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IMPLEMENTATION COMPLETION AND RESULTS REPORT

ON A

GRANT FROM THE

GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$6.00 MILLION

TO THE

HASHEMITE KINGDOM OF JORDAN

FOR A

PROMOTION OF A WIND POWER MARKET PROJECT

March 29, 2016

Energy and Extractives Global Practice
Middle East and North Africa Region

CURRENCY EQUIVALENTS
(Exchange Rate Effective March 29, 2016)
Currency Unit = Jordanian Dinar (JD)
JD 1 = US$ 0.7096500
US$1 = JD 1.4091454

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

BOO	Build, Own, Operate
CAS	Country Assistance Strategy
CEGCO	Central Electricity Generating Company
COD	Commercial Operation Date
DPL	Development Policy Loan
EPC	Engineering, Procurement, and Construction
EMRC	Energy and Mineral Regulatory Commission
EA	Environmental Assessment
ESIA	Environmental and Social Impact Assessment
FM	Financial Management
GA	Grant Agreement
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEO	Global Environmental Objective
GHG	Greenhouse Gas
GoJ	Government of Jordan
ICR	Implementation Completion and Results Report
IPP	Independent Power Producer
IRR	Internal Rate of Return
ISR	Implementation Status and Results Report
JREEEF	Jordan Renewable Energy and Energy Efficiency Fund
JWPC	Jordan Wind Project Company
LNG	Liquefied Natural Gas
MEMR	Ministry of Energy and Mineral Resources
MoPIC	Ministry of Planning and International Cooperation
NEPCO	National Electric Power Company
NPV	Net Present Value
PAD	Project Appraisal Document
PCU	Project Coordination Unit
PDO	Project Development Objective
PPA	Power Purchase Agreement
PPG	Project Preparation Grant
PV	Photovoltaics
REEE Law	Renewable Energy and Energy Efficiency Law (No. 13)

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JORDAN

Promotion of a Wind Power Market

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A. Basic Information

Country:	Jordan	Project Name:	Promotion of a Wind Power Market
Project ID:	P093201	L/C/TF Number(s):	TF-92162
ICR Date:	03/29/2016	ICR Type:	Core ICR
Lending Instrument:	Specific Investment Loan	Borrower:	BENEFICIARY: GOVERNMENT OF JORDAN
Original Total Commitment:	US$6.00 million	Disbursed Amount:	US$6.00 million
Revised Amount:	US$6.00 million		
Environmental Category: B		**Global Focal Area: C**	
Implementing Agencies: Ministry of Energy and Mineral Resources (MEMR)			

B. Key Dates

Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	03/06/2006	Effectiveness:	09/24/2008	11/26/2008
Appraisal:	12/10/2007	Restructuring(s):	—	07/25/2012 06/21/2013 06/21/2015
Approval:	06/26/2008	Midterm Review:	12/30/2011	09/29/2011
		Closing:	12/31/2012	06/30/2015

C. Ratings Summary

C.1 Performance Rating by ICR

Outcomes:	Moderately Satisfactory
Risk to Global Environment Outcome	Low or Negligible
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance

Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Satisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Moderately Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance:	Moderately Satisfactory	**Overall Borrower Performance:**	Moderately Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	**Indicators**	**QAG Assessments (if any)**	**Rating**
Potential Problem Project at any time (Yes/No):	Yes	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA):	None
Global Environmental Objective (GEO) rating before Closing/Inactive status	Moderately Satisfactory		

D. Sector and Theme Codes		
	Original	**Actual**
Sector Code (as % of total Bank financing)		
Central government administration	17	17
Other Renewable Energy	83	83
Theme Code (as % of total Bank financing)		
Climate change	67	67
Environmental policies and institutions	33	33

E. Bank Staff		
Positions	**At ICR**	**At Approval**
Vice President:	Hafez M. H. Ghanem	Daniela Gressani
Country Director:	Ferid Belhaj	Joseph P. Saba
Practice Manager/Manager:	Charles J. Cormier	Jonathan D. Walters
Project Team Leader:	Ferhat Esen	Reynold Duncan
ICR Team Leader:	Joern T. Huenteler	–
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F. Results Framework Analysis

Global Environment Objectives (GEO) and Key Indicators(as approved)

The Global Environment Objective (GEO) as defined in the Grant Agreement was 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."

Revised Global Environment Objectives (as approved by original approving authority) and Key Indicators and reasons/justifications

Not applicable.

(a) GEO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Increased electricity supply from grid-connected renewable power			
Value (quantitative or qualitative)	72 GWh per year	272 GWh per year	Only the target date was revised.	362 GWh per year
Date achieved	06/26/2008	12/31/2012	06/30/2015	06/30/2015
Comments (incl. % achievement)	133% achieved			
Indicator 2:	Increased number of private developers of wind power			
Value (quantitative or qualitative)	0	1 or more.	Only the target date was revised.	6 BOO wind project developers
Date achieved	06/26/2008	12/31/2012	06/30/2015	06/30/2015
Comments (incl. % achievement)	600% achieved			
Indicator 3:	Avoided direct CO2 emission			
Value (quantitative or Qualitative)	32,500 tCO2e per year	122,500 tCO2e per year	Only the target date was revised.	162,796 tCO2e per year
Date achieved	06/26/2008	12/31/2012	06/30/2015	06/30/2015
Comments (incl. % achievement)	133% achieved			
Indicator 4:	Generation capacity of renewable energy constructed - other than hydropower			
Value (quantitative or Qualitative)	5 MW	95 MW	The indicator was added during the second Level II restructuring in June 2013.	101.45 MW
Date achieved	06/26/2008	12/31/2012	06/30/2015	06/30/2015
Comments (incl. % achievement)	At least 90MW of the Tafila wind farm and 5 MW of solar were commissioned by June 30, 2015, in addition to already existing installations. Therefore the indicator was at least 107% achieved.			
Indicator 5:	Generation capacity of renewable energy constructed - wind			
Value (quantitative or Qualitative)	1.45 MW	91.45 MW	The indicator was added during the second Level II restructuring in June 2013.	91.45 MW

Date achieved	06/26/2008	12/31/2012	06/30/2015	06/30/2015
Comments (incl. % achievement)	At least 90MW of the Tafila wind farm were commissioned by June 30, 2015. Therefore the indicator was at least 100% achieved.			
Indicator 6:	A fund for renewable energy fully operational			
Value (quantitative or qualitative)	No renewable energy fund or financing mechanism	A fund for renewable energy fully operational	This indicator was added in the last restructuring to make the results indicators more consistent with the PAD. Only the target date was revised.	A fund for renewable energy fully operational
Date achieved	06/28/2008	06/30/2010	06/30/2015	06/30/2015
Comments (incl. % achievement)	100% achieved.			

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Incremental changes to policy and regulatory framework (IPP approval process; tariff approval) implemented.			
Value (quantitative or Qualitative)	None	Yes	This indicator was added in the last restructuring to make the results indicators more consistent with the PAD. Only the target date was revised.	Yes
Date achieved	06/26/2008	03/31/2010	06/30/2015	06/30/2015
Comments (incl. % achievement)	100% achieved.			
Indicator 2:	Financing mechanism for renewable energy			
Value (quantitative or Qualitative)	No formal financing mechanism for renewable energy in place	JREEEF established and operational.	Only the target date was revised.	JREEEF is fully operational.
Date achieved	06/26/2008	06/30/2010	06/30/2015	06/30/2015

Comments (incl. % achievement)	100% achieved.			
Indicator 3:	The capacity of NEPCO and MEMR to incorporate renewable energy, including wind power, in energy planning model			
Value (quantitative or Qualitative)	Weak capacity	Renewable energy, including wind power, fully incorporated in the energy planning.	Only the target date was revised.	Renewable energy, including wind power, fully incorporated in the energy planning (since 2012).
Date achieved	06/26/2008	03/31/2010	06/30/2015	06/30/2015
Comments (incl. % achievement)	100% achieved.			
Indicator 4:	Status of the contract for development of the wind power plant			
Value (quantitative or Qualitative)	No contract in place.	A contract for development of the wind power plant signed and project financing close completed.	Only the target date was revised.	Contract for the Tafila Wind IPP in place; Financial close completed; Construction started; and Test-commissioning works in place for full commercial operation to begin by August 2015.
Date achieved	06/26/2008	03/31/2010	01/31/2014	06/30/2015
Comments (incl. % achievement)	100% achieved.			
Indicator 5:	60-70 MW of wind power IPPs operational			
Value (quantitative or Qualitative)	None	Yes	This indicator was added in the last restructuring to make the results indicators more consistent with the PAD. Only the target date was revised.	Yes
Date achieved	06/26/2008	12/31/2012	06/30/2015	06/30/2015
Comments (incl. % achievement)	100% achieved.			

G. Ratings of Project Performance in ISRs

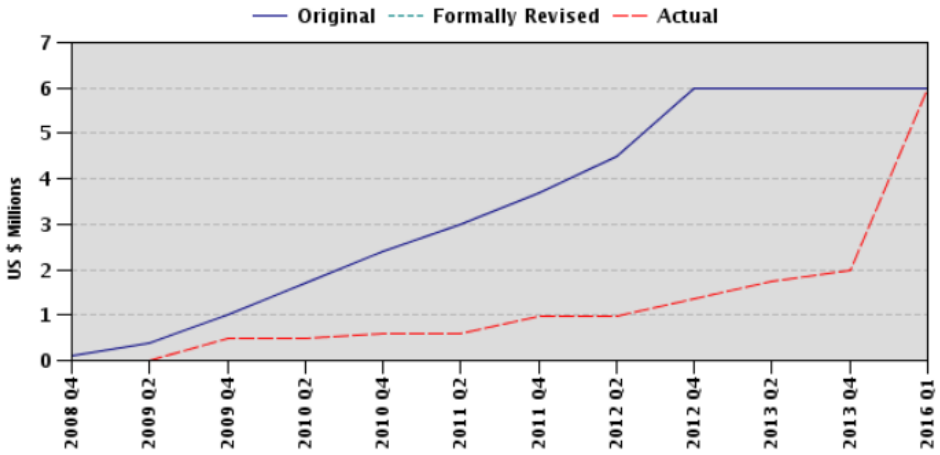
No.	Date ISR Archived	GEO	IP	Actual Disbursements (US$, millions)
1	09/02/2008	Satisfactory	Satisfactory	0.00
2	06/23/2009	Satisfactory	Satisfactory	0.50

3	12/23/2009	Moderately Satisfactory	Moderately Unsatisfactory	0.50
4	06/23/2010	Moderately Satisfactory	Moderately Unsatisfactory	0.58
5	12/30/2010	Moderately Satisfactory	Moderately Satisfactory	0.58
6	06/15/2011	Moderately Satisfactory	Moderately Satisfactory	0.98
7	12/03/2011	Moderately Unsatisfactory	Moderately Unsatisfactory	0.98
8	06/28/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	1.36
9	12/26/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	1.73
10	07/04/2013	Moderately Satisfactory	Moderately Unsatisfactory	1.99
11	12/31/2013	Moderately Satisfactory	Moderately Unsatisfactory	2.34
12	06/28/2014	Moderately Satisfactory	Moderately Unsatisfactory	2.34
13	12/02/2014	Moderately Satisfactory	Moderately Unsatisfactory	2.34
14	06/21/2015	Moderately Satisfactory	Moderately Satisfactory	2.34

H. Restructuring (if any)

Restructuring Date(s)	Board Approved GEO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in US$, millions	Reason for Restructuring and Key Changes Made
		GEO	IP		
07/25/2012		MU	MU	1.36	To allow the government to operationalize the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) and complete the Fujeij wind independent power producer (IPP) bidding process. The original closing date of December 31, 2012 was extended to June 30, 2013.
06/21/2013		MU	MU	1.99	To provide additional time to allow the disbursement of the performance-based subsidy component. The project closing date was extended to June 30, 2015.
06/21/2015		MS	MS	2.34	Removed targeted support for Fujeij. Reallocated US$0.26 million of unused disbursed funds from Component 3 to Component 2b). Revised the Project's Grant Agreement to assign the National Electric Company (NEPCO) as beneficiary of the performance-based subsidy.

I. Disbursement Profile



1. Project Context, Global Environment Objectives, and Design

1. **The project 'Promotion of a Wind Power Market' (P093201) is aimed at increasing electricity supply from renewable energy in Jordan, with a focus on wind power.** Specifically, the project supported (a) the passing of the renewable energy legislation and regulations; (b) the establishment of a funding institution to support renewable energy development; (c) technical assistance to government agencies involved in wind power; and (d) the development of a promotional wind power project through an independent power producer (IPP), under a build-own-operate (BOO) arrangement. Funded through a US$6.0 million Global Environment Facility (GEF) Grant (TF-92162), the project was approved on June 26, 2008 and, after two extensions, closed on June 30, 2015. The project's preparation was funded by a US$350,000 GEF Grant (TF-054261) that was signed on October 27, 2004 and, after three extensions, closed on February 29, 2008.

1.1 Context at Appraisal

Energy Sector Background

2. **There was no market for commercial wind power in Jordan at the time of approval.** The key barriers included limited access to commercial financing, the absence of a legal and regulatory framework for wind power, and limited understanding of the impact of wind energy on Jordan's power system. Two small demonstration-scale wind farms were installed in Jordan in the 1980s and 1990s, with a total of 1.45 MW of nominal generation capacity (see Table 10.1 in annex 10). Attempts to develop large-scale, grid-connected wind farms had stalled, including an attempt to tender private sector-owned wind capacity in 2000–2002, which did not result in a contract award as the National Electric Power Company (NEPCO) was hesitant to pay a premium for wind power and donors were hesitant to provide concessional financing without a clear pricing mechanism and the prospect of a sustainable market for wind power (see paragraph 28).

3. **Shortly before the project's approval, the government of Jordan (GoJ) had set ambitious targets for renewable energy.** Natural gas and crude oil or petroleum products covered approximately 98 percent of Jordan's total primary energy supply in 2007 while renewable energy represented less than 1 percent. Jordan lacks domestic natural gas and conventional crude oil resources and in 2008, imported 96 percent of its energy needs. In 2007, total spending on energy imports was equivalent to over 10 percent of the gross domestic product. The National Energy Strategy 2007–2020 aimed to diversify the fuel mix and supply sources to reduce dependence on imports and use of oil and mitigate adverse balance of payments situations and negative environmental impacts. Besides targets for increased utilization of natural gas and energy use efficiency, the National Energy Strategy 2007–2020 set a target of 7 percent of the country's energy mix to come from renewable sources by 2015 and 10 percent by 2020—revising upward the 3 percent target for 2015 set in the National Agenda 2006–2015 published the year before. To provide the basis for achieving this target, a new Renewable Energy and Energy Efficiency Law (REEE Law) was close to completion at the time of approval.

4. **The GoJ expected significant demand growth and aimed to develop new generation capacity though the private sector.** Demand growth was expected to exceed 4 percent per year over 2006–2015. The GoJ envisioned new generation capacity to meet this new demand to be

owned by the private sector. In 2007, the first IPP, Amman East Power Plant, successfully raised US$300 million of private capital (comprising US$75 million in private equity and US$225 million in loans, of which US$45 million was covered by an IBRD Partial Risk Guarantee). Furthermore, the privatization of the Central Electricity Generation Company (CEGCO), the main electricity generation company, was concluded in October 2007 and saw 51 percent of the company shares sold to private investors.

5. **The National Energy Strategy 2007–2020 sought to develop large-scale, grid-connected wind power projects owned by the private sector.** To achieve the 7 percent renewable energy target, the National Energy Strategy 2007–2020 called for the issuance of a Renewable Energy Law and a mechanism to stimulate investment from the private sector. Specifically, the strategy recommended developing a number of large-scale wind power projects, including at the sites Fujeij, Tafila, Kamsha, Harir, and Wadi Araba. A total of 600 MW of wind projects were to be developed through the private sector, in line with the GoJ's strategy to leverage private investment to expand power generation capacity.

6. **Jordan prioritized wind power development for three reasons.** First, wind power was attractive because it contributed to energy security in Jordan and saved fuel oil and natural gas could be diverted to higher value use. Second, Jordan has a strong wind regime—considered the best in the Mashreq region—and the potential for wind power generation was expected to be large enough to provide a significant proportion of power supply over the long term. Third, recent cost reductions meant that wind power was at that time considered more cost-effective than solar photovoltaics (PV) and concentrated solar power.

7. **The GoJ had concluded a number of technical assistance activities on renewable energy, but no large-scale investment had taken place.** These activities included research, training, measurements and resource assessments, feasibility studies, and small-scale pilot projects with support from bilateral and multilateral donor organizations. Significant experience had, as a result, been gathered in solar heating (15 percent of households used solar water heaters) and cooling applications, water pumping, and off-grid PV (for example, for communications). However, no large grid-connected renewable energy investments had taken place in Jordan at the time of approval.

Rationale for the GEF/World Bank Group Assistance

8. **The project was designed to help create a sustainable renewable energy market in Jordan and contribute to reducing greenhouse gas (GHG) emissions.** The project was designed to contribute to the GoJ's objective to supply 7 percent of the country's energy mix from renewable sources by 2015. To achieve these results, the project aimed to do the following:

(a) **Support creation of a legal and regulatory framework for renewable energy development.** A new REEE Law was close to completion at the time of approval. Passing of this legislation and supporting regulations was expected to address the key barriers of not having a suitable policy and regulatory framework.

