Report Number: ICRR0020219

1. Project Data

Project ID **Project Name**

P093201 JO-Promotion of a Wind Power Market

Practice Area(Lead) Country **Energy & Extractives** Jordan

L/C/TF Number(s) Closing Date (Original) Total Project Cost (USD) 141,900,000.00

TF-92162 31-Dec-2012

Bank Approval Date Closing Date (Actual)

26-Jun-2008 30-Jun-2015

IBRD/IDA (USD) Grants (USD)

Original Commitment 6,000,000.00 6,000,000.00

Revised Commitment 6,000,000.00 6,000,000.00

Actual 6,000,000.00 6,000,000.00

Sector(s)

Renewable Energy Biomass(20%):Renewable Energy Geothermal(21%):Renewable Energy Solar(21%):Renewable Energy Wind(21%):Central Government (Central Agencies)(17%)

Theme(s)

Climate change(67%):Environmental policies and institutions(33%)

Reviewed by ICR Review Coordinator Prepared by Group

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2. Project Objectives and Components

a. Objectives

The Project Appraisal Document (p.7) states that the objectives of the project were to increase power supplied from renewable energy sources in a sustainable manner through the private sector and thereby help reduce the level of carbon emissions from hydrocarbon-based power generation sources.

The Global Environment Objective, as set out in the GEF Grant Agreement (p.7), differed slightly: to assist the Recipient in developing a sustainable market for power supply from renewable energy sources, thereby reducing carbon emissions from hydrocarbon-based power generation sources.

b. Were the project objectives/key associated outcome targets revised during implementation?
No

c. Components

(i) <u>Development of a Promotional Wind IPP Power Plant</u>: (At appraisal: US\$131.0 million, of which GEF: US\$1.0 million. At completion, GEF: US\$0.9 million).

This component (a) would provide for the supply and installation of wind power-based electricity-generating equipment, to generate 60-70 MW of electricity producing the equivalent of about 200 GWh per annum - in the area of Fujeij. The scheme would be developed by and financed by a private developer on a Build-Own-Operate (BOO) basis; (b) provide technical assistance in the design of the wind power plant, as well as in preparation of requests for proposals (RFPs) for the selection of private investors to develop the wind power plant.

(ii) <u>Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)</u>: (At appraisal: US\$6.9 million, of which GEF, US\$3.4 million. At completion, GEF: US\$4.06 million).

The component aimed (a) to establish a financing mechanism for JREEEF to support renewable energy activities (US\$0.4 million), and (b) to provide financial support to JREEEF, to be applied to performance-based subsidies for wind power projects (US\$3 million).

(iii) Renewable Energy Technical Assistance Support: (At appraisal: US\$2.4 million, of which GEF: US\$1.4 million. At completion, GEF: 0.74 million).

This component provided technical assistance to the Ministry of Energy and Mineral Resources (MEMR). The National Electric Power Company (NEPCO), the Electricity Regulatory Commission and other stakeholders to help (a) strengthen the legal, regulatory, institutional and policy frameworks for development of renewable energy resources, (b) establish guidelines for integrating the renewable energy sector into the national energy grid, (c) strengthen project implementation and M&E, (d) develop business models for wind power plants, (e) raise pubic awareness for renewable energy development, and (f) strengthen the knowledge base for renewable energy development.

(iv) <u>Development of a Market for Renewable Energy</u>: (At appraisal: US\$1.6 million, of which GEF: US\$0.2 million. At completion, GEF: US\$0.30 million).

This component aimed to develop a market for renewable energy through conduct of feasibility studies, engineering designs and other activities, including project financing, bid evaluation, processing of applications for environmental and other permits, and the processing of applications for regulatory controls and land titling.

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

Project Cost: Total project costs, including costs incurred by a private sector developer, totalled US\$141.9 million, of which items funded purely by the GEF Grant, amounted to US\$6.0 million (at appraisal and project closure). Actual costs worked turned out to be significantly higher than anticipated, on account of the delays in bringing the power plant at Fujeij to financial closure, and its substitution by the Tafila plant which raised the costs for Component 1 from US\$130.0 million to US\$287.0 million.

