by the solar island.

However, the possible impact of the evolving local environment on the project was not examined in depth in the Environmental and Social Impact Analysis nor in the feasibility study for the Solar Island. This was partly because the project site was in a largely uninhabited area, with only a gas fired power plant in the vicinity as the main source of pollution. There had also been no significant prior experience from operational concentrated solar power plants related to the corrosive impact of local environment on the operation of the solar field which would have called for an in-depth assessment of the local environment on the project.

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

**b. Quality of supervision:**

The Bank team visited the project approximately twice a year. According to the ICR, these visits were adequate to stay abreast of implementation progress and maintain continuous interaction with the client. The ICR notes that the client considered Bank support beneficial for the capacity building and dissemination activities. The technical and financial knowledge of the team was deemed useful for project implementation by the implementing agency. To deal with the low level of awareness relating to environmental safeguards in the early stages of the project, an environmental team member was assigned to the Project Implementation Entity (PIE) in 2008, which helped helped overcome weaknesses in implementing and overseeing the safeguards process. The ICR states that although the Bank was not responsible for supervising the Combined Cycle Island, it would have been preferable had it been involved in decisions related to the power plant being financed by JICA as the integration of the Solar Island and Combined Cycle Island is essential for the success of the plant.

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| **Quality of Supervision Rating :** | Moderately Satisfactory |
| **Overall Bank Performance Rating :** | Moderately Satisfactory |

**9. Assessment of Borrower Performance:**

**a. Government Performance:**

The Government demonstrated its strong commitment to this project by proceeding with it even when the cost proved to be much higher than originally envisaged (US$427.8 million against the planned US$327.7 million, an increase of nearly 30 percent). The Government financed the Solar Island to the extent of about US$ 61 million and facilitated and provided smooth flow of counterpart funding during implementation. In addition, government displayed its commitment to the project through sector reforms and specific policy interventions. These include the Supreme Energy Council's announcement in March 2010 of key policy steps related to wind and CSP scale-up in the country, proposed under the new Electricity Law, relating to transmission, customs duty on items required to be imported for construction, land use policy, environmental, social and defense -related permits for civil works, power purchase agreements and Build Own and Operate arrangements. As one incentive for the development of renewable energy, the government established a financial mechanism called the Petroleum Fund, where producers of non-fossil fuel electricity receive 2 Egyptian Pt/kWh (equivalent to 0.33 US cents/kWh), from the additional export revenues generated from fuel savings derived.

NREA received full support from the Ministry of Energy and Electricity during implementation of this project and also from the Egyptian Electricity Holding Company (EEHC) in building its capacity to develop and implement large projects.

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| **Government Performance Rating** | Satisfactory |

**b. Implementing Agency Performance:**

NREA established a Project Implementation Entity at the project site headed by a project manager, and staffed with specialists in technical, financial, procurement and environmental matters, some of whom were based at the NREA headquarters. NREA has had a relatively intensive transition from being a research and development-focused entity to becoming a green electricity generating entity. The ICR reports that the NREA team was largely responsive to Bank feedback, for example in tightening the environmental safeguards compliance during implementation. As the implementing agency, NREA monitored the contractors closely and, according to the ICR, ensured that project implementation was satisfactory (for example in addressing corrosion issues in the solar plant once they had been identified) although having separate contractors for the Solar Island and Combined Cycle Island made issues more complicated.

However, issues that arose during implementation and early operations are partly attributable to NREA 's limited experience and institutional capacity in managing multiple large contracts. Early in the project, there were weaknesses in monitoring the implementation of safeguards polices mainly due to low awareness among project implementation staff, but this improved as the project progressed. It would have been appropriate to have highlighted the corrosion issues in detail in the quarterly construction progress reports; however, these focused mainly on construction progress. The agency demonstrated its openness in sharing its experiences internationally through facilitation of a number of sites visits, including for World Bank senior management.

NREA decided to rely on an internal cadre of Combined Cycle Gas Turbine operators from Egyptian generation

companies rather than hire an external operation and & maintenance (O&M) contractor as recommended by the Bank. By doing so, NREA took on greater risk than initially envisaged. The project team notes that initial maintenance issues on the CCGT Island could have been managed better had the O&M contractor been hired as envisaged.

**Implementing Agency Performance Rating :** Moderately Satisfactory

**Overall Borrower Performance Rating :** Moderately Satisfactory

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

**a. M&E Design:**

The outcome indicators were appropriate for measuring progress towards attainment of the project 's development objective. They included generation capacity of the solar portion of the plant and the ISCC; solar output as a percentage of the total energy produced in the hybrid plant; the contribution of solar -based power in the Egyptian energy mix; and the total electricity generated from the ISCC plant. NREA was responsible for monitoring and evaluation through the PIE. The outcome were realistic and useful for assessing the progress towards the specified quantitative targets

**b. M&E Implementation:**

Quarterly progress reports were submitted regularly to the Bank by NREA. However, these reports focused mainly on construction progress but did not reflect the corrosion issue. Only the final completion report addressed this issue in detail.

**c. M&E Utilization:**

According to the project team, feedback from monitoring and evaluation helped to take corrective measures on progress in construction, and to track the main outcome indicators.

**M&E Quality Rating :** Modest

**11. Other Issues**

**a. Safeguards:**

The project was classified as Environmental Assessment Category "B" because its impacts were expected to be site-specific. Only the Environmental Assessment safeguard policy (OP 4.01) was triggered. The ICR (page 14) reports that the environmental impact of the project during the construction and operation phases was properly identified in the environmental and social impact assessment report, and the mitigation measures and monitoring plan were detailed in the environmental management plan. The project was developed on a site already owned by NREA, with no existing residents or any economic activity. No land acquisition was involved. Because of the rather remote location of the project, negative social development impacts were considered minimal.