(b) **Establish a financing mechanism for renewable energy development.** Taking cognizance of the previous failure with a BOO structure for wind power, the project

was designed to support the establishment of transparent procurement and financing mechanisms, including the provision of subsidies where necessary. The project design envisioned the to-be-established Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)[1] to be the main vehicle for this financing mechanism.

(c) **Develop a promotional wind power project.** Subsequent to establishing the required policy and regulatory framework as well as the financing mechanism, the project's design was to assist the GoJ in procuring a full-scale pilot wind power project all the way through to commissioning.

9. **GEF support was intended to bring international expertise and financing into Jordan to develop the market for large-scale, grid-connected wind power.** The rationale for GEF support was as follows:

(a) The financial and technical/operational risks of grid-connected wind power were still high at the time of approval, especially in a developing country context. International expertise and financing, leveraged through GEF assistance, were considered critical to generate market confidence and reduce local investment risks.

(b) By demonstrating the development of grid-connected wind power in a developing country context and disseminating best practices, the project was considered a critical step toward scaling up grid-connected wind energy in developing countries.

(c) The potential for future cost reduction in grid-connected wind power was considered high. GEF assistance was expected to contribute to bringing down local cost of wind power development, ensuring a self-sustaining market for wind power in the long term.

(d) A large potential market for grid-connected wind power was expected in Jordan and the Middle Eastern Region in general. The project was expected to help unlock this large potential market, thereby contributing to the regional scale-up of low-carbon power generation.

(e) The project was expected to enable substantial reduction in GHG emissions, especially if additional scale-up financing from the Clean Development Mechanism of the Kyoto Protocol was to become available for wind power development in Jordan.

10. **The operation was consistent with, and supportive of, national development priorities and the strategies of the World Bank and the GEF.** As outlined, the project was aligned with the 7 percent renewable energy target for 2015 specified in the National Energy Strategy 2007–2020. The project was also consistent with Jordan's National Agenda 2006–2015, which recommended developing the exploitation of new and renewable energy resources and establishing suitable regulatory frameworks to manage these resources. On the donor side, the project formed part of the Bank's Country Assistance Strategy (CAS) FY2006–2010. Specifically, it was to support the Programmatic Cluster 1 of the CAS (Productive job creation through strengthening the

[1] JREEEF is also variously referred to in the project documents as JORDAN REEEF, JORDAN REEF, JREEF, or J-REEEF.

investment environment and human resources for a skill-intensive and knowledge-based economy) by assisting to reduce the perceived risk of the investment environment and initiating diversification of energy supply through output-based private sector involvement. The project addressed the objectives of the GEF's Operational Program 6 (Promoting the adoption of renewable energy by removing barriers and reducing implementation costs) and contributed to Strategic Program 3 (Promoting market approaches for renewable energy) under the climate change focal area of GEF-4 (2006–2010).

1.2 Original Global Environmental Objective and Key Indicators *(as approved)*

11. **The Global Environment Objective (GEO)** as defined in the Grant Agreement was 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." The PAD lists a GEO and a separate Project Development Objective (PDO), however both are slightly different from the GEO definition in the Grant Agreement.[2] This ICR measures the project's outcomes primarily against the GEO in the Grant Agreement but discusses the (minor) differences between the objective formulations in view of the project's outcomes in section 3.2.

12. **The key indicators as specified in the PAD** (section 2, p. 5) were market penetration of on-grid renewable energy (with a target of at least 2% of total supply by the end of the project); and GHG emissions avoided from electricity generation (targeting an increase from 32,500 to at least 122,500 tons of CO_2-equivalent per year). However, the Grant Agreement does not specify any GEO indicators (or any other type of outcome indicator), and the ISRs measure a slightly different set of GEO indicators: (i) electricity supply from grid-connected renewable power (in GWh); (ii) the number of private developers of renewable electricity generation (without unit); and (iii) avoided direct CO2 emission (in tons of CO_2-equivalent per year). This ISR measures the project's outcomes primarily against the key performance indicators as approved in the PAD but discusses extensively the project's performance against all of the mentioned GEO indicators.

1.3 Revised GEO and Key Indicators (as approved by original approving authority), and reasons/justification

13. The second Level II restructuring in June 2013 added two GEO indicators (non-hydro renewable capacity installations and wind power capacity installations) to reflect the guidance on core indicators as defined for the sector 'Other Renewable Energy' in the Bank's Results Platform.

1.4 Main Beneficiaries

14. **While there is no formal definition of main beneficiaries in the PAD, the document names as the main beneficiary of the project the GoJ and specifically the Renewable Energy Department in the Ministry of Energy and Mineral Resources (MEMR)** (p. 48). Other

[2] The GEO in the PAD (section 3, p. 5) is defined as "to reduce GHG emissions by removing the barriers to the establishment of a sustainable wind energy market as well as integrate wind energy generation into the energy mix through the operation of a commercial wind farm in Jordan." The PDO in the PAD (section 2, p. 5) is defined as "to increase electricity supply 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".

beneficiaries explicitly referred to in the PAD include contracted consultants (p. 41). The Grant Agreement refers to the recipients of subgrants from JREEEF (the fund to be set up under the project; see section 1.5 below) as beneficiaries. Inferring from the project design in the PAD, further immediate beneficiaries include—mainly as recipients of technical assistance under the project—NEPCO, JREEEF, and the Energy and Mineral Regulatory Commission (EMRC).[3]

15. **A Level II restructuring in June 2015 revised the project's GA to include NEPCO as a beneficiary of the grant component that was originally to be disbursed to JREEEF.** Details on the restructuring are given in sections 1.6 and 2.2.

16. **The ultimate beneficiaries of the project are the electricity consumers in Jordan, including households, private sector, and public sector consumers, who benefit from cleaner and more secure power supply compared to fossil fuels.** The population of Jordan further benefits from employment generated through renewable energy development, which is particularly relevant in view of high youth unemployment, which stood at 28.8 percent in 2014. The population, and especially the poor, further benefit from reduced local air pollution caused by fossil-fueled power generation.

1.5 Original Components *(as approved)*

17. **The project consisted of four main components covering technical and financial assistance.** The components as defined in the Grant Agreement and the PAD are given below. Importantly, the specificity of the description of Component 1a differed between the Grant Agreement and the PAD. The description indicates the text in both versions. Since the text in the GA is less specific, it did not have to be revised in the third Level II restructuring described in section 2.2 (paragraph 41).

Component 1: Development of a Wind Power Plant (Total: US$131.0 million; Private Sector: US$130.0 million; GEF: US$1.0 million)

(a) **Grant Agreement:** Promoting the generation of electricity from wind resources.

Project Appraisal Document: Supply and installation of equipment for generating electricity from wind resources to produce 60–70 MW of electricity in the area of Fujeij (US$130 million). The scheme, excluding connection to the grid, will be developed and financed by a private sector developer on a BOO basis. Studies show that a total of about 200 GWh could be produced annually from a 60–70 MW wind farm. This will form part of the total wind power capacity of 600 MW that the GoJ plans to have operational by 2015 (US$130 million, to be financed by the private sector).

[3] The EMRC changed its name from the Electricity Regulatory Commission during the implementation of the project.

(b) Provision of technical assistance in the design of the wind power plant as well as in the preparation of requests for proposals for the selection of private investors to develop the wind power plant (US$1 million from the GEF).

Component 2: Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) (Total: US$6.9 million; GoJ: US$2.5 million; GEF: US$3.4 million)

(a) Establishing a financing mechanism for JREEEF to support renewable energy activities (US$0.4 million)

(b) Provision of financial support to JREEEF, which was to be applied to performance-based subsidies for wind power projects (GoJ: US$2.5 million; GEF: US$3 million)

Component 3: Renewable Energy Technical Assistance Support (Total: US$2.4 million; GoJ: US$1.0 million; GEF: US$1.4 million)

18. Provision of technical assistance to MEMR, NEPCO, Electricity Regulatory Commission, and other stakeholders in the development of renewable energy regarding (a) strengthening the legal, regulatory, institutional, and policy frameworks for the development of renewable energy resources; (b) establishing guidelines for integrating the renewable energy sector into the national energy grid of the recipient; (c) strengthening project implementation, evaluation, and monitoring; (d) developing business models for wind power plants, including the establishment of portfolios of wind power plants; (e) raising public awareness for renewable energy development; and (f) strengthening the knowledge base pertaining to renewable energy development through studies, training, workshops, publications, and seminars.

Component 4: Development of a Market for Renewable Energy (Total: US$1.6 million, GoJ: US$1.4 million; GEF: US$0.2 million)

19. Developing a market for sustained renewable energy through, among others (a) feasibility studies; (b) engineering designs; and (c) other activities related to market development, such as project financing, the evaluation of bids relating to the setting up of wind power plants, the processing of applications for environmental and other permits, and the processing of applications for regulatory approvals and land titling.

20. The expenditure categories included 'Consultants' services, seminars, and training' (Components 1–4) and 'Subproject grants for wind power performance subsidy' (Component 2b). The funding allocation to the four components is summarized in Table 1. Figure 1 shows the envisioned flow of funds under the project.

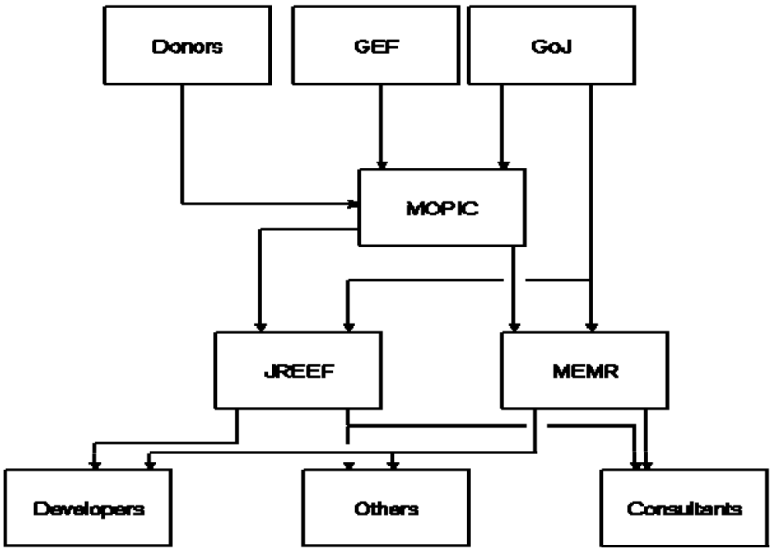
Table 1. Summary of Project Components

Component	Indicative Costs (US$, million)	% of Total	Bank financing (US$, million)	% of Bank Financing	GEF Financing (US$, million)	% of GEF Financing*
Development of a Wind Power Plant	131.0	92.3	0.0	0.0	1.0	16.7
Jordan Renewable Energy and Efficiency Fund (JREEEF)	6.9	4.9	0.0	0.0	3.4	56.7

Renewable Energy Technical Assistance Support	2.4	1.7	0.0	0.0	1.4	23.3
Development of a Market for Renewable Energy	1.6	1.1	0.0	0.0	0.2	3.3
Total Project Costs	**141.9**	**100.0**	**0.0**	**0.0**	**6.0**	**100.0**

Note: *Allocation of the GEF grant to each project component (as a percentage of the US$6 million GEF grant).

Figure 1. Flow of Funds Envisioned under the Project



1.6 Revised Components

21. The project had three Level II restructurings in 2012, 2013, and 2015.

22. **Two Level II restructurings, approved in November 2012 and June 2013, reallocated funds between the (unchanged) components.** The changes in fund allocation are given in Table 2.

23. **The third Level II restructuring, approved in June 2015, revised Component 2.** The revised text in the amended GA is given below.

24. **Component 2: Performance-based Payments for Wind Power Projects.** Provision of performance-based payments to NEPCO for the achievement of performance targets.

Table 2. Revisions of Fund Allocation to Project Components

Component	Original GEF Financing (US$, millions)	Restructuring November 2012	Restructuring June 2013	Restructuring June 2015
Development of a Wind Power Plant	1.00	0.90*	0.90	0.90
Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)	3.40	3.40	3.80	4.06
Renewable Energy Technical Assistance Support	1.40	1.40	1.00	0.74

Development of a Market for Renewable Energy	0.20	0.30*	0.30	0.30
Total Project Costs	6.00	6.00	6.00	6.00

Note: *The reallocation of US$0.1 million from Component 1b to Component 4 did not require a restructuring because both components fell under one category of expenses in the GA (Consultants' Services).

1.7 Other significant changes

25. No other significant changes were made to the project's design and structure.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design, and Quality at Entry

Assessment of the Project Design

26. **The project's design addressed the key barriers to wind energy development in Jordan, but the scope of the project may have been too ambitious for a single operation.** The project aimed to promote, with relatively small financial means, the wind market through technical assistance to entities across the sector and by supporting a full-scale pilot project along the entire development process—from helping set up the regulatory and institutional framework up to actual performance payments to the commissioned wind farm. The project's design enabled the Bank to be a partner to the GoJ throughout the market development process and address problems and issues as they arose, and most of the project's efforts have come or are coming to fruition. However, the project's ambitious scope and timeframe led to considerable delays; in hindsight, risks stemming from the many interdependencies between the project's components were underestimated.

27. **The project's objectives, focus, and design were grounded in five years of preparatory work by the Bank, as well as long-standing assistance by other donors.** Bilateral donor organizations—including from the United States, Denmark, and Germany—were supporting the GoJ with initial wind measurements, drafting regulations, and an initial tendering process (2000–2002) since the 1990s. A US$1 million Climate Change Grant from Japan's Policy and Human Resources Development Trust Fund (TF-052920), administered by the Bank, supported, among others, technical assistance for the wind sector in 2003–2007. Outputs of the Policy and Human Resources Development Grant included a resource assessment in renewable energy (including detailed wind resource maps), a renewable energy development strategy, a prefeasibility study for a commercial wind power project, and a draft of what later became the REEE Law. The GEF project's preparation was also supported by a two-year US$350,000 GEF Project Preparation Grant (PPG) in the form of a recipient-executed trust fund active from 2004 to 2008 (TF-054261). Key outputs of the PPG included a technical and economic study of wind power development, a work plan for the procurement of wind projects under a BOO arrangement, the institutional and operational arrangements for JREEEF, an environmental assessment (EA) as well as a resettlement framework for the Fujeij site, and assistance to MEMR in preparing the tendering for Fujeij. Moreover, the Bank, in parallel to the preparation of the GEF wind grant, supported the GoJ in the preparation of the National Energy Strategy 2007–2008, published in 2006, in which renewable energy was featured as a core element of diversification of energy sources. The assessment of

capacity-related and institutional barriers was therefore well grounded in dialogue and country experience. Therefore, the objectives, focus, and design of the technical assistance components was in sync with the country's institutional capacity and need for assistance.

28. **Specifically, the project's focus on establishing an enabling legal, regulatory, and institutional framework was the direct result of previous experiences in tendering private sector-owned wind power capacity in Jordan.** Previous initiatives to involve the private sector in wind power development failed because of inadequate preparation by the GoJ to decide how the incremental costs will be financed. In 2002, MEMR had received two proposals from two international joint ventures for the development and operation of wind power projects on a BOO basis at three preselected sites (Fujeij, Wadi Araba, and Hofa) with 25–30 MW per site. However, even though the tariff bids could be considered relatively attractive in hindsight (US$0.0672-0.0877 per kWh), the state-owned single buyer NEPCO was unable to evaluate the adequacy of the proposed tariffs and eventually unwilling to carry the incremental cost. At the same time, international donors such as the Danish International Development Agency were hesitant to provide concessional financing in the absence of a legal and regulatory framework that ensured market sustainability. Therefore, it was realized at an early stage that sufficient analysis needed to be carried out to provide a legal, regulatory, and pricing framework and to assess the cost and corresponding tariff implications of wind power in Jordan. It was also acknowledged that there was a need for a subsidy or grant on commencement of the renewable energy program, to establish a suitable financing mechanism that is performance based and to ensure sustainability to eventually be able to absorb the full incremental cost through the electricity tariff.

29. **A simpler institutional design for the performance subsidy (Component 2b) may have been more adequate in hindsight.** The draft law and the project design envisioned the performance subsidy to be channeled through JREEEF, which was to be set up as an organizationally independent entity, in the form of an output-based premium on top of the revenues from power sales to NEPCO. The rationale of channeling the subsidy through JREEEF was that NEPCO would not have to cover the full incremental cost of wind power. The rationale to establish JREEEF as an independent entity was to ensure sufficient independence in JREEEF's financial decision making, to avoid interference in its activities to promote large-scale renewable energy. Eventually, however, after considerable delay because of this issue, the final legislation passed in 2012 established JREEEF as one of MEMR's subentities (with a mandate that focuses on distributed and small-scale renewables). For large-scale renewable projects, NEPCO serves as the sole contractual counterpart. Having a single counterpart for wind developers simplifies the contractual process leading up to financial closure, and instituting NEPCO as the sole counterpart has so far not led to any hindrances in the development of Jordan's renewable energy sector. This is consistent with international experience with policy frameworks for wind power development, which suggests that only few countries have chosen to channel wind subsidies through an independent financial vehicle and that the absence of such a vehicle does not seem to be a major hindrance to market promotion.[4]

[4] For example, GEF.2008. *Promotion of Wind Energy: Lessons Learned from International Experience and UNDP-GEF Projects*. Available at link; IRENA.2012. *30 Years of Policies for Wind Energy: Lessons from 12 Wind Energy Markets*. Available at link.