Financing: The sources of finance for this project consisted of the GEF grant of US\$6.0 million, supplemented by resources brought to bear by the private power developer (US\$287.0 million).

Borrower contribution. The Government had originally undertaken to provide US\$5.9 million of counterpart funding through JREEEF to the wind farm independent power producer. However, during implementation, the government chose to let NEPCO cover the full incremental cost which was estimated for 2015 to have been around US\$14.7 million.

Dates. The project was originally envisaged to close on December 31, 2012, but was restructured in November, 2012 and extended to June 20, 2013, and subsequently extended again to June 30, 2015.

3. Relevance of Objectives & Design

a. Relevance of Objectives

The project's objective of increasing supplies of power from renewable energy sources - which would contribute to a reduction of fuel imports by about 162 Ktoe of crude oil a year, whilst reducing greenhouse gas emissions by about 1.8 million tons of CO2-equivalent over the life of the project - was highly relevant at the time of inception and remained so until closure. By contributing to increased diversity of fuel options, the project was consistent with the Governments 2025 National Vision and Strategy (launched in 2015), which included a comprehensive national strategy to increase the contribution of local, renewable energy sources, and which set a target of 11 percent for renewable energy as part of the total energy mix by 2020, with particular focus on the development of wind and solar power plants. It was also consistent with the World Bank Group's Country Partnership Strategy (CPS) for Jordan for FY12-FY15, which drew attention to the Governments efforts to promote fundamental reforms in the electricity sector, including approval in 2010 of the Renewable Energy and Energy Efficiency (REEE) Law, which required creation of the Jordan REEE Fund, and which supported the Governments efforts to diversify energy sources and increase the share of renewable energy in overall electricity generation. Under the CPS, support to an increase in electricity generation capacity and to the Green Growth agenda (through two GEF Trust Funds), as well as to a possible project to provide a transmission line linking new solar and wind power plants, formed a key part of the strategy for the energy sector.

The project's relevance increased after 2010 as a result of an energy supply shock that exposed the power market to significant fluctuations, greatly increasing the economic and financial attractiveness of wind power, almost overnight. As a result of a sharp decline in availability of gas from Egypt, and a corresponding increase in its prices, the price of power generation soared, with energy import costs reaching over 21 percent of GDP in 2012. This increased the urgency of developing wind power, as a way of reducing import dependency on fuels and vulnerability to price fluctuations.

Rating High

b. Relevance of Design

The project's design and results chain was substantially consistent with its developmental objectives. The project's approach was to provide a combination of technical and financial assistance to help address key regulatory and institutional barriers to wind energy development in Jordan, with a view to promoting and developing a full-scale pilot project, established by an independent investor. This approach was intended to allow the Bank to participate along the entire project development process, and be in a position to address problems and issues as they arose. One fairly major weakness of this approach was that the Bank's financial exposure through the project was miniscule compared to the size of the Independent Power Producers' (IPPs) operation being promoted. This meant that the financial incentives that could be provided by the project, in the form of performance-based subsidies, were likely to be small and probably inadequate for the purpose of significantly affecting the cost structure of wind farm investments under consideration. The results framework captured the projects broad logic, in terms of its choice of outcome indicators; however, its intermediate indicators were not differentiated enough to determine attribution of the outcomes achieved to the specific inputs provided by the project.

Rating Substantial

4. Achievement of Objectives (Efficacy)

Objective 1

Objective

"To assist the Recipient in developing a sustainable market for power supply from renewable energy sources."

Rationale

Outputs:

The GEF grant funded consultant services to assist the authorities in preparing key regulations that contributed to the Governments overall efforts to develop a sustainable market for renewable energy supply, thereby diversifying Jordans energy mix, by playing a role in the establishment of an attractive business environment for renewable energy IPPs. The REEE law (2102, amended in 2014) provided the legal foundation for renewable energy in the country, allowing projects to be awarded through the direct proposal scheme. The REEE Law also set up JREEEF, which provided renewable energy subsidies to private operators, interest rate subsidies on commercial loans, a renewable energy guarantee facility to ease credit access for renewable energy project developers. Consultants prepared business plans for JREEEF and assisted the Government in drafting legal provisions concerning JREEEF in the REEE law. However, given the size of the project's financial contributions, it is likely that in the absence of the project, the above activities would have proceeded, albeit at a slower pace.