Through quarterly reporting to the Bank, a log was kept on progress in implementing the Environmental Management Plan. According to the ICR (page 15), bi-annual supervision missions on safeguards aspects helped to ensure that any limitations in implementing the Plan were corrected in a timely fashion. All Bank supervision missions for this project after 2008 included an environmental team member to oversee safeguards implementation, and a specific section (and an annex) on safeguards were included in every mission Aide Memoire.

During the early phases of implementation (2008), awareness of environmental safeguards was low among the Project Implementation Entity staff, and the environmental mitigation and monitoring measures - relating to noise, air quality, waste, and occupational, health and safety - were not adequately conducted nor thoroughly reported. After the Bank team raised this issue with the Chairman of NREA, environmental performance improved, and maintained a "Satisfactory" rating in supervision reports from 2009 to project closure. An environmental team member was assigned to the Implementation Entity to oversee safeguards implementation. The Environmental Management Plan was disseminated to all relevant staff, including health and safety managers of the two main contractors on site, and to the site engineer, and appropriate training was provided to them. Existing contracts were amended with the contractors' cooperation to ensure that the Plan 's requirements were met. The ICR reports that, following these

measures, environmental protection measures were adequate and included the control of air, water and noise pollution, regular sprinkling of roads in the project sites, restricting the speed of vehicles in the working area to 20 km/hour, limiting the height of wastes carried on trucks to prevent over -spilling, and the construction of sedimentation tanks and sewage treatment facilities to ensure the outcomes met the required standards . Based on this information, the project team confirms compliance with the Bank's safeguard polices .

**b. Fiduciary Compliance:**

Procurement for the proposed project was carried out in advance during project preparation . The GEF Grant financed a single contract, for which the procurement process was completed in accordance to World Bank Procurement Guidelines. Procurement of non-bank financed contracts for other components of the power plant (the combined cycle component and consultant services ) had been conducted using JICA's procurement procedures and Standard Bidding Documents (SBD), which were deemed satisfactory to the Bank.

The establishment and maintenance of the financial management arrangements were assigned to NREA 's finance department. These arrangements were consistently found to be "Satisfactory" according to supervision reports. The recording and reporting of the project's transactions was done manually and on Excel sheets by the NREA Foreign Exchange Department. All external audit reports were received on time, were reviewed, and found acceptable . All of the audit reports were unqualified. The ICR also reports that project funds were managed in a transparent and efficient manner and full disbursement of GEF funds took place well before closing .

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

**d. Other:**

The institutional development associated with this first CSP project in Egypt has been significant . There are now PIE staff and private sector companies with skills in the design and implementation of CSP plants and also in the manufacture of components.

The project has created greater awareness for Concentrated Solar Power (CSP) technology within Egypt as well as globally. At the time this project was conceptualized and prepared, the international market momentum for CSP was slow. In the wake of the revived global interest in CSP and availability of critical concessional support through the Clean Technology Fund (CTF) for CSP development in developing countries, the Bank has since been supporting a program on CSP scale-up in the Middle East and North Africa Region (MENA). Lessons from the Kureimat ISCC implementation experience have informed the design of the MENA CSP Scale -up program.

| 12. Ratings: | ICR | IEG Review | Reason for Disagreement /Comments |
|---|---|---|---|
| Outcome: | Satisfactory | Moderately Satisfactory | While relevance of objectives and design, and efficacy are rated substantial, efficiency is modest due to significant cost overrun and delays in the completion and testing of the integrated plant. |
| Risk to Development Outcome: | Moderate | Significant | Financial, technical and institutional risks are still in the process of being resolved. |
| Bank Performance : | Satisfactory | Moderately Satisfactory | Greater attention could have been paid to issues related to the integration of the Solar and Combined Cycle Island; and corrosion issues relating to the solar plant as they arose. |
| Borrower Performance : | Satisfactory | Moderately Satisfactory | Initial delays in implementation and failure to sufficiently highlight corrosion issues relating to the solar plant as they arose. |

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| **Quality of ICR :** | | Satisfactory | |

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

**13. Lessons:**

The ICR provides the following two significant lessons which are adapted slightly below :

- Projects that seek to demonstrate a new approach and technology (CSP in this case) can be highly effective when used as tools for "visual learning". The Kureimat Project has made significant impact as one of the first CSP projects in the region and contributed to learning and greater awareness for CSP technology within Egypt, in the region and globally.
- The procurement and implementation strategy for a project should be aligned with the capacity of the implementation agency. Early planning for this project envisioned a single Engineer, Procure, Construct (EPC) contract for the solar and power plant implementation. However, this was split into two different contracts due to separate sources of funding with their own procurement requirements . The project experience suggests that the split contract approach has hindered rather than helped the implementation process in both the construction and O&M phases. An approach involving a single EPC contractor with responsibility for operations and maintenance would have been a better model in this context .

**14. Assessment Recommended?** ● Yes ○ No

**Why?** This project can be usefully assessed along with the similar Morocco ISCC Power (P041396) and Mexico Hybrid Solar Thermal Power Plant projects (P066426) which are due to close in December 2012 and January 2014 respectively.

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

The ICR provides adequate evidence of outputs and outcomes . The document is written in an analytical manner, and arrives at lessons that are well-grounded in technical information and implementation details . . Some of the technical and implementation detail could have been placed in an annex to make the main report more compact and readable. The document adequately follows the harmonized ICR guidelines .

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