Assessment of the GoJ's Commitment

30. **The project was consistent with the GoJ's national development priorities.** The GoJ's commitment to develop renewable energy through the private sector was explicit at the time of approval**.** Approved shortly before appraisal, the National Energy Strategy 2007–2020 set a target of 7 percent of the country's energy mix to come from renewable sources by 2015 and 10 percent by 2020—revising upward the 3 percent target for 2015 set in the National Agenda 2006–2015 published the year before. Unlike other countries in the region, for example, Egypt, the GoJ was determined to develop renewable energy through the private sector, in line with its overall strategy for the energy sector (see paragraph 4). However, these commitments took time to result in legislative and regulatory actions, as discussed below.

Assessment of Risks

31. **While the assessment of individual project risks and the corresponding mitigation strategies were broadly adequate, the risk stemming from the ambitious scope and timeframe of the project's design was underestimated.** The PAD identified a number of risks and corresponding mitigation strategies, which are listed and assessed in Table 3. The risk of overall project risk was assessed as Moderate at appraisal. In hindsight, this appears too low. The project's ambitious scope and timeframe carried the risk of delays because many elements were dependent on each other; this could have been foreseen. For example, the REEE Law was necessary for JREEEF to become operational, which was necessary for setting up the mechanisms for the performance-based subsidy, which was necessary for disbursement of the subsidy, and so on. Furthermore, the political risk (referred to in the PAD as 'lack of political commitment') as well as the risk of environmental safeguard issues (which was not explicitly discussed in the PAD) were clearly underestimated.

Table 3. Risks and Mitigation Measures

Risk (from PAD)	Mitigation Measure (from PAD)	Assessment of the Effectiveness of Mitigation Measure
Fiduciary and Procurement Risks		
Financial and fiduciary risks.	This risk was mitigated as (a) all payment orders were to be signed by the project director, the finance officer at the Ministry of Planning and International Cooperation (MoPIC) and staff of the Ministry of Finance assigned to the MoPIC, (b) the project director would certify that the services have been rendered before the payments are made by the MoPIC, and (c) regular interim financial reports were presented to the Project Coordination Unit (PCU). In addition, the MoPIC engaged an independent qualified private consultancy firm acceptable to the Bank to assist NEPCO in developing	The mitigation strategy was adequate; all financial or fiduciary policies were complied with during the project.

Risk (from PAD)	Mitigation Measure (from PAD)	Assessment of the Effectiveness of Mitigation Measure
	procurement and tendering procedures and documents.	
Not being able to recruit and retain local qualified procurement and finance staff.	To mitigate this issue, the PCU was to engage staff who are experienced in procurement, project management, and financial management, with appropriate job descriptions included in the PAD Manual of Procedures.	The mitigation strategy was partially effective. Qualified procurement staff were recruited and retained. However, the procurement process turned out to be a source of delay, primarily because of safeguards issues that had to be addressed.
From Outputs to Objective		
Lack of political commitment.	Ensure implementation of a new legal framework.	While political commitment was indeed high throughout the project implementation, the task team underestimated procedural obstacles to getting the Renewable Energy Law passed, which was assumed to be accomplished by or around project approval.
No follow-up wind power investments.	Technical assistance in addition to law, to ensure continued attractiveness of investment environment.	Jordan's ambitious renewable energy targets, the enabling legal and regulatory framework that was developed under the project, and the track record of successful tenders and project development ensure high attractiveness for follow-up investments, many of which are under way.
From Components to Outputs		
Noncompetitive bids.	Procurement will be through international competitive bidding and request for proposal packages, which will be reviewed by the Bank before bidding.	MEMR has chosen to award all but one wind power project under the so-called 'direct proposal' scheme of the REEE Law, which allows developers to submit project proposals directly without going through a tender, as long as the proposed power purchasing prices are equal to or below the 'indicative prices' developed under the GEF grant. The direct proposal scheme is thus closer to a feed-in-tariff for renewable energy than to competitive bidding, but MEMR has demonstrated that it is able to attract very competitive bids. For example, the solar prices obtained during the second call for direct proposals in early 2015 were at that time among the lowest in the world.
The cost of equipment is high because of escalating energy and equipment cost, resulting in high levelized tariffs, and the delivery period is long.	(a) The GoJ's agreement to cover any incremental cost through the bulk tariff; (b) The implementation period considers the long delivery period.	The cost of wind power increased compared to the bids filed in 2000–2002, but the counterfactual cost of natural gas and oil-fired generation increased even more over the project's implementation period. Wind power therefore remained competitive. The length of the project period turned out to be insufficient.
NEPCO not willing to purchase from the IPP because of higher tariff.	Awareness of NEPCO.	**Effective**. NEPCO was and is willing to sign power purchase agreements (PPAs) with all wind IPPs.
Local financial market not interested in	Will not affect promotional project, which is projected to achieve foreign financing.	**Effective**. Foreign financing was available for Tafila and continues to be available for projects in the pipeline.

Risk (from PAD)	Mitigation Measure (from PAD)	Assessment of the Effectiveness of Mitigation Measure
lending for wind power.		

2.2 Implementation

32. **Despite delays in individual components during implementation, overall, the project progressed steadily as renewable energy became a key priority for Jordan over the course of the project lifetime (2008–2015).** Components 1 and 2 of the project were delayed because of the passing of the REEE Law (see paragraph 33) and a combination of procurement and environmental safeguards issues related to migrant birds at the Fujeij project site (paragraph 35 and section 2.5). These delays led to progress toward achievement of the GEO and overall implementation progress being rated as Moderately Unsatisfactory for part of the project's implementation period. At the same time, the economics of wind power in Jordan improved fundamentally because of an energy supply crisis (paragraphs 36–37). Rapid cost reductions in solar PV during 2010–2013 also made solar power an economically attractive prospect. Therefore, even though the pilot project Fujeij was delayed, other renewable energy projects progressed rapidly, and six ISRs (3-4 and 10-13) rate the progress toward achievement of the GEO higher than the implementation progress. This eventually led the Bank to expand the focus of some of the technical assistance activities to include solar PV and to restructure the project to accommodate support for other wind farms (in particular, Tafila) in addition to the support provided for Fujeij (paragraphs 39–41).

Progress in the Project's Implementation

33. **The technical assistance components were mostly implemented on time.** The three main technical assistance assignments were the following:

(a) Integration of Wind Farms in the National Electric System of Jordan (under Component 3);

(b) Strengthening the Legal, Regulatory, and Institutional Frameworks for the Development of Renewable Energy Resources (under Component 3);

(c) Estimating Indicative Prices for Various Renewable Energy Products (under Component 4).

The outputs of each of the activities are summarized in annex 2. Their impact on the development of the renewable energy sector is described in section 3.2.

34. **However, the Bank's appraisal of the project underestimated the risk of delays because of the law's approval process and safeguard challenges of the first IPP wind project (Fujeij).** The REEE Law was available as a draft at the time of appraisal. The draft law contained all provisions that were considered necessary to implement the project and passing of the law looked imminent at the time of approval; the Bank expected it to be completed within a year of project approval (that is, by mid-2009). This, in combination with the strong commitment of the GoJ, convinced the Bank to go ahead with the project without the legal basis being in place. The REEE Law had the status of a temporary law since 2010 and was eventually enacted on April 16,

2012 (and subsequently amended in 2014) and now provides what stakeholders perceive as a very robust and comprehensive legal and regulatory framework for renewable energy development. However, the significant delay in passing the law affected the implementation progress of the project. The reason for the delay were partly procedural (for example, the law was at some point to be integrated into a general energy sector law, then later withdrawn and passed as a separate law) and partly substantial (for example, there was a debate about the institutional setup for JREEEF).

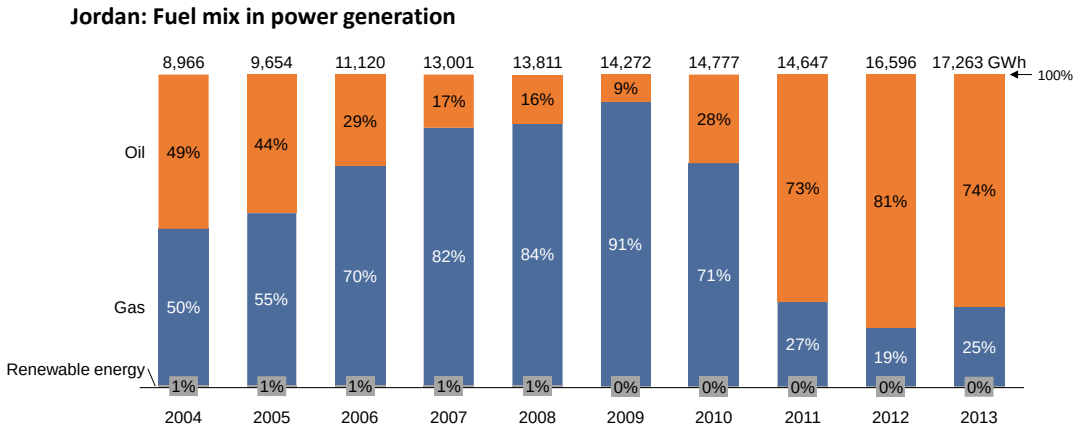
35. **Delays during tendering and contractual negotiations of the Fujeij wind project meant that a second wind farm, near Tafila, was completed earlier.** While the GA does not explicitly refer to Fujeij, the project soon focused the support provided under Component 1 on preparing, tendering, and contracting the Fujeij project. However, the bidding process of Fujeij endured considerable delays because the passing of the REEE Law was postponed and there were issues related to potential impacts of the wind farm on migratory birds; first planned to be operational by 2012, the wind farm is now planned to be operational by 2018. A preliminary EA during the GEF PPG raised the bird migration issue but was inconclusive (see section 2.4). The lack of clarity on the bird migration issue led bidders to submit bids that included conditionality and modifications of the technical specifications, which were inconsistent with the bidding documents. MEMR had to ask for the bids to be resubmitted, which delayed the process. After the bid award, a full Environmental and Social Impact Assessment (ESIA) was undertaken, with the recommendations of required changes to the project design, which further delayed the project's development. These changes led Korea Electric Power Corporation (KEPCO), the company which was selected in the tender, to cancel its bid and resubmit under the (then passed) REEE Law's provision for direct proposals (details in Section 3.2). The issues were thus resolved and the Fujeij project's PPA was eventually signed between NEPCO and the developer on December 20, 2015. As a result of these delays, both in establishing JREEEF and initiating the Fujeij IPP project, the GEF grant original closing date, December 31, 2012, was extended twice (see paragraphs 39–40). However, while Fujeij itself was delayed, the improvements in the economics of wind power in Jordan (see paragraphs 36–37) meant that other projects at the Ma'an and Tafila sites proceeded in parallel. The 117 MW Tafila wind farm eventually became the first to reach the commercial operation date (COD) in September 2015. The project reached financial closure in January 2014 and the final testing, commissioning, and inspections, including for the eight wind turbine generators, were concluded in August 2015.

Changes in the Economics of Renewable Energy and the GoJ's Vision for JREEEF

36. **The grant's design was based on the assumption that the economics of wind power in Jordan would be largely shielded from international fuel price fluctuations; this changed after 2010.** The cost differential between wind power and natural gas-based power generation (the 'incremental cost') were an important barrier to wind power development at the time of approval and a major determinant of the eventual design of the project. The cost of natural gas was expected to remain relatively stable because gas supply to Jordan's power sector was mostly shielded from international fuel price fluctuations. Jordan had in 2005 entered into a long-term agreement with Egypt to receive piped gas through 2028 at relatively low and stable prices. As a result, the share of natural gas increased from 50 percent in 2004 to 91 percent in 2009 (see Figure 2). During project preparation, the incremental cost was expected to be primarily driven by the cost of wind power rather than fluctuations in international energy prices because of the prospect of stable gas

prices. Jordan's energy crisis after 2010 changed the prices against which wind power would have to compete.

Figure 2. Fuel Mix in Power Generation in Jordan in 2004–2013, Showing Growth of Natural Gas Share in 2004–2009 Followed by Precipitous Decline in 2010–2012



Source: International Energy Agency

37. **Jordan experienced an energy supply shock from 2010 that exposed the power market to significant fuel price fluctuations and made wind power economically and financially very attractive almost overnight.** Egyptian gas exports declined substantially, falling by an annual average of 30 percent per year between 2010 and 2013, because of declining gas production in Egypt, the start of the Arab Spring in 2011, and sabotage of the gas pipeline connecting Egypt and Jordan. By April 2014, gas flow from Egypt almost came to a halt. The share of gas in power generation fell accordingly, from 91 percent in 2009 to 19 percent in 2012 and 7 percent in 2014. Power generators in Jordan had to switch from natural gas to heavy fuel oil and light fuel oil/diesel purchased in international fuel markets. This exposed Jordan's power sector to international energy price fluctuations and raised the price of power generation substantially. Energy import cost soared, reaching 21.1 percent of gross domestic product in 2012. At the peak of international oil prices during 2012–2014, the diesel power cost was at US$0.24 per kWh, when compared to an average power generation cost of US$0.045 per kWh from Egyptian gas at the time of appraisal. This increased the urgency to develop wind power, both as a way to reduce the average cost of electricity supply and as a way to reduce import dependency and vulnerability to price fluctuations. Jordan was able to alleviate fuel supply constraints in 2015 when it began importing liquefied natural gas (LNG) through a leased floating import terminal, but it remains vulnerable to international fuel price fluctuations.

38. **The GoJ and the Bank agreed to restructure the performance-based subsidy (Component 2b) after delays in JREEEF's establishment and shifts in the GoJ's vision for the fund's role in the sector**. The GoJ's vision for JREEEF changed over the course of the project's implementation. The original design envisioned that JREEEF would provide performance-based subsidies for all types of renewable energy projects, but JREEEF's mandate, as defined in the REEE Law, focuses primarily on small-scale, distributed renewable energy and energy efficiency. At the same time, in view of the shifting sector economics described, MEMR and specifically NEPCO had become much more willing to take on the financial burden of large-

scale renewable energy PPAs. The GoJ and the Bank therefore decided not to channel the performance-based subsidy through JREEEF but to restructure and channel it through NEPCO.

Project Restructurings

39. **The first Level II restructuring**, approved in November 2012, extended the original closing date of December 31, 2012 to June 30, 2013. By 2012, the project had made good progress in most of the planned works such as the promulgation of the Renewable Energy Law and technical assistance provided to sector stakeholders. However, JREEEF was not yet operational and the bidding process for Fujeij was not yet completed. The project was therefore unable to disburse the allocated performance subsidy.

40. **The second Level II restructuring**, approved in June 2013, extended the project closing date up to June 30, 2015, to provide additional time to allow the disbursement of the performance-based subsidy components, as both JREEEF and Fujeij experienced further delays. It was observed from the restructuring that, besides Fujeij, with the Tafila project a second IPP project was in an advanced stage of development, with commercial operations expected by late 2014/early 2015. This second restructuring also reallocated unused funds of US$0.8 million under Components 2a and 3 to Component 2b, which will be used toward a performance subsidy for wind energy generation, which increased the performance-based subsidy Component 2b to US$3.8 million.

41. **The third Level II restructuring**, approved in June 2015, revised the technical and financial assistance Components 1–3 as follows:

(a) Removed the specific reference to Fujeij in Component 1 to reflect that the technical assistance for the wind power project development in Jordan provided under the project benefited not only the Fujeij project but also wind IPP projects in general.

(b) Revised Component 2 to remove JREEEF as an intermediary for disbursement of the performance-based subsidy. This was done because it was foreseeable that JREEEF would still not be fully operational by the time the first large-scale wind farm (Tafila) would start its commissioning process (early 2015). Instead, the subsidy was to be directly disbursed through the MoPIC to NEPCO, which, in its role as the off-taker for the renewable electricity, had entered into a PPA with the developer of the Tafila wind farm and incurred the cost of integrating wind power into the grid.

(c) Reallocated US$0.26 million of unused disbursed funds from Component 3 to Component 2b, to be used toward the performance-based subsidy (shown in Table 2).

(d) Slightly revised the results framework in the system, primarily to remove inconsistencies between the ISRs and the original results framework as approved in the PAD (p. 24). The inconsistencies are discussed in sections 1.3 and 2.3 of this ICR.

42. The third Level II restructuring enabled the project to fully disburse and close on time.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

43. **M&E design.** The Results and Monitoring Framework included in the PAD outlined the process for measuring project progress and identified the required data, information sources, and methods of measurement. The type and level of detail of the information and data required by the Results and Monitoring Framework were sufficient for tracking the outcomes. After the second Level II restructuring in June 2013, the indicators included all applicable core indicators as defined for the sector 'Other Renewable Energy' in the Bank's Results Platform (that is, indicators 1, 4, and 5 in the Results Framework shown in Table 5 below: renewable power generation, non-hydro renewable capacity installations, and wind power capacity installations).