Outcomes:

The goal of developing a sustainable market for renewable sources of energy in Jordan appears to have been substantially achieved. This was reflected in an increase in the number of private developers of wind power, increased delivery of electric power from grid-connected renewable power, combined with an increase in generating capacity, over the project period. The project period also saw the JREEE fund becoming operational, and a major wind farm project being commissioned (albeit after a lengthy delay). From the perspective of the results indicators, most of the projects outcome targets were either fully met or exceeded (e.g. Electricity supply from renewable power sources achieved a value of 362 GWh per annum, relative to a target of 272 GWh; 6 BOO private developers expressed active interest in the country, against a target of one). The market also showed signs of sustainability, reflected in the fact that 26 projects were observed to be under development by the end of the project period (23 of which were BOO-type IPPs).

Rating Substantial

Objective 2

Objective

"To assist the Recipient to reduce carbon emissions from hydrocarbon-based power generation sources".

Rationale

In terms of reduced carbon emissions resulting, the target of 122,500 tCO2e per year of avoided direct CO2 emissions (originally scheduled to have been achieved by end-2012, later revised to mid-2015), was more than fully achieved, reaching a level of 162,796 tCO2e per year.

Some questions could be raised however regarding the extent to which all of these results could be attributed to the project. While the GEF grant no doubt contributed to the establishment of a financing mechanism for JREEEF, and for helping strengthen the legal and regulatory framework for developing renewable energy resources, the role of the performance-based subsidy is questionable. In May, 2014, given the delays in implementing and bidding of both Fujeij and Tafila plants, the Bank in fact proposed to the Government that the GEF grants performance subsidy amount be cancelled. Though the Government ultimately decided to retain it, the amount of funding available for the performance-based subsidies ostensibly to underpin the viability of the pilot wind IPP plant(s) - was very small relative to the cost of those wind farms (equal to about 0.8 percent of the discounted value of the lifetime electricity generation of the Tafila plant), and on balance - unlikely to have played much of a role in the investment decision of the IPP concerned. The project did provide advisory assistance support to the Governments procurement process for the Fujeij project, to support investor confidence, thereby reducing the risk premium and incremental cost, but that project was delayed significantly, such that the project is likely to be operational only in 2018. Meanwhile,

improvements in the economics of wind power in Jordan resulting from a sharp reduction in supplies of natural gas, necessitating a switch to more expensive fuel oils, from 2010 onwards provided a stimulus to the Tafila plant, which was being developed independently, to reach financial closure in 2014 and become operational the next year.

Rating Substantial

5. Efficiency

Economic and Financial Efficiency

The project concept consisted of an effort to leverage a significant amount of private-sector financing in the renewable energy sector on the basis of a small amount of funding provided for technical assistance and a small incremental-cost subsidy, combined with efforts to mitigate risk and disseminate best practice. Whether or not this was feasible, the earlier-mentioned energy supply shock that affected Jordan in 2010, resulted in a major increase in cost of gas, and changed the economics of wind power significantly. Though, ostensibly, for the Tafila power plant, US\$287 million in foreign direct investment were catalyzed on the basis of a tiny performance-based subsidy, a more realistic counterfactual for reasons described below - is that the investment, supported as it was by an IFC financing, would have occurred even in the absence of the project, though perhaps on a slightly longer timeline.

Economic and financial analysis conducted at appraisal, and presented in the PAD, for a 65 MW wind farm (in principle, the Fujeij plant) suggests that with a tariff rate of 12 US cents per kWh, a financial internal rate of return (IRR) of 15 percent would be generated. (A separate economic rate of return was also calculated, ranging between 5 percent and 9 percent (base to high case), with US\$2.4 million of the GEF grant amount earmarked for the wind farm as a performance-based subsidy/grant. However, this was inexplicably based on a lower tariff rate of only 7 US cents per kWh, and is therefore of doubtful validity). Reflecting the changed situation, economic analysis conducted in the ICR, based on an illustrative 117 MW wind farm, estimated an IRR of 10.1 percent. The performance-based subsidy made only a marginal difference: in its absence, the IRR worked out to 9.6 percent.

Organizational and Administrative Efficiency

A factor that impacted negatively on the projects efficiency was the effect of delays in implementation and disbursement. It is clear that the Bank seriously underestimated the risk of delays to the approval of the REEE Law. This together with safeguards challenges during tendering (on account of the potential impacts of the wind farm on migratory birds) led to major delays in the bidding process for Fujeij project, with the project's PPA being signed eventually only in December, 2015, well after the project had closed.

Efficiency Rating Modest

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

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	15.00	100.00 □Not Applicable
ICR Estimate	✓	10.00	100.00 □Not Applicable

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

6. Outcome

The project's objective is rated as highly relevant at inception, and continues to be so. At the same time, its design is found to be substantially relevant. In terms of efficacy, the project's two development outcomes were substantially achieved, the project contributing to the development of a sustainable renewable energy market, thereby helping to reduce carbon emissions from hydrocarbon-based energy sources. The project's efficiency is rated as Modest. There were moderate shortcomings in the operations efficiency and outcome is rated Moderately Satisfactory.

Outcome Rating
Moderately Satisfactory

7. Rationale for Risk to Development Outcome Rating

At project closure, the market for large-scale wind power could conceivably slow down in the foreseeable future. After the first few hundred megawatts are operational, the REEE Law envisions that NEPCO will take over the tendering of new capacity from MEMR, which could slow down the process, as there is no clear mechanism in place to finance the incremental cost if international prices of energy stay low. There is also a possibility that solar storage could become significantly cheaper for Jordan and could end up replacing wind power as a source of renewable energy. However, these factors do not endanger what has been achieved so far, and the risk of global environmental outcomes being derailed is relatively low. This is because all of the IPP projects have signed 20-year take-or-pay Power Purchase Agreements, as a result of which the sustainability of the market for power supply from renewable sources is virtually guaranteed and the risk that existing renewable energy plants will cease operating is small.

 Risk to Development Outcome Rating Negligible

8. Assessment of Bank Performance

a. Quality-at-Entry

The Bank team conducted some five years of preparatory work with the Government of Jordan, in identifying the Governments needs for institutional and technical assistance. The focus on establishing an enabling legal and regulatory framework for wind power development was the direct result of this effort, and of previous experiences in tendering private sector wind power capacity in Jordan. However, the project seriously underestimated the risks stemming from the overly ambitious scope and timeframe of the project's design. The risk assessment, as outlined in the PAD, was too narrow, focusing predominantly on risks of collusion and corruption involving the staff of the Project Coordination Unit (PCU), and on the issue of recruitment and retention of local qualified procurement and finance staff. It did not however take into account the fact that the project's scope and timeframe contained many elements that were intertwined; hence carrying the risk of delays building up. The passage of the REEE Law was, for instance, necessary for JREEEF to become operational, which was in turn necessary in order to set up the mechanism for the performance-based subsidy. Similarly, risks of political commitment (or lack thereof) were underestimated, as were risks relating to implementation of environmental safeguards. In the latter context, a full-scale Environmental and Social Impact Assessment (ESIA) may have been advisable prior to initiating the procurement process.

Based on this, Quality at Entry is rated Moderately Satisfactory.

Quality-at-Entry Rating Moderately Satisfactory

b. Quality of supervision

Quality of Supervision was similarly moderately satisfactory. The Bank team worked closely with the Government through the implementation

process, providing support to the PCU, as needed. The Bank fielded two supervision missions per year on average, in addition to maintaining a regular presence in the field, and dialogue with the Government. The Bank responded to the delays in passage of the REEE Law (and hence to the establishment of JREEEF and implementation of the performance-based subsidy) by working with the Government to address challenges and restructure the project. Corrective measures were also taken to address fiduciary and safeguards issues as they arose. Some shortcomings were observed in the tracking of GEO outcome and output indicators. Several indicators included in the PAD were not included in the ISRs, and inconsistencies were observed in target values though the impact of this on the quality of supervision was limited by the fact that no new wind farm was built until the end of the project.