44. **M&E implementation**. The ISRs and mission aide memoires were produced regularly and include updates on the indicators. However, the implementation of the monitoring framework shows four inconsistencies. First, the GEO indicators included in the ISRs differ slightly from indicators defined in section 2 (p. 5) of the PAD (see section 1.3 of this ICR). Second, four indicators that were included in the PAD were not included in the ISRs (Indicators 10–13 in Table 5). Third, the monitoring of the indicators by MEMR focuses on large-scale projects, whereas the indicators in principle also include small-scale, distributed projects. Fourth, the formulation of the targets of some of the indicators differs slightly between the PAD and the ISRs. Furthermore, originally it was planned to contract an independent party to certify the results at midterm and at project completion and that the M&E would be financed under the technical assistance component (the budget allocated US$100,000 for this activity). However, because of the rapid growth of the scale of the renewables program, which now is a core element of the sector, MEMR and NEPCO took ownership of monitoring the development of the renewable energy pipeline; no independent party was assigned to conduct the aforementioned activity, and the savings were repurposed during the third restructuring.

45. **M&E utilization.** The utilization of the Results and Monitoring Framework was limited to the qualitative Intermediate Outcome Indicators 6-9 during the implementation phase as the five GEO indicators remained unchanged for most of the implementation period. See section 2.5 for a discussion of the future utilization of the monitoring arrangements.

2.4 Safeguard and Fiduciary Compliance

46. **Environmental and social safeguards.** The project was assessed as Category B according to OP 4.01 mainly because of possible ecological and noise impacts. All environmental and social safeguard policies were complied with and the ISRs consistently rated the safeguards as satisfactory. However, the potential impacts of the Fujeij wind farm on migrant birds became a major source of delay for Fujeij, which—instead of being operational by 2012 as expected in the PAD—is now expected to be commissioned by the end of 2018.

47. **The issue of migrant birds caused delays in the procurement process.** The Jordan Rift Valley, where most good wind sites are located, is a major flyway for migratory birds. A preliminary EA raised the issue, but because the study was undertaken outside the migratory

season, the report was inconclusive.[5] The study was not intended to be a complete and final ESIA; rather, it was to provide an initial assessment and inputs for the bidding and preparation of the final ESIA for the project, which was to be prepared by the selected bidder. As noted, the lack of clarity on the bird migration issue led bidders to submit bids that were inconsistent with the bidding documents, which delayed the process. The Fujeij project was eventually redesigned to minimize the impact on birds, including through a buffer zone and manned monitoring stations. Although being located farther away from the Rift Valley's main bird migration route, the Tafila wind farm also has a comprehensive policy to minimize its impact on birds, including three full-time personnel on site to watch out for birds and request turbines to be shut down temporarily.

48. **The project did not involve resettlement.** However, OP 4.12 was triggered because of the likelihood of compensation for land used for the transmission line and for reduced land use to ensure safety. A Resettlement Policy Framework was prepared, disclosed, and complied with. No resettlement issue was raised during implementation.

49. **Fiduciary aspects.** The PCU was responsible for all fiduciary aspects of the project, especially relating to consulting contracts and (before the third restructuring) the procurement of the Fujeij wind farm. Fiduciary issues relating to Fujeij were a source of delay as some of the bids did not comply with the Bank's procurement policies. However, eventually all fiduciary policies were complied with.

2.5 Post-completion Operation/Next Phase

50. **The legal and regulatory sector framework ensures a sustainable transition to postcompletion operation.** The legal framework in the form of the REEE Law and the contractual arrangement of the IPP wind farms ensures that NEPCO and the developers, including for the already commissioned Tafila project, continue to have a strong interest in bringing the projects online on time and/or keeping the projects operational. The operators of wind farms in Jordan, including the Jordan Wind Project Company (JWPC) in the case of Tafila, have a strong incentive to ensure effective wind farm operation because their remuneration is in the form of performance-based payments (per kWh). Developers of wind farms are incentivized to bring plants online on time because NEPCO is no longer bound to purchase the power if the plant is commissioned after an agreed-upon date. NEPCO has an incentive to integrate all available wind power into the grid because the PPA is structured as a take-or-pay contract for NEPCO as an off-taker. Critical inputs for wind farm operators include specialized cranes, the access to which is guaranteed in the PPA, as well as technical staff, who are being trained by an increasing number of graduate programs on renewable energy available in Jordan's universities. Lastly, the GoJ and MEMR in particular are actively disseminating best practices and lessons learned as they aim to become a regional hub for renewable energy-related services.

[5] The report noted that, "None of the [environmental safeguards policies] are considered to represent an obstacle to the development of a wind farm at the proposed Fujeij Wind Farm site" (p. 4). On the issue of migrant birds, the report states that "The proposed project area is located on the eastern range of a major fly way for birds. The study was undertaken in summer where the migration is minimal and it is therefore not easy to gauge the potential impact associated with the project. There is no specific data available as to the importance of Fujeij in relation to bird migration. It is recommended that additional survey work be undertaken in the spring to better inform the impact assessment of the project" (p. 98).

51. **MEMR and NEPCO are closely monitoring the main outcome indicators that inform their transmission and generation planning.** The indicators, which are monitored almost on a real-time basis by both institutions, include renewable electricity generation (Indicator 1); the number of renewable energy IPPs active in Jordan; and the installed capacity of wind and solar power. The GoJ also plans the establishment of a public data room for renewable energy development to improve transparency in 2016.

52. **The Bank continues to assist the GoJ's broader reform agenda in the renewable energy sector, including through a series of development policy loans (DPLs) targeted at the energy and water sectors as well as technical assistance.** The Bank approved an IBRD loan in the amount of US$250 million in September 2015, the first in a programmatic series of two DPLs, which aim to support fiscal and policy reform programs undertaken by the GoJ in the energy and water sectors. One of the core themes of the DPL series is to improve the security of electricity supply by diversifying its power generation mix from domestic energy resources. Three prior actions of the first DPL address renewable energy, including the approval of bylaws to the REEE Law on renewable energy direct proposals; the bylaws to the REEE Law concerning JREEEF; and energy efficiency and renewable energy policy for the water sector. Triggers of the second DPL concerning renewable energy include the implementation of the direct proposal bylaws and the establishment of a public data room for renewable energy development; new operating procedures at NEPCO for integrating renewable power resources into the transmission grid; and at least two of JREEEF's financing windows in place. The outcome indicators of the DPL series include the share of megawatt renewable power in the generation mix, which is expected to increase from 0 percent in 2014 to 10 percent in 2017. Energy Sector Management Assistance Programme-funded technical assistance is providing assistance in implementing the reforms supported by the DPL.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design, and Implementation

Rating: High

53. **The fuel supply crisis during 2010–15 brought the development of domestic energy sources, including renewable energy, to the forefront of the domestic development agenda.** Supported by the Bank DPL series (FY2016–2017; see paragraph 52), Jordan implemented wide-reaching energy reforms, including an expansion of the renewable energy program, in response to the fuel supply crisis during 2010–2015. Developing renewable energy is thus even more relevant for Jordan today than it was at the time of the project's approval. This is reflected in the Jordan 2025 National Vision and Strategy development blueprint (launched in 2015), which calls for a comprehensive national strategy to increase the contribution of local energy sources including renewable energy (section 1, p. 43), and sets an 11 percent target for the renewable energy share in the total energy mix in 2025.

54. **Jordan is party to the Paris Agreement and made renewable energy a core element of its national submission before the 21st Conference of the Parties.** Jordan in its intended nationally determined contribution to the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change in Paris in December 2015 states its intention to reduce GHG emissions by 1.5 percent (unconditional) to 12.5 percent (conditional) compared to business-

as-usual levels. The 11 percent renewable energy target by 2025 is listed as one of its two key performance indicators (besides GHG emission reductions), and renewable energy is featured extensively throughout the intended nationally determined contribution submission document.

55. **The project's objectives of climate change mitigation, renewable energy development, and leveraging the private sector are core elements of the GEF 2020 strategy.** The new GEF strategy aims to address the drivers of environmental degradation (Key Strategic Priority 1), including climate change. This is to be achieved by, among others, transforming policy and regulatory environments, strengthening institutional capacity and decision-making processes, and leveraging private sector investments (p. 25–26).

56. **The project's objectives are aligned with the Bank's new Middle East and North Africa Strategy and its country engagement in Jordan.** First, the project contributes to Pillar 1 of the new Bank Middle East and North Africa Strategy (2015), which calls for 'a stronger private sector that can create jobs and opportunities for Middle East and North Africa's youth'. Second, it is aligned with the CAS FY2012–2016, which aims to support Jordan in pursuing a knowledge-based economy, leveraging the country's strong human capital base and creating jobs in the private sector (Results Area II.2: Improve business environment). Third, it also directly contributes to Results Area II-government objective (ii) of the CAS (increase the share of renewable energy resources in the total energy mix). Fourth, as described in paragraph 52, promoting renewable energy is also at the heart of the recent Bank's DPL series in FY2016–2017.

57. **Developing low-carbon energy through the private sector is also at the core of the Bank's energy sector engagement.** In 2010, the Bank Group positioned support for infrastructure as a strategic priority in creating growth opportunities and targeting the poor and vulnerable. One of the three pillars of the subsequent strategy document, Transformation through Infrastructure (2012), is leveraging the Bank Group's capital by mobilizing more private sector financing. The direction paper 'Inclusive Green Growth: The Path to Sustainable Development (2012)' underscores the importance of growth to be inclusive and environmentally sound and highlights opportunities in the energy sector to contribute to inclusive green growth. The Bank Group's Environment Strategy 2012–2022 (2012) emphasizes the need to reduce GHG emissions and mainstream mitigation in Bank operations. The strategy paper of the Bank's Energy and Extractives Global Practice, Towards a Sustainable Energy Future for All (2013), has as one of its guiding principles that the Bank "will seek market solutions and help governments foster private sector investment."

58. **The approach of providing a combination of technical and financial assistance along the entire development process of a full-scale IPP project remains highly relevant for introducing new renewable energy technologies in a country**. While the project's scope may have been too ambitious for a single operation (see section 3.3 below), both transaction advisory and innovative financial support remains highly relevant for renewable energy IPP projects. The technical assistance helped create the enabling environment for investment, and the financial support helped cover the remaining incremental cost. The lessons learned during this grant demonstrate once more that the process of introducing a new renewable energy technology in a country takes time and can encounter into unexpected barriers. Providing access to financial and technical support throughout the process in a flexible way increases the likelihood of eventual success.

3.2 Achievement of Global Environment Objective

Rating: High

Global Environment Objective

59. **The GEO in the Grant Agreement was "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."** The achievement of this objective is High. The rating would remain unchanged even if measured against the alternative formulations of the GEO and the PDO in the PAD (see footnote 2), which aim at "integrat[ing] wind energy generation into the energy mix through the operation of a commercial wind farm in Jordan" (GEO in the PAD) and "increase[ing] electricity supply from renewable energy sources in a sustainable manner" (PDO in the PAD). The slight nuances here are that (i) the GEO in the PAD focuses on wind energy rather than renewable energy more broadly and addresses aspects of grid integration; and (ii) the PDO in the PAD would require the increase of renewable energy *supply* to be sustainable, whereas the GEO in the Grant Agreement calls for a sustainable *demand* (market) for the generated power. However, as discussed below, these differences do not affect the outcome rating.

60. **The rating is based on the indicators' values as of the project's closing date (June 30, 2015).** However, because the project supported a pilot IPP project which was aimed to impact the sector more broadly, the discussion below takes into account the developments as of March 2016 (see Table 5 below).

Outcomes

61. **The project helped Jordan grow wind power installations 100-fold over the course of the project's implementation.** By June 30, 2015, over 90 MW of the Tafila wind farm were commissioned. Since Tafila's COD on September 16, 2015, Jordan has 117 MW of commercial grid-scale wind power in operation (see Table 4 below), compared to 1.45 MW of (noncommercial) wind farms at the time of project approval**.** Wind power now represents about 3 percent of the total installed.

62. **The Tafila wind project was the first private wind project to reach financial close in the Middle East and North Africa region outside of Morocco.** The 117 MW Tafila wind farm has produced 125.252 GWh (as of March 1, 2016) since its COD, avoiding an estimated 68,513 tCO_2e. The median expected value of generation (P_{50}) is 391 GWh per year. This represents about 2.1 percent of total power generation and avoid an estimated 175,950 tCO_2e. The power from Tafila is well integrated into the grid, with only one incidence of curtailment so far as of March 2016.

63. **A further 399 MW of wind projects are currently under development and expected to become operational by 2018.** Table 4 below presents a detailed overview of the wind projects under preparation. There are a total of six IPP wind developers active in Jordan as of March 2016 (at the Tafila (3x), Fujeij, Rajef, and Mazar sites) and another engineering, procurement, and construction (EPC) project is being developed by MEMR in Ma'an. All six wind IPPs were

selected under the direct proposal scheme of the REEE Law (see paragraph 74). The wind power purchase tariffs in the PPAs are oriented to the ceiling tariffs developed by the EMRC (see paragraph 78). With a total of 399 MW, these projects represent a further expansion of the market by 340 percent. The wind farm in Ma'an is the next to become operational in early 2016, with a total of 66 MW. Total wind investments by 2020 are expected to be in the order of US$1.2–1.6 billion, creating over 1,500 jobs (see Table 10.2 in annex 10).

64. **Similarly, there is rapid development of large-scale grid-connected solar power.** Table 4 below presents a detailed overview of the solar projects under preparation. Two large-scale projects, with 10 MW and 5 MW capacity, became operational in 2015, and another 480–515 MW is under development. Jordan looks set to surpass its target of installing 600 MW of solar PV by 2020, with 400 MW having already been awarded under the country's first two tenders for large-scale plants and a further 65-100 MW were approved in the form of an EPC contract for a state-owned PV plant, to be located in the South.

65. **The market for the renewable power supply from these projects is sustainable.** The sustainability of the market for renewable energy projects is clear from the large and growing pipeline of projects through 2020, shown in Table 4. There are now 26 projects under development, 23 of which are BOO-type IPP projects. The market for wind power may slow down after 2020 from its current rapid pace for reasons discussed in section 4, but the GoJ' demonstrated commitment to its long-term renewable energy targets means that it is highly unlikely that wind market will come to a halt. The sustainability of the market for the power generated by the projects in the pipeline is guaranteed by the fact that all IPP projects have 20 year, fixed-price PPAs. The PPAs are designed as take-or-pay contracts, which means that the off-taker – NEPCO – is obligated to purchase the entire amount of electricity produced by private producers or compensate them with the full price if the power cannot be absorbed by the grid. NEPCO is also required to provide grid access to each individual renewable energy project.

Table 4. Pipeline of Large-scale Renewable Energy Projects in Jordan

Operational Projects					
No.	**Type**	**Capacity**	**Location**	**Type**	**Project(s) Information and Current Status (as of March 2016)**
1	Wind	117 MW	Tafila	BOO	• Project by the JWPC. • Project agreements along with the successful financial closure have been completed by the end of 2013 • COD on September 16, 2015
2	PV solar	10 MW	Mafraq	BOO	• Project by the local PV manufacturing company 'Philadelphia-Solar'; • COD on October 22, 2015
3	PV solar	5 MW	Azraq	EPC	• Debt Swap Grant and Soft loan • EPC projects, awarded to Spanish companies • Operational since mid-April 2015
Subtotal		**132 MW**			
Projects Under Construction					
4	Wind	80 MW	Maan	EPC	• Funded through a grant from the 'Kuwait Fund for Arab Economic Development' • EPC project, awarded to the Spanish company 'Elecnor', using GAMESA machines • To be operational by the end of 2016

Operational Projects					
No.	**Type**	**Capacity**	**Location**	**Type**	**Project(s) Information and Current Status (as of March 2016)**
5-16	PV solar	200 MW total	10 projects in Maan area, 1 in Aqaba, 1 in Mafraq	BOO	• Direct proposal round 1 • 12 PV solar proposals were received in March 2013 with total capacity of (200) MW • PPAs signed in March 2014 • reached financial close in May 2015 • To be operational within 2016
Subtotal		**280 MW**			
Projects Under Development					
17-20	Wind	230 MW	3 projects in the south and 1 project in the north	BOO	• Direct proposal round 1 • Proposals have been submitted by September 30, 2014 • PPA signed for one project; the other 3 under PPA signing • To be operational in 2018
21	Wind	89 MW	Fujeij/ Shobak	BOO	• On November 30, 2014, KEPCO submitted a direct proposal for this project • The PPA was signed on December 20, 2015 • To be operational by the end of 2018
22-25	PV Solar	200 MW total (50 MW each)	North, East, and Middle Jordan	BOO	• Direct proposal round 2 • 45 MOUs were signed with short-listed PV bidders • 34 proposals were submitted by February 10, 2015 • Encouraging prices were proposed • PPAs signed for 3 projects; the last one under PPA signing • To be operational by end of 2017
26	PV Solar	65–100 MW	Al Quweira/ Aqaba	EPC	• EPC Project funded by Abu Dhabi Fund • 15 bidders were qualified • 7 proposals were received by the deadline (July 26, 2015) • Negotiation with the 1st ranked bidder completed • Project Agreement signed in December 2015 • To be operational by end of 2017
Subtotal		**584–619 MW**			
Total		**1,006–1,041 MW**			

Source: MEMR.

66. **Distributed solar PV is also rapidly expanding.** The net metering scheme in the REEE Law, in particular, has created an active domestic market. According to the latest EMRC statistics, around 1,000 net metering projects have been installed in Jordan with a total capacity of 45 MW. Another 10 MW of solar capacity is installed under the wheeling arrangement.

67. **These developments make Jordan a front-runner for private sector-based development of renewable energy in the Middle East and North Africa region**. The country strives to become a regional hub for knowledge and service industries related to renewable energy. A €146 million upgrade of the transmission grid is under way (the 'Green Corridor Project') to allow the transmission system operator to absorb larger amounts of renewable electricity and to ensure a sustainable market for wind and solar power.

68. **The developments in wind and solar PV mean that the project was highly successful according to all six GEO outcome indicators.** The project's impact as measured by the six outcome indicators is summarized in Table 5. As of March 2016 the achievement rate for the five indicators is

- 166 percent (Outcome Indicator 1. Increased electricity supply from grid-connected renewable power);
- 600 percent (Outcome Indicator 2. Increased number of private developers of wind power);
- 166 percent (Outcome Indicator 3. Avoided direct CO_2 emissions);
- 146 percent (Outcome Indicator 4. Generation capacity of renewable energy constructed - other than hydropower);
- 130 percent (Outcome Indicator 5. Generation capacity of renewable energy constructed - wind); and
- 100 percent (Outcome Indicator 6. A fund for renewable energy is fully operational).

69. **The values for Outcome Indicators 1 and 3–5 most likely underestimate the true values**. In the case of Indicators 1 and 3, they only account for wind power generation (and thus not include solar PV), and in the case of Indicators 4 and 5, they only account for large-scale wind and solar power plants (while not accounting for distributed generation capacity, which is estimated at around 45 MW).

70. **The project was also successful when measured against indicators that were not included in the ISRs or replaced during restructuring (see discussion in sections 1.3 and 2.3).** The Additional Indicators 12-16 in Table 5 were either replaced during restructuring to make the framework more consistent with the original framework in the PAD or not measured regularly. The project fully achieved each of these indicators with the exception of Additional Indicator 13 (Reductions in the levelized cost of wind energy) and Additional Indicator 16 (Project development support). However, as discussed in section 2.2, the relative attractiveness of wind power improved significantly over the course of the project's implementation, making the cost indicator much less relevant for the success of the wind market. Taking the additional indicators into account would therefore not negatively affect the project's rating.

Table 5: Results Framework

S. No.	GEO Indicators	Baseline	Target Value	Actual (as of June 30, 2015)	Actual (as of March 2016)
1	Increased electricity supply from grid-connected renewable power[a]	72 GWh per year	272 GWh per year	362 GWh* (2.5% of total power supply**) (133% achieved)	452 GWh* (3.1%**) (166% achieved)
2	Increased number of private developers of wind power[a]	0	1 or more	6 BOO wind project developers (600% achieved)	

3	Avoided direct CO_2 emissions	32,500 tCO_2e per year	122,500	162,796*,*** (133% achieved)	203,400*,*** (166% achieved)
4	Generation capacity of renewable energy constructed - other than hydropower[b]	5 MW	95 MW	101.45 MW* (107% achieved)	138.45 MW* (146% achieved)
5	Generation capacity of renewable energy constructed – wind[b]	1.45 MW	91.45 MW	91.45 MW (100% achieved)	118.45 MW (130% achieved)
6	A fund for renewable energy fully operational[c]	No renewable energy fund or financing mechanism	A fund for renewable energy fully operational	JREEEF is fully operational (100% achieved)	
	Intermediate Outcome Indicators	**Baseline**	**Target Value**	**Actual (as of June 30, 2015)**	**Actual (as of March 2016)**
7	Incremental changes to policy and regulatory framework (IPP approval process; tariff approval) implemented[a]	None	Yes	Legislative changes enacted and regulatory framework in place (100% achieved)	
8	Financing mechanism for renewable energy[d]	No formal financing mechanism for renewable energy in place	JREEEF established and operational, or alternative in place	JREEEF is fully operational (100% achieved)	
9	The capacity of NEPCO and MEMR to incorporate renewable energy, including wind power, in energy planning model	Weak capacity	Renewable energy, including wind power, fully incorporated in the energy planning	Wind and solar power are being fully incorporated into NEPCO's and MEMR's energy sector planning (100% achieved)	
10	Status of the contract for development of the wind power plant	No contract in place	A contract for development of the wind power plant signed and project financing close completed	The contract for the Tafila IPP wind farm has been signed and the project's financial close has been completed (100% achieved)	
11	60-70 MW of wind power IPPs operational[c]	None	Yes	Most of the Tafila IPP wind farm (>90 MW) is commissioned (100% achieved)	The Tafila IPP wind farm (117 MW) is fully operational (100% achieved)
	Additional Indicators	**Baseline**	**Target Value**	**Actual (as of March 2016)**	
12	Risk and barriers for independent wind power development[e]	Gaps in the legal, policy and regulatory framework for electricity with respect to renewable energy	Legislative changes enacted	Legislative changes enacted and regulatory framework in place (100% achieved)	
13	Reductions in the levelized cost of wind energy[f]	Levelized economic cost U.S. cents 7–9	U.S. cents 7.9–10.5 c/kWh in US_{2015}$	U.S. cents 11.3 per kWh in US_{2015}$ (current ceiling tariff for the PPAs under the REEE Law) (not fully achieved)	

		per kWh in US$$_{2001}$$		
14	Knowledge on wind power[f]	Knowledge lacking in the sector	10 institutions and 100 individuals	Knowledge of wind power in at least 10 institutions: 6 IPPs, MEMR, EMRC, NEPCO, MOPIC, and so on. (100% achieved)
15	Indicative wind power development plan[f]	No indicative plan	Plan complete	Project development schedule developed by NEPCO and is used for PPA scheduling (100% achieved)
16	Project development support[f]	No facility in place	20 applications to facility	The Bank is not aware of any project development facility, but project development is progressing rapidly (not fully achieved)

Note: a. These indicators were slightly reworded during the third Level II restructuring to make the results framework in the system more consistent with the results framework in the PAD (p. 24). This did not represent a substantial change.

b. These indicators were added during the second Level II restructuring in June 2013 to comply with the Bank's policy on core indicators for renewable energy investment projects. This did not represent a substantial change.

c. These indicators were added during the third Level II restructuring to make the results framework in the system more consistent with the results framework in the PAD (p. 24).

d. This indicator was retained in the third Level II restructuring but is redundant with Outcome Indicator 6.

e. This indicator was removed during the third Level II restructuring and was replaced with Intermediate Outcome Indicator 7. This did not represent a substantial change.

f. These indicators were included in the PAD (p. 25/26) but not included in the ISRs or the monitored results framework.

*These values are a conservative estimate because they do not include 15 MW of solar power contracted by NEPCO and an estimated 45 MW of PV capacity connected to the distribution grid; 391 GWh is Tafila's median (P_{50}) value for expected generation per year. The estimates for indicators #1 and #3 include hydropower and biomass power generation based on 2013 data from the International Energy Agency (IEA).

**The share of total power generation is based on the assumption of continued total electricity consumption growth of 4 percent per year.

***The avoided GHG emissions are based on a grid emission factor of 450 g/kWh, which represents a mix of 50 percent natural gas single cycle and 50 percent natural gas combined cycle; the grid emission factor is the same as the one used in the PAD.

71. **Besides the outcome indicators defined by the monitoring framework, the success of the project in setting up an attractive business environment for renewable energy IPPs is demonstrated by the record low PV bidding prices achieved in 2015.** Under MEMR's second direct proposal round to install 200 MW of solar PV, the three lowest bids coming in were at US$0.0613, US$0.0649, and US$0.0691 per kWh, respectively. These were, at that time, globally the lowest bidding prices ever recorded in a PV bidding round.

72. **The project further contributed to Jordan's achievements in diversifying its energy mix, developing domestic energy sources, and achieving financial sustainability in the electricity sector.** The development of wind power reduces Jordan's dependence on hydrocarbons in the electricity sector, which accounted for over 99 percent of power generation in the decade to 2014. It makes the country more resilient to the external energy supply shocks, such as the frequent interruption of piped gas supply from Egypt after 2010. By displacing costly imports of diesel for power generation, renewable energy also contributes to Jordan's target of achieving cost recovery in the power sector by 2017.

Linkage between Outcomes, Intermediate Outcomes, and Project Outputs

73. **Renewable energy investment in Jordan is driven by an enabling environment that the project helped create.** Key enabling conditions include (a) ambitious wind energy targets; (b) a consistent legal, policy, and regulatory framework for renewable energy (Intermediate Outcome Indicator 7); (c) a financial mechanism to support renewable energy (Outcome Indicator 6 and Intermediate Outcome Indicator 8); and (d) institutional capacity in MEMR, NEPCO, and EMRC (Intermediate Outcome Indicator 9); and (e) track record of successful project development, including contract negotiations and on-time payments (Intermediate Outcome Indicators 10 and 11). The project directly contributed to factors (b)–(e) through technical and financial assistance. Refer to Table 5 for details on the intermediate outcome indicators. Annex 2 summarizes the outputs of the project by component.

74. **The REEE Law (No. 13) from 2012 (amended in 2014) provided the legal foundation for renewable energy in Jordan.** The law aims to provide the GoJ with suitable tools to reach the national renewable energy targets of 7 percent of the energy mix by 2015 and 10 percent by 2020. By closing the gaps in the legal, policy, and regulatory framework (through the project preparation grant as well as Components 2, 3 and 4), the passing of the law and the subsequent regulations fulfilled Intermediate Outcome Indicator 7 (Incremental changes to policy and regulatory framework (IPP approval process; tariff approval) implemented). Under the REEE Law, MEMR and NEPCO are authorized to issue tenders for the development of specific sites under a competitive bidding process. The REEE Law also allows for projects to be awarded through the 'direct proposal' scheme. The direct proposal scheme allows developers to submit project proposals directly without going through a tender, as long as the proposed power purchasing prices are equal to or below the 'indicative prices' developed under the GEF grant. So far all but one IPP wind power plant (Ma'an) were awarded based on direct proposals. In the case of solar, too, most projects so far were selected based on direct proposals, including the direct proposal round 2 in February 2015, which yielded very competitive prices. The project funded consultant's services that assisted the GoJ in preparing key regulations to implement the law, including (a) the list of 'indicative prices', which guides the pricing of the PPAs; (b) regulations for net metering under the law; and (c) regulations concerning the connection of renewable generators to the grid.

75. **Under the REEE Law large-scale renewable power is remunerated through 20-year PPAs with NEPCO and developers enjoy tax incentives.** The power purchasing tariff under the PPA is determined through competitive bidding when the project is awarded through tendering or through bilateral agreements with the developer when the project is procured through direct proposals. The REEE Law also provides tax exemptions, free use of public lands and ensures distributed renewable power producers access to the distribution grid under net-metering and wheeling arrangements.

76. **The REEE Law also sets up JREEEF.** The fund provides renewable energy subsidies to privately owned and operated facilities, interest rate subsidies on commercial loans, a public equity fund to support the deployment of private investment in the sector, a renewable energy guarantee facility to ease credit access for energy efficiency and renewable energy project developers, and research and technical cooperation grants for targeted programs and feasibility studies. The project preparation grant funded consultant's services to prepare the business plan for JREEEF and to assist the GoJ in drafting the legal provisions concerning JREEEF in the REEE Law. JREEEF

became fully operational on May 3, 2015 when the bylaws concerning the fund were ratified. In combination with the PPA-based financing mechanism for large-scale renewable energy plants, the establishment of JREEEF fulfilled Outcome Indicator 6 (A fund for renewable energy fully operational) and Intermediate Outcome Indicator 8 (Financing mechanism for renewable energy).

77. **The performance-based subsidy supported NEPCO as off-taker of renewable electricity.** Pursuant to the third Level II restructuring, the performance-based subsidy (Component 2) was paid against a performance based contract. The contract specified two performance targets which, once met, triggered the disbursement of 50% of the subsidy each. The two conditions were (i) the signing and enforcement of a wind power purchasing agreement and (ii) the signing and enforcement of the associated transmission connection agreement. Both conditions were met by June 2015 through Tafila's progress and the subsidy was disbursed in the form of one-time payment shortly thereafter. This contributed to meeting the target for Intermediate Outcome Indicators 10 (Status of the contract for development of the wind power plant) and 11 (60-70 MW of wind power IPPs operational). However, as discussed in section 3.3 below, the ICR cannot clearly establish how instrumental the performance-based subsidy was for attracting IPP project developers.

78. **MEMR, NEPCO, and EMRC developed the institutional capacity to incorporate wind energy development into their energy sector planning functions.** The project contributed to building up the capacity by providing technical assistance to all three agencies, including through transaction advisory to MEMR for the tendering of Fujeij (Component 1); assistance to NEPCO in estimating the grid impact of renewable energy in general and wind power in particular (Component 3); and assistance to the EMRC in preparing a model for indicative prices for renewable energy PPAs (Component 4). By building up the institutional capacity, the project directly contributed to meeting the target for Intermediate Outcome Indicator 9 (The capacity of NEPCO and MEMR to incorporate renewable energy, including wind power, in energy planning model). The large pipeline of projects ensures that the agencies' institutional capacity will be sustained and further enhanced.

79. **Over the course of the project's implementation, NEPCO and MEMR developed a track record in wind power IPP procurement, which is key for attracting further investor interest and reducing risk premiums.** The project contributed to this track record by providing transaction advisory to MEMR during the procurement of Fujeij, by developing standard PPA documents and transparent ceiling prices that assist NEPCO and MEMR in procuring IPP capacity (Components 1 and 4) and the performance-based subsidy that helps NEPCO meet its payment obligations to the Tafila wind farm developer (Component 2). The project thus contributed to meeting the target for Intermediate Outcome Indicator 10 (Status of the contract for development of the wind power plant). The large pipeline of projects ensures that the agencies' track record will be sustained and further expanded.

80. **The GoJ applied the lessons learned from the Fujeij IPP procurement process in real time to other IPP renewable energy projects, including Tafila.** The GoJ was successful in scaling up renewable energy beyond the 'pilot' IPP project envisioned under the grant (Components 1 and 2) because the learnings and outputs from the Fujeij procurement process, which included the project agreements and the safeguards experiences, were applied in real time to the development of other renewable energy projects. For example, the Fujeij power purchase

agreement, the land lease agreement and the transmission connection agreement served as draft inputs for all other subsequent renewable IPP projects. The other wind projects also benefited from the extensive experience with migrant birds generated during the Fujeij procurement process; these lessons learned were translated into measures such as the bird observation program at Tafila described in section 2.2. The fact that these documents and processes are now standardized and bankable is one of the main reasons for Jordan's success in attracting a large pipeline of IPP investments.

3.3 Efficiency

Rating: Modest

81. **The project leveraged significant private-sector financing.** The project focused on a small incremental-cost subsidy combined with efforts to de-risk investment and disseminate best practices. This significantly reduced the public sector investment necessary to implement the project compared to a NEPCO-owned wind plant. The technical assistance provided to the GoJ to establish a consistent and enabling legal, policy, and regulatory framework as well as the advisory to the procurement process of Fujeij contributed to investor confidence, thereby reducing the risk premium and the incremental cost. Both the technical assistance and the financial assistance thus contributed to the GoJ's ability to leverage large private sector investments with a relatively small incremental cost subsidy. In the case of Tafila, US$287 million in foreign direct investment were attracted by providing what was, at the time of the PPA signing, a very small subsidy.

82. **The project contributed to Jordan's ability to realize economically attractive wind IPP projects.** The economic and financial analysis (see annex 3) demonstrates that even under the current low-oil price regime, investing in wind power was economically attractive for Jordan. The base case results in an economic net present value (NPV) of US$32.62 million (using a 6 percent discount rate) and an internal rate of return (IRR) of 10.09 percent. Even financially, wind power is attractive for NEPCO under the current low-oil price regime if it is assumed that the share of diesel in the displaced power generation is 75 percent (IRR: 6.01 percent).

83. **However, it is unclear to what extend the performance-based subsidy was necessary for the implementation of the IPP projects.** The performance-based subsidy directly contributed to NEPCO's ability to pay its payment obligations on time and cover the costs of integrating wind power into the grid. However, even after restructuring the subsidy was very small compared to the cost of wind farms (the subsidy amount is equal to roughly half the cost of each of the 39 turbines in Tafila) and the incremental cost of wind power compared to gas-fired generation (the subsidy amount is equal to about 0.8% of the discounted value of the lifetime electricity generation of Tafila). Therefore the ICR cannot clearly establish to what extend the prospect of the performance-based subsidy enabled the wind IPP projects, or if technical assistance alone would have been sufficient to create the wind power market.

84. **Furthermore, the project may have been even more efficient with a slightly less ambitious scope and timeframe.** The design of the project was ambitious in that many implementation steps were interdependent and all were supposed to be completed in a relatively short period of time. The resulting delays tied up undisbursed GEF financing, the opportunity cost of which could have been avoided if the project's design had incorporated a more realistic time

frame. For example, the REEE law could have been introduced as effectiveness condition, and the preparation of a full environmental impact assessment as part of the preparation grant could have avoided delays in the procurement process.

3.4 Justification of Overall Outcome Rating

Rating: Moderately Satisfactory

85. **The project met the GEO in a way that was Moderately Satisfactory.** The project's objectives are even more relevant today than at the time of approval, and the project overachieved its objectives as measured by the GEO indicators as well as the monitored intermediate outcome indicators as discussed in section 3.2—on some indicators by a large margin. Furthermore, there is a clear linkage between the project's outputs and the measured outcomes, as established in section 3.2.