Quality of Supervision Rating Moderately Satisfactory

Overall Bank Performance Rating Moderately Satisfactory

9. Assessment of Borrower Performance

a. Government Performance

Government agencies generally showed positive commitment to the objectives of the project and made significant progress in developing the necessary regulatory regime for attracting private capital in wind and solar PV power. However, the delayed passage of the REEE Law indicated that in addition to procedural and legislative obstacles, a strong constituency of support for the institutional setup of JREEEF had not been established at the outset of the project, which affected the ability of the project's performance-based subsidy to disburse in a timely manner. The Government did take such steps as it could to address these shortcomings through such measures as rechanneling the performance-based subsidy through NEPCO. There is no question however that the delayed passage of the REEE Law, and of its subsequent bylaws and regulations, did substantially slow down the development of a wind power market.

Government Performance Rating Moderately Satisfactory

b. Implementing Agency Performance

The project was implemented by a Project Coordination Unit (PCU), established under the Department of Renewable Energy in the Ministry of Energy and Mineral Resources (MEMR). The PCU's role included coordination with other institutions involved in the project, such as JREEEF, land owners, potential investors and the Electricity Regulatory Commission. The PCU had the responsibility for launching the RFP for the wind power BOO component on behalf of MEMR, and to administer the bidding and evaluation process. In addition, it would coordinate the technical assistance component and be responsible for all fiduciary aspects.

To implement the project, the PCU built up a core of qualified staff, who appear to have managed sector planning, procurement and financial management adequately. Procurement issues however proved to be a challenge in the case of the Fujeij wind farm. The management of safeguards which impacted the bidding process, by requiring additional conditionality and modification of technical specification in bids, to take account of bird migration safeguard risks (which the initial Environmental Assessment had mentioned but failed to fully assess) - was similarly a major learning experience for the PCU. The technical assistance assignments financed by the GEF grant were mostly implemented on time. The financial management performance of the PCU was similarly satisfactory.

Implementing Agency Performance Rating Moderately Satisfactory

Overall Borrower Performance Rating Moderately Satisfactory

10. M&E Design, Implementation, & Utilization

a. M&E Design

Monitoring indicators were for the most part adequate to measure the achievement of the projects Global Environmental Objectives. Targets specified in the PAD were generally appropriate, but target dates were revised to accommodate the additional time provided to the operation by the restructurings in 2012 and 2013. Data sources were clearly identified for each of the outcome indicators, along with institutional responsibility for collecting the necessary information. Additional core indicators were included at the time of the 2013 restructuring, to comply with the Other Renewable Energy sector category in the Bank's Results Platform.

b. M&E Implementation

Indicators were regularly updated for the purpose of the ISRs. However, some inconsistencies did emerge during implementation: For instance, four indicators included in the PAD were not included or monitored in the ISRs; MEMRs monitoring focused on large-scale projects, whereas the indicators in principle included small-scale projects; some small differences emerged in the formulation of targets for some indicators between PAD and ISRs. In addition, the results matrix implemented in the ISRs included two additional GEO indicators, added during the 2013 Level II restructuring, to reflect the guidance on core indicators, as defined for the sector in the Banks Results Platform.

Secondly, while it had originally been planned to contract an independent party to certify the results at mid-term and at project completion, on account of the rapid growth of the scale of the renewables program, MEMR and NEPCO took over the responsibility for monitoring the development of the renewable energy pipeline. As a consequence, no outside party was brought in to conduct the monitoring, and the savings (of US\$100,000 allocated) were reallocated during restructuring.

c. M&E Utilization

During implementation, the utilization of indicators was limited to the qualitative Intermediate Outcome indicators, as the main GEO indicators remained unchanged for much of the implementation period registering positive results mostly closer to the time of project closure. That said, MEMR and NEPCO are continuing to monitor the main outcome indicators on a real-time basis, to inform their generation and transmission planning. It appears that the Government is planning for the establishment during 2016 of a public data room for renewable energy development, in order to improve transparency.