86. **The reasons for not rating the overall outcome higher are related to the project's efficiency.** First, the project's ambitious scope and timeframe led to significant delays during implementation because of procurement and safeguard issues, as well as the legislative process (as described in section 2). This tied up undisbursed funds for several years. Second, the causal link between the performance-based subsidy component of the project and the implementation of the IPPs is unclear, as described in section 3.3. The ICR can therefore not rule out that technical assistance alone would have been sufficient to create the wind power market.

3.5 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

87. **The project's impact on future electricity tariffs will benefit the poor and bottom 40 percent, and the project created employment opportunities in the renewable energy sector.** Jordan is currently reforming its electricity tariffs to reach full cost recovery in the power sector by 2017. In this context, renewable electricity provides two benefits to electricity consumers. First, it provides a hedge against the risk of sudden increases in energy import cost as experienced during 2010–2015. Second, it helps ensure reliable power supply by increasing the share of domestic energy supply. The benefits accrue to all electricity consumers but are most relevant for the bottom quintiles of society who are vulnerable to the effects of non-food inflation on household welfare. The population of Jordan further benefits from employment generated through renewable energy development, which is particularly relevant in view of high youth unemployment, which stood at 28.8 percent in 2014. Table 10.2 in Appendix 10 provides a detailed overview of the employment opportunities generated by the different renewable energy projects in Jordan. The population, and especially the poor, further benefit from reduced local air pollution caused by fossil-fueled power generation.

(b) Institutional Change/Strengthening

88. **The capacity of MEMR, EMRC, and NEPCO to develop renewable energy through the private sector has increased substantially.** Besides the new legal and regulatory environment, key improvements include well-trained staff at key positions in all three agencies;

the adoption of international standards in procurement and financial management, rigorous monitoring of social and environmental safeguards' compliance; comprehensive stakeholder engagements for all projects; models available for techno-economic analyses of tariffs, generation potentials, and grid impacts of renewable energy plants; and bankable standard documents for PPAs, grid codes, and so on. These developments, while mostly developed in the context of wind power projects, also directly contributed to the institutional capacity to procure private sector-owned solar PV capacity.

(c) Other Unintended Outcomes and Impacts (positive or negative, if any)

89. **The project was focused on large-scale renewable energy plants but also positively impacted the development of small-scale distributed renewable energy.** First, the project contributed to the establishment of JREEEF. Rather than helping finance large-scale plants as envisioned in the project's design, JREEEF's main goal is now to provide the funding necessary to exploit small-scale renewable energy and energy efficiency opportunities by (a) supporting investments and sector stakeholders to conserve and/or generate energy and in energy efficiency and (b) improving the availability of financing and cooperation with local and international financial institutions under five financing windows, including subsidy, guarantees, studies and technical cooperation, interest rate subsidy, and equity windows. Primary targeted sectors are small and medium enterprises (industrial, tourism, health, households/residential, and public buildings/facilities). Second, the project contributed to the development of distributed renewable energy by assisting the EMRC in drafting regulations for net metering.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

90. Not applicable.

4. Assessment of Risk to Global Environment Outcome

Rating: Low to Negligible

91. **While the market for large-scale wind power may slow down compared to its rapid scale at the moment, as discussed below, the risk that the GEO achievements would be derailed is very low.** This is because the sustainable market for power supply from renewable sources is virtually guaranteed through the 20-year take-or-pay PPAs that all IPP projects have signed, and the risk that the already existing installations will cease operating, or displacing fossil fuels, is negligible.

92. **Jordan remains very committed to renewable energy expansion.** As described in section 3.2, Jordan has ambitious targets for renewable energy development, domestic energy sources, and energy mix diversification. The legal and regulatory basis for wind energy is sound and stable, and the PPAs offered by NEPCO have been proven bankable. The pipeline of projects is large, with around 1,000 MW currently under development, and the country strives to become a regional hub for knowledge and service industries related to renewable energy.

93. **The development of wind power, and renewable energy more generally, may slow down from its current rapid pace, but the market for renewable power supply is sustainable.** As discussed in Section 3.2 there is a very low risk of the renewable energy market coming to a

halt. But there are three main reasons why development may slow down**.** First, after the first few hundred megawatts are operational, the REEE Law envisions that NEPCO takes over the tendering of new capacity from MEMR. This may slow down the process because there is no clear mechanism in place to finance the incremental cost if international energy prices stay low. Second, the fact that Jordan has a relatively small power system (with a total installed capacity of 3,545 MW) could, in the absence of further progress on regional interconnection, at some point reach the limits of NEPCO's ability to operate the transmission grid reliably, given the large amounts of already contracted intermittent power. NEPCO is in the process of procuring the 'Green Corridor Project', and expanding the north-south transmission grid, to address this issue. Third, there is a possibility that solar as well as day/night storage could become significantly cheaper for Jordan and therefore become the dominant renewable power source. However, none of these three factors endangers what has already been achieved with regard to the GEO, and there is already a guaranteed market (through signed PPAs) for roughly 10 times as much renewable capacity as was achieved under the GEO.

94. **The risk that the Tafila wind farm—or the two existing solar plants—will cease operating or no longer avoid CO_2 emissions is negligible.** Tafila will in all likelihood continue operating, for three reasons. First, the Tafila wind project has started commercial operation and has thus passed the period of highest project implementation risk. Second, the selected turbine manufacturer (Vestas) has over 30 years of track record and the turbine model V112-3.0 MW has already over 600 turbine years of operational track record. Third, the operational expenditure of wind power is very low compared to the PPA tariff; therefore, even significant technical failures will not lead the operator to cease operation. It is also very unlikely that Tafila will no longer avoid CO_2 emissions, because Jordan will fully decarbonize its grid within the lifetime of the Tafila wind farm. The situation for the two existing solar plants is broadly the same. The Tafila Wind IPP will also be subject to regular supervision from IFC (which provided debt financing for the project) in terms of safeguards, procurement and financial management.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry
Rating: Moderately Satisfactory

95. **The project's design addressed the key barriers to wind energy development in Jordan at the time of approval.** The project was fully consistent with the GoJ's national development priorities and aligned with the GEF's and the Bank's strategic priorities. Grounded in five years of preparatory work with the GoJ, as well as long-standing assistance by other donors, the project addressed the GoJ's needs for institutional and technical assistance. Specifically, the project's focus on establishing an enabling legal, regulatory, and institutional framework was the direct result of previous experiences in tendering private sector-owned wind power capacity in Jordan. The project's approach of providing a combination of technical and financial assistance tasks in a flexible way along with the procurement process of the IPP was suitable for achieving the GEO.

96. **However, the scope of the project proved too large for timely disbursement as the design did not adequately anticipate the potential delays in the REEE law's passing and the tendering process.** The project aimed to assist the GoJ in the entire process, from establishing the legal and regulatory framework up to the COD of the first full-scale wind investment. In hindsight this scope proved too comprehensive for an investment project. While some delays may have been unavoidable, as introducing a new renewable energy technology to a country will always take time, it may have been advisable to wait for the REEE Law to be passed before approving the grant, or to introduce it as an effectiveness condition.[6] Furthermore, given that there was no experience with developing large-scale wind power in the country and the region more broadly at the time of approval, few lessons learned on safeguards issues from similar projects were available to the GoJ or the Bank. In this context, a full-scale ESIA, although not prescribed by the Bank's policies, may have been advisable before initiating the procurement process.

(b) Quality of Supervision

Rating: Moderately Satisfactory

97. **The Bank worked in close partnership with the GoJ throughout the implementation process and assisted the PCU in a flexible way while ensuring compliance with the Bank's policies.** The Bank maintained a regular presence in the field with constant communication with the GoJ and two or more supervision missions per year. Faced with the major and largely unexpected delays of both passing of the REEE Law and consequently the establishment of JREEEF and the implementation of the performance-based subsidy component (that is, Fujeij replaced by Tafila), the Bank worked jointly with the client to address challenges and bring the project back on track. The flexibility demonstrated during the restructurings ensured that the GEO was eventually achieved.

98. **Fiduciary and safeguard aspects were addressed adequately when they arose.** Unforeseen adverse events were reacted to constructively, including the GoJ's decision to establish JREEEF as a department of MEMR rather than an autonomous institution as envisioned in the PAD and the delays caused by Fujeij. The Bank took corrective measures, including three Level II restructurings, to allow the project to continue moving forward. Despite the delays caused by these issues, the Bank remained confident that the GEO could eventually be achieved and therefore did not close the project prematurely, an approach that was vindicated by the eventual success of the project.

99. **However the tracking of GEO outcome indicators and intermediate outcome indicators showed minor shortcomings.** As discussed in section 1.3 and section 2.3, there were inconsistencies between the indicators and their target values in the PAD and the ISRs. However, this did not affect the quality of supervision much as (i) no new wind farm was built until the very end of the project, and the values of most of the key outcome indicators in the ISRs therefore remained unchanged (that is, equal to baseline values) during most of the project's implementation; and (ii) the inconsistencies between the indicators in the PAD and the ISRs

[6] Already the first ISR three months after the grant's approval states that "the [performance] subsidy component (50% of the grant) is at serious risk because of delays in approval of the Renewable Energy Promotion Law". This suggests that the approval of the law was expected within weeks of the grant's approval; including it as an effectiveness condition may have been advisable.

described above did not affect the M&E implementation too much as almost all indicators – especially the GEO indicators – are highly correlated.

(c) Justification of Rating for Overall Bank Performance
Rating: Moderately Satisfactory

100. This rating combines the ratings for ensuring quality at entry and supervision.

5.2 Borrower Performance

(a) Government Performance
Rating: Moderately Satisfactory

101. **All involved agencies of the GoJ showed high commitment to the project throughout its execution, but the implementation of the legal and regulatory framework took longer than expected.** All government agencies involved in the renewable energy sector, including MEMR, NEPCO, EMRC, and—after its formation—JREEEF, committed significant resources to creating the market for private sector-owned wind power. When issues such as the delay in the REEE law arose, the GoJ took the necessary measures in restoring the viability of the project. The flexibility to rechannel the performance-based subsidy through NEPCO in particular, proved essential for bringing the project to a satisfactory closure. However, delays in the legislative process leading up to the eventual passing of the REEE Law as well as the subsequent bylaws and regulations slowed down the development of a wind power market.

(b) Implementing Agency or Agencies Performance
Rating: Satisfactory

102. **The PCU managed to build a core of qualified staff who manage sector planning, procurement, and financial management issues well.** This continuity helped maintain satisfactory management and supervision and is a key enabling condition for the market for IPPs. The management of safeguards and monitoring was a significant learning experience for the PCU, which quickly disseminated best practices and adapted lessons learned from other IPP projects, and took the necessary measures in restoring the viability of the project. The flexibility on the part of the GoJ to assign NEPCO to take over from JREEEF as the recipient of the performance-based subsidy was key to allowing full disbursement and accounted for the changed vision for JREEEF in the sector.

103. **Performance of the implementing agencies in terms of financial management (FM):** In general, the FM overall performance of the implementing agency was satisfactory. The FM and disbursement function were handled by an Accountant seconded from the Ministry of Planning and Internal Cooperation (MOPIC) finance department. The Accountant had the competency and qualification to handle the FM and disbursement function. Flow of funds with the Bank has been smooth with no major interruptions. Related to financial reporting, all interim unaudited financial reports (IFRs) were submitted to the bank in acceptable format and content. Further, all due audit reports under this Project have been submitted to the Bank with unqualified "clean" audit opinions. The reports were timely submitted to the Bank.

(c) Justification of Rating for Overall Borrower Performance
Rating: Moderately Satisfactory

104. This rating combines the ratings for the government and the implementing agency.

6. Lessons Learned

105. **Developing wind power through the private sector takes time, but once a competitive investment environment is created, it allows for rapid scale-up of the technology.** The project demonstrated that developing wind power through the private sector allows for rapid scale-up of the technology once the enabling conditions are in place. The institutional capacity required for creating the enabling environment was significant; it took 15 years from the first wind tender and the first COD of a large-scale wind plant. The Bank technical assistance projects were provided over the course of 13 years, from 2002 to 2015, to build institutional capacity and assist the GoJ in creating the legal, regulatory and institutional setup for the wind market. These timeframes are consistent with experiences in other middle-income countries, which suggests that there is little in the project's design that could have been changed to significantly accelerate the process. However, once the enabling investment environment was in place, the private sector moved very rapidly. Installed capacity grew by two orders of magnitude during the project's implementation and will continue to grow rapidly in the near future. In the process, the private sector transferred technology and experience from abroad and helped develop a skilled wind workforce in Jordan, which positions the country well to become a regional hub for renewable energy project development.

106. **A full-scale ESIA should be part of preparing the tender if the wind project is the first of its kind in the country and the capacity is to be procured competitively.** Wind power projects can involve a range of safeguard-relevant impacts, including noise, visual impacts, ecological impacts, resettlement, and so on. The significance of each of these impacts depends on local conditions and is difficult to anticipate in the absence of comparable projects in the same country or region. A lack of investor confidence in previous safeguards assessments or the GoJ's process of dealing with safeguard issues can significantly delay the process of procuring private-sector owned infrastructure. Therefore, especially when the projects are the first-of-a-kind in the country or region, all efforts should be made to resolve all safeguard issues relating to the project before starting a competitive bidding process.

107. **Financing the incremental cost of renewable energy projects can in principle be a very efficient use of donor financing, but the legal, policy, and regulatory basis for the project should be in place before project approval.** Financing incremental costs can be an attractive option for donors to promote environmentally or socially additional projects wherever market prices do not reflect the full benefits of the projects—for example, for renewable energy projects that are more expensive than fossil-fueled power in the absence of carbon pricing. Especially when the incremental cost only constitutes a fraction of the total project cost, relatively modest donor financing can close the gap to profitability and leverage large-scale private sector investment. However, the development of legal, regulatory, and institutional conditions for investment should not be part of the investment project. Rather, these should be supported through separate technical assistance and/or the DPLs. Otherwise, delays because of unforeseen challenges in the legislative and regulatory process can tie up financing commitments over extended periods and significantly reduce the efficiency of the project. Furthermore, since the incremental costs of most projects vary

significantly over time (in this case, with variations in international fuel prices), any delays because of the development of the legal and regulatory framework can mean that, by the time of financial closure, the incremental cost subsidy that was originally calculated is no longer needed or no longer enough to make the project profitable.

108. **Several FM related lessons can be learned from this Project**. First, despite the general limitation of Government FM staff, having a part time Accountant seconded from MoPIC working on this Project was successful due to the satisfactory capacity of MoPIC staff on World Bank FM and disbursement policies. Second, simple excel sheets were used to capture the financial transactions and generate the quarterly interim financial reports, using a sound accounting software that is capable of generating the required financial reports is highly recommended, Third, the project's accounts were annually audited by an independent audit firm, it is recommended for such simple and straight forward projects in nature to be audited by the Jordan Supreme Audit Institute (SAI), this would help building the knowledge of Jordan SAI in World Bank operations and push forward the use of country system agenda.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

109. No major issues were raised by the borrower. Annex 7 contains a copy of the borrower's response to the draft of this report.

(b) Co-financiers

110. No co-financiers raised issues in relation to the project.

(c) Other partners and stakeholders

111. No other partners or stakeholders raised issues in relation to the project.

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in US$, million equivalent)

Component	Appraisal etsimate	Level II Restructuring I (November 2012)	Level II Restructuring II (June 2013)	Level II Restructuring III (June 2015)
1. Development of a Wind Power Plant	1.00	0.90	0.90	0.90
2. Performance-based Payments for Wind Power Projects	3.40	3.40	3.80	4.06
3. Renewable Energy Technical Assistance Support	1.40	1.40	1.00	0.74
4. Development of a Market for Renewable Energy	0.20	0.30	0.30	0.30
Total Project Costs	**6.00**	**6.00**	**6.00**	**6.00**

(b) Financing

Source of Funds	Type of Cofinancing	Original (US$ million)	Revised at Restructuring (US$ million)	Actual (US$ million)
Borrower	Counterpart	5.90	5.90	n.a.[a]
GEF grant	Grant	6.00	n.a.	6.00
Private sector	Commercial	130.00	n.a.	287.00

a. The actual counterpart's funding cannot be assessed precisely. Most of the counterpart funding was to be provided, through JREEEF, to the wind farm developer of the IPP power plant in addition to NEPCO's power purchase price to cover the incremental cost. However during project implementation the GoJ chose to let NEPCO incur the full incremental cost, which at the time of the PPA signing for Tafila were negative. The actual incremental cost and thus the Borrower's contribution to the project have so far (in 2015/16) been positive (see Annex 3) but vary from hour to hour. An estimate of the incremental cost incurred by NEPCO for the year 2015 (see Annex 3) is US$ 14.7 million.

Annex 2: Outputs by Component

Component	Output summary	Comments
Project preparation grant	Outputs of the PPG included a technical and economic study of wind power development, a work plan for the procurement of wind projects under a BOO arrangement, the institutional and operational arrangements for JREEEF, an environmental assessment (EA) as well as a resettlement framework for the Fujeij site, and assistance to MEMR in preparing the tendering for Fujeij.	
1. Development of a Wind Power Plant	Under Component 1 the Grant funded a consultant that, over the course of about four years, gave advice and support to MEMR along the procurement process of a first IPP wind farm. The outputs of this task included requests for proposals, bidding documents, financial and technical bid evaluations and a range of project agreement documents. These project agreement documents included the power purchase agreement, the implementation agreement, the independent engineer agreement, the land lease agreement and the transmission connection agreement. These project agreement documents provided the foundation for all subsequent renewable energy projects in Jordan. The fact that these documents are now standardized and bankable is one of the main reasons for Jordan's success in attracting a large pipeline of IPP investments.	
2. Performance-based Payments for Wind Power Projects	Under Component 2 the Grant provided a performance-based subsidy to NEPCO which, as the off-taker of renewable electricity according to the PPAs, incurred the incremental cost of purchasing renewable power from the Tafila wind farm. Pursuant the third Level II restructuring, the performance-based subsidy was paid against a performance based contract. The contract specified two performance targets which, once met, triggered the disbursement of 50% of the subsidy each. The two conditions were (i) the signing and enforcement of a wind power purchasing agreement and (ii) the signing and enforcement of the associated transmission connection agreement. Both conditions were met by June 2015 through Tafila's progress and the subsidy was disbursed as a one-time payment shortly thereafter. Under this component the Grant also provided technical assistance to MEMR to design institutional arrangements for JREEEF as well as in the preparation of a corresponding operations manual.	This component was restructured in the third Level II restructuring
3. Renewable Energy Technical Assistance Support	Under Component 3, NEPCO was assisted in integrating renewable energy into its power system planning process and its grid operations. Under the main consultancy task, a consultant (i) developed databases necessary for the technical grid impact analysis, including databases of hourly wind speeds in relevant locations and system load; (ii) reviewed system planning policies, standards and grid codes for wind turbines; and developed a methodology in order to assess their impact on integration of wind power generation; (iii) studied the impact of renewable energy on system operation and system reliability for varying levels of wind penetration in the power generation portfolio. A separate consultancy task covered an assessment of Jordan's solar power generation potential and the potential impact of solar PV on the grid. Under Component 3 the Grant also financed assistance to what is now the Electricity and Mining Regulatory Commission (EMRC). This technical assistance activity reviewed the legal and regulatory framework and provided draft regulations to strengthen the framework. Outcomes of the activity adopted by EMRC include the specification of renewable energy connection requirements and net metering regulations.	
4. Development of a Market for Renewable Energy	Under Component 4 the grant provided assistance to EMRC. The consultant developed a model for determining purchasing prices for renewable energy, with a particular focus on wind power and solar technologies, and handed over the model to EMRC. The consultant also assisted EMRC in developing the first set of indicative prices (the 'Reference Price List') which was published in 2012. The Reference Price List sets the upper PPA price limit for direct proposals under the	

	REEE Law, and has been a key guidepost for all wind and solar IPP projects in Jordan. EMRC continues to use the model to update the Reference Price list, which have since been revised once.	

Annex 3. Economic and Financial Analysis

1. **The economic and financial analysis was done from the perspective of NEPCO and the GoJ, respectively.** The state-owned utility NEPCO serves as the single buyer in the electricity sector and is the sole off-taker for large-scale wind power plants (see sector structure in annex 11). Since NEPCO is also responsible for fuel provision to the generation companies (both state owned and IPPs), there is not much difference between the economic and the financial analysis; the main differences are the consideration of the counterparty funding of consultancy services and the social cost of carbon, both of which are only considered in the economic analysis. The analysis assumes, for illustration purposes, a 117 MW wind farm with an expected generation of 391 GWh per year, but the results can be assumed to be proportional to the size of the wind farm.

Economic Analysis

2. The economic analysis follows the approach of the PAD (annex 9), with a few variations as discussed below. The economic cost for Jordan are assumed to include[7]

(a) the project preparation cost (government's share of the consultancy services in the project; data from the PAD);

(b) the grid connection investment carried out by NEPCO (inflation-adjusted data from the PAD);

(c) cost of operating the substation and the transmission line (2.5 percent of initial investment); and

(d) wind power purchasing cost (at the ceiling tariff of US$0.12 per kWh which was available at the time of the signing of Tafila's PPA).

3. The economic benefits for Jordan are assumed to include the following:

(a) Avoided cost of diesel and LNG, at a heat rate of 7,500 BTU/kWh (data from PAD; the base case assumes a 50/50 mix between the two in avoided fuel consumption). Fuel prices are assumed to be proportional to crude oil prices, with diesel including refining cost being priced at 130 percent of Brent and LNG per MMBTU being priced at 14 percent of the Brent price per barrel. Fuel price projections are taken from the Bank's Commodity Market Outlook (January 2016).

(b) Avoided variable generation cost of CCGT plants (inflation-adjusted data from the PAD).

(c) Performance-based subsidy payment from the GEF grant.

[7] The analysis did not include any cost of back up capacity investment as the project size is small compared to the volume of flexible capacity already connected to the grid. Back-up capacity investments may become a requirement in the future but by then the PPA tariffs will also have further come down compared to the ceiling tariff of US$0.12 per kWh available in 2013 and assumed in this analysis (the wind power ceiling tariff has already been reduced by 6% since then).

(d) Social benefits of avoided CO_2 emissions, assuming a carbon price of US$30 per tCO_2e in 2015, which gradually increases to US$50 per tCO_2e in 2030.

4. The main difference to the economic analysis in the PAD is that the cost to Jordan of the wind farm are approximated differently. The economic analysis in the PAD calculated the actual cost of investment and operation and maintenance, which reflects the fact that at the time of appraisal it was unclear how these costs are allocated between the private and the public sector. The economic analysis below estimates the cost to Jordan based on the actual power purchasing prices that NEPCO pays the developer. This is a more accurate measure of the cost as it includes the profit margin by the (majority foreign-owned) project developer.

5. The results of the economic analysis are shown in Table 3.1 below. The base case results in an economic NPV of US$32.62 million (using a 6 percent discount rate) and an IRR of 10.09 percent. Without the performance-based subsidy, the NPV decreases to US$29.92 million and the IRR decreases to 9.62 percent.

6. The economic NPV is sensitive to future oil price developments. The World Bank's Commodity Price Outlook, which was used for the base case, assumes annual growth of the oil price from 2017 onwards of about 7 percent p.a. The economic NPV using a 6 percent discount rate remains positive as long as the annual oil price growth remains above 4.5%.

Table 3.1. Economic Analysis of Connecting a 117 MW Wind Power Plant to the Grid (US$, millions)

Year	Preparation	Grid Connection	Operating Cost	Wind Power Purchasing Cost	Avoided Diesel	Avoided Cost LNG	Performance-based Subsidy	Variable Operation and Maintenance Cost CCGT	Social Benefits of Avoided CO_2 Emissions	Net Cash Flow
2009	-0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-0.20**
2010	-1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-1.90**
2011	-2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-2.10**
2012	-1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**-1.80**
2013	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
2014	0.00	-4.8	-0.34	-13.67	9.66	7.28	0.00	2.74	1.54	**-0.33**
2015	0.00	-8.7	-0.34	-46.88	17.53	14.61	4.06	9.40	5.45	**-14.27**
2016	0.00	0.00	-0.35	-46.88	12.39	11.19	0.00	9.40	5.63	**-18.02**
2017	0.00	0.00	-0.36	-46.88	16.07	13.64	0.00	9.40	5.81	**-11.72**
2018	0.00	0.00	-0.37	-46.88	17.21	14.39	0.00	9.40	5.98	**-9.66**
2019	0.00	0.00	-0.37	-46.88	18.38	15.17	0.00	9.40	6.16	**-7.54**
2020	0.00	0.00	-0.38	-46.88	19.68	16.04	0.00	9.40	6.42	**-5.11**
2021	0.00	0.00	-0.39	-46.88	21.06	16.95	0.00	9.40	6.69	**-2.57**
2022	0.00	0.00	-0.40	-46.88	22.53	17.93	0.00	9.40	6.95	**0.14**
2023	0.00	0.00	-0.40	-46.88	24.10	18.97	0.00	9.40	7.21	**3.01**
2024	0.00	0.00	-0.41	-46.88	25.81	20.11	0.00	9.40	7.48	**6.11**
2025	0.00	0.00	-0.42	-46.88	27.65	21.33	0.00	9.40	7.74	**9.43**
2026	0.00	0.00	-0.43	-46.88	29.49	22.55	0.00	9.40	8.01	**12.75**
2027	0.00	0.00	-0.44	-46.88	31.33	23.78	0.00	9.40	8.27	**16.07**
2028	0.00	0.00	-0.45	-46.88	33.17	25.00	0.00	9.40	8.53	**19.39**
2029	0.00	0.00	-0.45	-46.88	35.02	26.22	0.00	9.40	8.80	**22.71**
2030	0.00	0.00	-0.46	-46.88	36.86	27.45	0.00	9.40	9.06	**26.02**
2031	0.00	0.00	-0.47	-46.88	38.70	28.67	0.00	9.40	9.33	**29.34**
2032	0.00	0.00	-0.48	-46.88	40.54	29.89	0.00	9.40	9.59	**32.66**
2033	0.00	0.00	-0.49	-46.88	42.38	31.11	0.00	9.40	9.85	**35.98**
2034	0.00	0.00	-0.50	-46.88	44.22	32.34	0.00	9.40	10.12	**39.30**

Year	Preparation	Grid Connection	Operating Cost	Wind Power Purchasing Cost	Avoided Diesel	Avoided Cost LNG	Performance-based Subsidy	Variable Operation and Maintenance Cost CCGT	Social Benefits of Avoided CO_2 Emissions	Net Cash Flow
2035	0.00	0.00	-0.51	-46.88	46.06	33.56	0.00	9.40	10.38	**43.62**

Financial Analysis

7. In the financial analysis, the cost and benefits for NEPCO are assumed to be equivalent to the economic cost and benefits for Jordan with the exception that the financial analysis does not consider the GoJ's share of the consultancy/project preparation cost and the social benefits of avoided carbon emissions.

8. This approach differs from the PAD which calculates the financial analysis from the perspective of the project developer, not NEPCO. The deviation from the PAD's approach was necessary as the performance-based grant was restructured to go directly to NEPCO, not to the developer. Therefore, the most appropriate focus for the financial analysis is that of NEPCO's financial benefits and losses.

9. The results of the financial analysis are shown in Table 3.2. The financial NPV for NEPCO under the base case is −US$31.57 million (using a 6 percent discount rate), with an IRR of 2.95 percent. Without the performance-based subsidy, the NPV decreases to −US$35.19 million with an IRR of 2.70 percent. The project becomes financially attractive for NEPCO if it is assumed that the share of diesel in the displaced power generation is 75 percent (IRR: 6.01 percent).

Table 3.2. Financial Analysis of Connecting a 117 MW Wind Power Plant to the Grid (US$, millions)

Year	Grid Connection	Operating Cost	Wind Power Purchasing Cost	Avoided Diesel	Avoided Cost LNG	Performance-based Subsidy	Variable Operation and Maintenance cost CCGT	Net Cash Flow
2014	-4.8	-0.34	-13.67	9.66	7.28	0.00	2.74	**-1.87**
2015	-8.7	-0.34	-46.88	17.53	14.61	4.06	9.40	**-19.72**
2016	0.00	-0.35	-46.88	12.39	11.19	0.00	9.40	**-23.65**
2017	0.00	-0.36	-46.88	16.07	13.64	0.00	9.40	**-17.53**
2018	0.00	-0.37	-46.88	17.21	14.39	0.00	9.40	**-15.64**
2019	0.00	-0.37	-46.88	18.38	15.17	0.00	9.40	**-13.70**
2020	0.00	-0.38	-46.88	19.68	16.04	0.00	9.40	**-11.53**
2021	0.00	-0.39	-46.88	21.06	16.95	0.00	9.40	**-9.26**
2022	0.00	-0.40	-46.88	22.53	17.93	0.00	9.40	**-6.81**
2023	0.00	-0.40	-46.88	24.10	18.97	0.00	9.40	**-4.20**
2024	0.00	-0.41	-46.88	25.81	20.11	0.00	9.40	**-1.37**
2025	0.00	-0.42	-46.88	27.65	21.33	0.00	9.40	**1.69**
2026	0.00	-0.43	-46.88	29.49	22.55	0.00	9.40	**4.74**
2027	0.00	-0.44	-46.88	31.33	23.78	0.00	9.40	**7.80**
2028	0.00	-0.45	-46.88	33.17	25.00	0.00	9.40	**10.85**
2029	0.00	-0.45	-46.88	35.02	26.22	0.00	9.40	**13.91**
2030	0.00	-0.46	-46.88	36.86	27.45	0.00	9.40	**16.96**
2031	0.00	-0.47	-46.88	38.70	28.67	0.00	9.40	**20.02**
2032	0.00	-0.48	-46.88	40.54	29.89	0.00	9.40	**23.07**
2033	0.00	-0.49	-46.88	42.38	31.11	0.00	9.40	**26.13**
2034	0.00	-0.50	-46.88	44.22	32.34	0.00	9.40	**29.18**
2035	0.00	-0.51	-46.88	46.06	33.56	0.00	9.40	**33.24**

Annex 4. Bank Lending and Implementation Support/Supervision Process

(a) Task Team members

Name	Current Title	Current Unit	Responsibility
Ahmed Merzouk	Lead Procurement Specialist	GGO03	Team member
Anarkan Akerova	Counsel	LEGCF	Counsel
Angeline Mani	Language Program Assistant	GEE05	Team member
Banu Setlur	Senior Environmental Specialist	GEN05	Team member
Chandrasekar Govindarajalu	Senior Energy Specialist	CASEE (IFC)	Team member
Colin Scott	n.a.	n.a.	Reviewer
Dahlia Lotayef	Lead Environmental Economist	GEN07	Reviewer
Ferhat Esen	Senior Energy Specialist	GEE05	Task Team Leader
Ghada Abdel Rahman Shaqour	Consultant	GSU05	Team member
Hayat Taleb Al-Harazi	Program Officer	MNARS	Team member
Husam Mohamed Beides	Program Leader	MNC02	Task Team Leader
Jad Raji Mazahreh	Senior Financial Management Specialist	GGO23	Financial management specialist
Jan Hamrin	n.a.	n.a.	STAP reviewer
Josephine Masanque	n.a.	n.a.	Disbursement officer
Kanta Kumari Rigaud	Lead Environmental Specialist	GCCPT	Reviewer
Kenneth Mwenda	Program Manager	SECVA	Counsel
Layla Mohamed-Kotb Abdel Wahab	Program Assistant	MNCEG	Team member
Lina Fares	Senior Procurement Specialist	GGO05	Procurement specialist
Mario Antonio Zelaya	n.a.	n.a.	Team member
Mark Njore	Program Assistant	GEE05	Team member
Maya Abi Karam	Senior Councel	LEGAM	Counsel
Mazhar Farid	Legal Analyst	LEGAM	Counsel
Meskerem Brhane	Program Leader	AFCE2	Safeguards specialist
Mona El-Chami	Senior Financial Management Specialist	GGO23	Disbursement officer
Mutasem El-Fadel	Consultant	GEN05	Safeguards specialist
Nina Bhatt	Practice Manager	GSU03	Team member
Noureddine Bouzaher	n.a.	n.a.	Task Team Leader
Raffaello Cervigni	Lead Environmental Economist	GEN07	Safeguards specialist
Reynold Duncan	Lead Energy Specialist	GEE01	Task Team Leader
Rima Abdul-Amir Koteiche	Senior Financial Management Specialist	GGO23	Financial management Specialist
Roger Coma Cunill	Senior Energy Specialist	GEE05	Team member
Rome Chavapricha	Senior Energy Specialist	GEE02	Task Team Leader
Sydnella E. Kpundeh	Senior Program Assistant	GEN03	Team member
Velaythampillai Vijayaverl	n.a.	n.a.	
Vladislav Vucetic	Lead Energy Specialist	GEE01	Task Team Leader

(b) Staff Time and Cost

Stage of Project Cycle		Staff Time and Cost	
		No. of staff weeks	**US$, thousands (including travel and consultant costs)**
Lending	FY05	2.18	12,959
	FY06	4.61	26,495
	FY07	9.23	50,981
	FY08	19.38	116,981
Total:		**35.40**	**207,416**
Supervision/ICR	FY09	9.21	53,536
	FY10	12.3	84,687
	FY11	10.71	74,412
	FY12	9.65	64,798
	FY13	14.03	74,225
	FY14	6.57	31,877
	FY15	4.36	22,241
	FY16	9.25	52,785
Total:		**76.08**	**458,560**

Annex 5: Beneficiary Survey Results

Not applicable.

Annex 6. Stakeholder Workshop Report and Results

Not applicable.

Annex 7. Summary of Borrower's and/or Comments on Draft ICR

Project Design
Rating: Satisfactory

10. The project was a result of long preparation that started as early as 2003, but the project became effective on November 26, 2008. The original closing date, December 31, 2012, was extended twice: first to June 30, 2013 and then to June 30, 2015.

11. This project aimed to help the GoJ achieve its energy strategy target of 7 percent of the country's energy mix to come from renewable sources by 2015, especially after launching two unsuccessful tenders for solar and wind power.