M&E Quality Rating Substantial

11. Other Issues

a. Safeguards

The project was classified Environmental category B under OP/BP 4.01 Environmental Assessment, mostly on account of potential ecological and noise impacts. All environmental and social safeguard policies were complied with, and the ISRs rated safeguards as satisfactory (ICR, page 16). However, the potential impacts of the Fujeij Wind farm on migrant birds was an unanticipated environmental issue that ultimately significantly delayed construction of the plant which is now expected to be operational as late as end-2018, instead of 2012, as earlier expected.

The issue of migrant birds was noted in an earlier initial Environmental Assessment, but because the report was prepared outside the migratory season, it was inconclusive (notwithstanding the fact that the Jordan Rift valley is a major flyway for migratory birds). Lack of clarity on this issue led bidders to submit bids that were inconsistent with the bidding documents. The project had to be redesigned to minimize the impact on birds, including a buffer zone and manned monitoring stations.

The project did not involve any resettlement, even though OP/BP 4.12 Involuntary Resettlement, was triggered on account of possible compensation issues for land used for the transmission line. A Resettlement Policy Framework was prepared, disclosed and complied with.

b. Fiduciary Compliance

The PCU was responsible for all fiduciary aspects of the project. Its financial management (FM) performance was rated Moderately Satisfactory in most of the ISRs. FM and disbursement functions were handled by a part-time Accountant seconded from the Finance department of the Ministry of Planning and Internal Cooperation (MOPIC), and the flow of funds with the Bank was observed to be relatively smooth. Despite the general limitation of Government FM staff, the capacity of MOPIC staff was found to be generally adequate to deal with World Bank FM and disbursement policies. Financial reporting was satisfactory: all interim unaudited financial reports (IFRs) were submitted to the Bank in acceptable format and in timely manner. Also, all due audit reports were submitted to the Bank with clean audit opinions. Procurement was similarly rated Moderately Satisfactory through most of the implementation period. In the earlier years, however, procurement provided to be a significant learning experience on account of the delays that affected the Fujeij plant, which required re-design and modification of technical specifications for bids.

c. Unintended impacts (Positive or Negative)

The project was expected through its impact on future electricity tariffs to benefit the poor, whilst creating employment opportunities in the renewable energy sector. By providing for a greater domestic generation, it would provide the country with a hedge against future increases in prices of energy imports. A further social benefit arising was expected to be the reduction in local air pollution arising from alternative fossil-fueled generation.

d. Other

12. Ratings			
Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	
Risk to Development Outcome	Negligible	Negligible	
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Borrower Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of ICR		Substantial	

Note

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 key lessons:

• A full-scale Environmental & Social Impact Aseessment should be part of preparing the tender for a pioneering wind power project, if capacity is to be procured competitively. Wind power projects can involve a range of environmental impacts, including ecological, resettlement, etc., the significance of each of which depends upon local conditions, and it is difficult to anticipate in the absence of other comparable projects in the same region. Hence, for first-of-a-kind projects, efforts need tp be made to resolve all safeguard issues prior to starting a competitive bidding process.

• An approach based on financing the incremental cost of renewable energy projects can work provided the legal, regulatory and policy basis for the operation is in place prior to project approval. Finding donors or governments to finance incremental costs is often necessary to promote environmentally or socially additional projects wherever market prices do not reflect the full social benefit of the projects. For such projects, relatively small amounts of financing from donors/governments can be effective in closing financing gap, allowing a larger amount of private sector financing to be leveraged. However, the provision of an appropriate enabling legal and regulatory framework should not be part of the project; otherwise delays on account of unforeseen challenges can tie up financing commitments for an extended period, significantly raising the cost of the project and possibly increasing the cost of the original incremental cost subsidy envisaged.

14. Assessment Recommended?

No

15. Comments on Quality of ICR

The ICR is generally well-written and concise, and consistent with guidelines. It provides a reasonably good summary of a fairly complicated storyline. The analysis is generally evidence-based and candid. Two areas where the ICR could usefully have included a somewhat fuller discussion were the projects implementation progress (the ratings for which had been downgraded in most of the ISRs), and the question of attribution of results. The broad lessons drawn seem however to be mostly appropriate.

 a. Quality of ICR Rating Substantial