12. The draft Renewable Energy Promotion Law provided the legal framework to support renewable energy activities in Jordan. The law permitted the granting of renewable energy source certification. It allowed the tariff for renewable energy to be governed by PPAs, following competitive bidding of a project developer and allowing for indexation of variable costs. The law provided investment incentives in the form of customs tax exemption, buying all generated electricity, free use of public lands, and free cost of interconnecting to the electricity grid. The law also provided for the establishment of a fund to promote renewable energy and energy efficiency activities, JREEEF.

13. Moreover, the National Energy Strategy 2007–2020 called for a mechanism to support renewable energy projects and recommended proceeding with the issuance of renewable energy law to stimulate the private sector. In addition, it also recommended proceeding with the implementation of a number of proposed wind projects for electricity generation, including Kamsha, Fujeij, Harir, Wadi Araba, and others. Furthermore, the successful execution of the project was expected to generate confidence among local financial institutions regarding renewable energy projects. It was also to provide a model for private sector involvement in wind power in the region. The capacity-building activities for government agencies, financial intermediaries, and other stakeholders provided for under the technical assistance component were also expected to enhance the stakeholders' awareness and ability to analyze renewable energy proposals. The project was therefore expected to lead to increased involvement of the local financial sector in renewable energy development.

Project Implementation Modality
Rating: Moderately Satisfactory

14. The project paved the way for all the current renewable energy projects in Jordan. It laid down all the technical and legal requirements as follows.

15. **Technical assistance.** The three technical assistance assignments, financed by the GEF grant, were concluded on time and budget. The three assignments were the following:

(a) Integration of Wind Farms in the National Electric System of Jordan

(b) Strengthening the Legal, Regulatory, and Institutional Frameworks for the Development of Renewable Energy Resources

(c) Estimating Indicative Prices for Various Renewable Energy Products

16. The execution and completion of these consultancy assignments and associated analytical work and recommendations were essential for the implementation of Jordan's renewable energy development strategy and they are considered as a backbone for many renewable energy laws, bylaws, and regulations. As a result of the analytical work under the technical assistance, the law and regulations for direct proposals submission process as well as technical requirements (that is, ESIA, buffer zone), the PPA template, the pricing, grid capacity and reinforcement needs, net metering, and connection regulations necessary for development of Jordan's renewable energy projects have been finalized.

17. **REEE Law.** The REEE Law was issued on April 16, 2012. Although a temporary REEE Law was approved by the Cabinet and Royal Court in early 2010, the law could not be brought to the parliament for its approval until much later. This was mainly attributed to the objective of reducing independent entities since the draft law entailed the establishment of a stand-alone institution (that is, JREEEF, which will require financing and other resources allocation. However, the law did pave the way for the establishment of JREEEF, under the umbrella of MEMR rather than as an autonomous public entity.

18. **NEPCO performance subsidy.** The provision of US$3 million GEF performance-based subsidy was envisaged to be triggered by the Fujeij wind power farm and channeled through JREEEF to NEPCO. However, the bidding process endured considerable delay that was not only attributed to the much needed REEE Law and JREEEF establishment but also to an incomplete ESIA, which underestimated the bird migration concern and consequently led to including conditionality and proposing modification of technical specifications in bids. The bidding process concluded in December 2012 and a private sector was identified.

19. As a result of these delays, both in establishing JREEEF and initiating the Fujeij IPP project, the GEF grant original closing date, December 31, 2012, was extended twice: first to June 30, 2013, and then to June 30, 2015. Also, through the three restructurings, all undisbursed money was reallocated to be used toward the performance-based subsidy as per Table 7.1, where NEPCO was assigned as beneficiary of the performance-based subsidy for wind energy generation, and deleted any reference to JREEEF as an intermediary for disbursement of the performance-based subsidy. This allowed the subsidy to be fully disbursed and on time, through the MoPIC to NEPCO, which, in its role as the only off-taker for the renewable electricity, had entered into a PPA with the developer of the Tafila wind farm, the JWPC.

20. **Tafila Wind IPP.** As a result of enacting the REEE Law; Tafila Wind IPP, Jordan's first renewable energy IPP secured a package with IFC to support the development of a 117 MW wind farm in Jordan in November 2013. Final financial closure for the remaining funding need was achieved and the construction works were initiated in January 2014 by the JWPC. The project's construction works began in January 2014 and the final testing, commissioning, and inspections of the project, including the 39 wind turbine generators were concluded and the plant began its commercial operations COD in September 2015.

Table 7.1. Revisions of Fund Allocation to Project Components

Component	Original GEF Financing (US$, millions)	Restructuring November 2012	Restructuring June 2013	Restructuring June 2015
Development of a Wind Power Plant	1.0	0.9	0.9	0.90
Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)	3.4	3.4	3.8	4.06
Renewable Energy Technical Assistance Support	1.4	1.4	1.0	0.74
Development of a Market for Renewable Energy	0.2	0.3	0.3	0.30
Total Project Costs	**6.0**	**6.0**	**6.0**	**6.00**

Project Global Environment Objective and Development Objective

Rating: Satisfactory

21. The main objective of this project was to increase power supplied from renewable energy resources in a sustainable manner through the private sector and thereby help reduce the level of carbon emissions from hydrocarbon-based power generation sources and overcome barriers to the promotion of wind power. This meant overcoming barriers, which included limited access to commercial financing, shortfalls in the regulatory environment, and lack of knowledge in various aspects of renewable energy development in general, and wind energy development in particular. The project sought GEF funding, which included technical assistance for barrier removal, assistance in developing wind energy projects, and a performance-based subsidy or grant for the promotional wind power projects and other renewable energy projects.

22. A combination of a performance-based subsidy or grant and interventions in barrier removal was expected to leverage private sector funding and pave the way for favorable market conditions to scale up wind power in Jordan and reduce its import dependency. That was in addition to reducing fuel imports, mitigating investor risk, and bridging the knowledge gap to ensure sustainability and replicability. Moreover, the promotional investment was expected to contribute to reduction of GHG emissions and to the process of sustainable development by offering several socioeconomic benefits to the country in the form of development of indigenous industry, local capacity building, and employment generation. By contributing to increased diversity of fuel options, the project was expected to contribute to the GoJ's mandate, which gave high priority to a sustained efficient development of the energy sector to enhance economic competitiveness as the country was transitioning into a service-oriented economy. Given its strategic importance, the GoJ had attached high priority to the project. The GEF grant assistance was thus a critical input toward supporting this project to bring down the cost of wind and other renewable energy and thus begin to tap the large wind power potential in the country. The GoJ has taken important steps to improve the performance of the sector through regulation, restructuring, private sector participation, and development of the use of renewable energy.

23. More specifically, this operation was consistent with, and supportive of, national development priorities as well as internationally agreed programs of action for sustainable development. It laid down the framework necessary for the development of a sustainable wind market in Jordan, the implementation of which would lead to (a) transfer of technology that is

environmentally sound, adapted to suit local conditions, and is cost-effective and (b) important global benefits with regard to reduction of GHG emissions.

24. The GEO of the project was to reduce the GHG emissions by removing the barriers to the establishment of a sustainable wind energy market as well as integrate wind energy generation into the energy mix through the operation of a commercial wind farm in Jordan.

World Bank Performance
Rating: Moderately Satisfactory

25. The Bank representatives had been very supportive and understanding throughout the project duration and helped in concluding the project on time and budget; however, there were the following remarks:

(a) Very strict procurement processes, which required a no-objection from the Bank at each step of the way and delayed the tendering process for Fujeij.

(b) The environmental issue (birds' migration concern) was raised initially in the Bank's ESIA, which called for two studies during spring and autumn by the Bank and caused a delay to the project.

Government Performance
Rating: Satisfactory

26. The GoJ was supportive to the project during all phases. The highest level in the GoJ had shown excellent commitment to the development of renewable energy and ensured that this is reflected in the Energy Strategy and updated its target to a very ambitious 10 percent renewable energy share in the primary energy mix. To achieve this, the GoJ followed an evolving multifaceted action plan with its partners in the public and private sectors to significantly increase electricity generation from renewable sources and substitute conventional fuels for renewables across sectors without sacrificing economic growth.

27. To achieve the above target, the REEE Law No. 13 of 2012, first in the region, allows MEMR to accept direct proposals for sites and projects not under tender, whether integrated into the existing built environment, small or large, or as stand-alone generators. This allowed for further innovative, cost-effective technologies to be deployed, responding to particular demands and existing infrastructure. MEMR has been developing the required bylaws, regulations, and tariff range, providing an environment for investors with minimized risks, which is essential to allow cost-effective development of large-scale renewable energy generation.

28. The current legal framework has created a momentum. However, there are issues that cast a limit on further growth of the sector. Action has been initiated to address the existing bottlenecks, particularly relating to the grid limitation and absorption of increasing quantities of renewable power, as well as targeted studies and development for the environmental concerns and regulations.

29. These initiatives require action across the GoJ and the private sector; JREEEF will be a crucial source of support to make technology deployment attractive for end users. This fund will

channel funds from various local and international sources into funding windows that will evolve overtime to maintain the flexibility to respond to changing market needs. JREEEF will also play a key role in raising the awareness and providing technical assistance and studies and will support the development of renewable energy projects in Jordan, help reduce subsidies, and act as a catalyst for encouraging the existing banking market to lend to this challenging sector.

M&E

30. ISRs and mission aide memoires were produced regularly.

Lessons Learned

31. The project paved the way for all the current renewable energy projects in Jordan. It laid down all the technical and legal requirements.

32. Renewable energy projects may have environmental safeguard issues that need to be addressed thoroughly at an early stage and incorporated into the project design to minimize negative and/or irreversible impacts. A late acknowledgement of such impacts implies higher mitigation costs and often faces institutional inertia impeding its solution.

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

No comments were received from co-financiers and other partners/stakeholders.

Annex 9. List of Supporting Documents

Title	Date	Ref. #
Aide Memoires for the Project's Supervision Missions	Multiple	Multiple
Amended and Restated Global Environment Facility Grant Agreement	June 23, 2015	
Bank Procedure, "Small Recipient-Executed Trust Fund Grants"		Catalogue Number OPCS5.03-PROC.01
Central Electricity Generating Company Annual Report	2014	
Country Assistance Strategy FY2003-FY2006	December 20, 2002	Report No. 25228-JO
Country Assistance Strategy FY2006-FY2010	April 6, 2006	Report No. 35665-JO
Country Assistance Strategy Progress Report FY2006-2010	March 11,2009	Report No. 47518-50
Country Partnership Strategy FY12-FY15	February 1, 2012	Report No. 58114-JO
Country Partnership Strategy Progress Report FY12-FY15	June 23, 2014	Report No. 87054-JO
From Energy Mess to Energy Management: Jordan as a Case Study (2007-2020)	January 2015	
Fujeij Wind Farm Environmental Assessment	October 2007	E1752
Fujeij Wind Farm Resettlement Policy Framework	November 2007	
Global Environment Facility Grant Agreement (Promotion of a Wind Power Market Project)	August 28, 2008	
Implementation Completion and Results Report Guidelines	July 22, 2014	
Inclusive Green Growth: The Path to Sustainable Development	2012	ISBN (paper): 978-0-8213-9551-6
Jordan National Energy Strategy 2007-2008	2006	
Jordan National Vision and Strategy 2025	n.a.	-
Jordan National Agenda 2006-2015	n.a.	-
Jordan Renewable Energy and Energy Efficiency Law No. 13	2012	
Program Document for a Proposed Loan – Jordan DPL	March 31, 2016	Report No. ICR00003759
Project Appraisal Document	May 29, 2008	Report No. 43593-JO
Project Concept Note (PCN)	June 14, 2005	
Promotion of Wind Energy: Lessons Learned from International Experience and UNDP-GEF Projects	May 2008	
Restructuring Paper	July 25, 2012	Report No: 92196-JO.
Restructuring Paper	June 21, 2013	Report No RES18545-JO
Restructuring Paper	June 21, 2013	Report No RES11136: -JO
Tafila Wind Farm, Final Report of the Environmental and Social Impact Assessment Study (ESIA), Rev. 1	May 27, 2013	Report No.: 11-1-3058a_rev.1
Tafila Wind Energy Project	December 20, 2012	Report No.: 11-1-3058f
Toward a Green, Clean, and Resilient World for All WBG's Environment Strategy 2012–2022	2012	
Towards a Sustainable Energy Future for All	2013	
Transformation through Infrastructure (2012-2015)	2012	ISBN: 978-1-60244-006-7
Updated Master Strategy of Energy Sector in Jordan for the Period (2007-2020)	December 2007	-
World Bank. Project Implementation Status Reports (ISRs)	Multiple	Multiple

Annex 10: Additional Information on Project Outcomes

Table 10.1. Operational Wind Farms in Jordan

Name	Developer	Governorate	COD	Total Size (kW)	No. of Turbines	Turbine Type
Hofa	CEGCO	Amman	1996	1,125	5	Vestas V27/225 (225 kW, diameter 27 m)
Ibrahimyah	CEGCO	Amman	1987	320	4	n.a. (80 kW)
Tafila	JWPC (IPP)	Tafilah	2015/09/16	117,000	39	Vestas V112/3000 (3,000 kW, diameter 112 m)

Source: MEMR; TheWindPower.net.

Table 10.2. Investment and Employment Impacts of Large-scale Renewable Energy Projects under Development in Jordan

Renewable Energy Project Pipeline	Investment Amount (US$, millions)	Total Job Opportunities:	Direct Jobs	Indirect Jobs	Governorate
1. Solar energy: Financial closure - projects of first round (200 MW - 12 projects in Ma'an, Mafraq, Aqaba)	400	600	500	100	Ma'an, Mafraq, Aqaba
2. Solar energy: Qwairah Project (65–100 MW - 1 project in Qwairah- Aqaba)	150	120	100	20	Aqaba
3. Solar energy: Project of local company Philadelphia, connected to distribution network (10 MW - 1 project in Mafraq)	25	60	50	10	Mafraq
4. Solar energy: North, eastern and middle projects *(*200 MW - projects in north, eastern and middle areas)	400	600	500	100	All
5. Wind energy: First round projects (230 MW - 4 projects in Rajef-Ma'an, Tafileh, Mazar-Irbid)	400	600	500	100	Ma'an, Tafileh, Irbid
6. Wind energy: Project of Korean Company KEPCO (89 MW - I project in Fujaj-Shoubak)	160	120	100	20	Ma'an
7. Wind energy: Project of Spanish Company Elecnor (80 MW - 1 project in Ma'an)	120	60	50	10	Ma'an
Total	**1,655**	**2,160**	**1,800**	**360**	–

Source: MEMR.

Annex 11. Jordan: Electricity Sector Structure

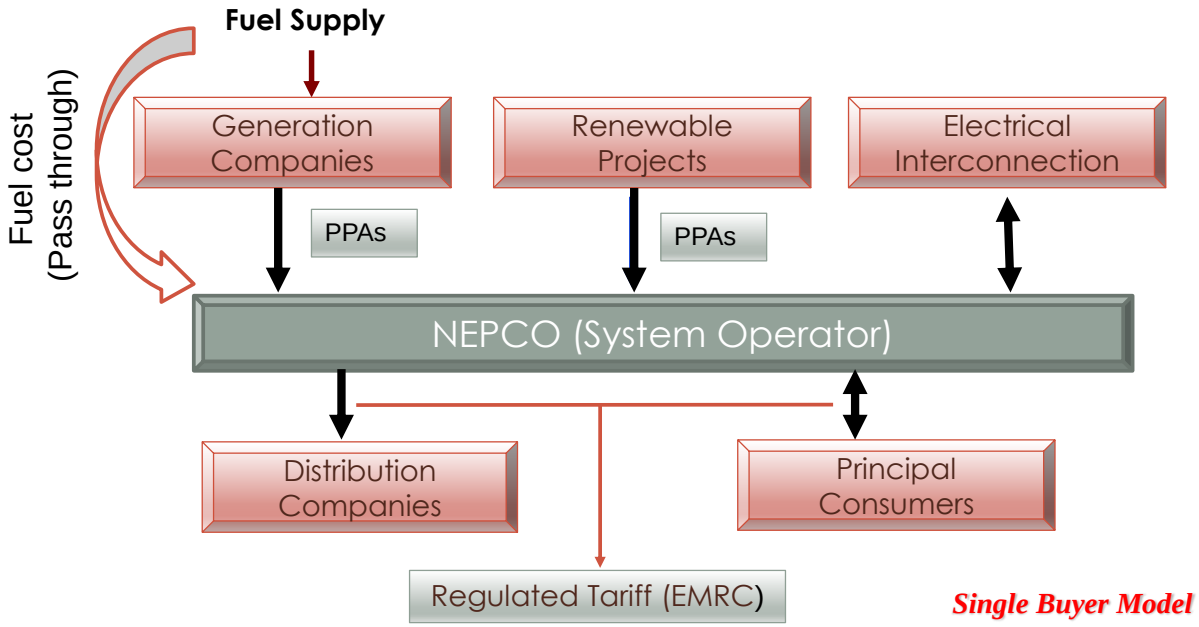


Figure 3: Electricity sector structure in Jordan (Source: NEPCO).

Annex 12. Photos

Figure 12.1. Northwestern part of the Tafila Wind Farm (Source: World Bank staff; Site Visit 03/08/2016).

Figure 12.2. Southern part of the Tafila Wind Farm (Source: World Bank staff; Site Visit 03/08/2016)

Figure 12.3. Northern part of the Tafila Wind Farm (Source: World Bank staff; Site Visit 03/08/2016)