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AN INVESTIGATION OF FINANCING MECHANISMS OF RENEWABLE ENERGY AND ENERGY EFFICIENCY PROJECTS IN JORDAN: A REVIEW PAPER

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Abstract: The development of renewable energy and energy efficiency is crucial to Jordan's current and future prosperity and there are substantial opportunities to pursue green growth. Despite the progress which has been made in this regard, there are some financial barriers that face this sector. These barriers concern the lack of familiarity of renewable energy and energy efficiency technologies and practices within banks. The government of Jordan is aware of these financial difficulties and that is why a fund of renewable energy and energy efficiency has been created to provide technical assistance to energy developers and financial institutions in addition to adopting a specific loan guarantee program to tackle the perceived risks that may face the financial institutions and to encourage these institutions to extend more credit facilities to this vital sector.

Keywords: Renewable Energy, Energy Efficiency, Energy Mix, Financing Mechanisms.

JEL Classification: H23, L33, L9, M11, O22, Q20, Q30

1. Introduction

Unlike neighbor countries, Jordan lacks conventional sources of energy and imports 96% of its fuel needs from neighboring Arab countries to meet its energy requirements. The high cost associated with fuel imports creates a financial burden on the national economy and the country had to spend about 20% of its GDP on fuel imports. Electricity consumption grows at the rate of 5.5% yearly .Therefore it was necessary to adopt a strategy that will lead to the exploitation of renewable energy sources such as wind, solar and biomass. In 2007, the Government of Jordan adopted an Energy Master plan to develop the energy sector, requiring about $ 14 billion during the period (2007-2020). One of the main goals of the plan is to raise the contribution of renewable energy in the energy mix from 7% in 2015 to 10% in 2020. By doing so, this strategy will lead Jordan into a sustainable economy that reduces dependency on imported oil, creates more jobs while leaving the least negative impact on the environment. This study starts with objectives and methodology: part 2 is about the microeconomic situation in Jordan. Part 3 covers the state of energy sector. Part 4 is about mechanisms of financing and the last section ends with conclusion and recommendations.

2. Statement of the Problem

Jordan is a developing country, with limited resources and dependent on workers remittances and foreign aid. In the last decade, the economy of Jordan was severely affected by what is called (Arab Spring) and the increase of oil prices which put a heavy burden on the budget. In order to reduce the burden of oil's bill, Jordan opted to develop its own available sources of energy especially the renewable energy but the problem of financing is the main challenge that faces the country in this regard.

3. Objective of the study

The main objective of this paper is to assess the mechanisms of financing Energy efficiency and Renewable energy projects and what challenges exist around financing for EE and RE projects either by local banking system, international aid from different agencies, or foreign credits.

4. Methodology

This study on Renewable energy and Energy efficiency financing is a review research and performed based on available data from the Central Bank of

Jordan, Jordan Loan Guarantee Corporation, Ministry of Energy and Mineral Resources and commercial banks.

5. Literature Review

There are many studies that tackled the issues of Renewable Energy and Energy efficiency in terms of experience of different countries but a few discussed the mechanisms of financing this sector. A report for the Commission for Environment Cooperation, Montreal, Canada, 21 march 2006. Indicated that the interest rate subsidy in India enticed numerous banks to finance solar water heating systems and that in turn led to the growth of manufacturers. According to above mentioned report, in 1994, Japan launched the "Solar Roofs" program to promote solar PV through low interest loans and it became the world's largest supporter of PVs.Christa. N. Brunuscheiler in her empirical analysis of 'Finance for Renewable Energy in Developing and Transition Economies, Cambridge Univ. Press, 2010. Indicated that the influence of financial sector on the use of RE resources is confirmed in panel data estimation on up to 119 non-OECD countries for 1980-2006, financial intermediation, in particular commercial banking has a significant positive effect on the amount of RE produced especially hydropower RE such as wind, solar, geothermal and biomass.Another study on Sustainable Finance and Banking by Marcel Jeucken, published in London, 2001 by Earth Scan Publication LTD. Shows that the initiative of green investment incentive scheme, launched in 1995 which offers individuals, companies and public authorities loans at 2% below the market rates, strengthened the role of the financial sector in environmental policy. Discussing the application of loan guarantees to support low-carbon energy sources, Brown and Jacob (2011) suggest that by reducing the maximum losses, a bank may face when extending a loan, guarantee will make lenders more willing to provide financing. The study on innovative financing mechanisms for renewable energy projects in North Africa, published by United Nations, Economic Commission for Africa shows that the development of renewable energies requires implementation of coherent institutional regulatory and incentive framework and significant funding due to the cost of required initial capital investment. Ernst and Young Editors, December 26, 2014 published a Renewable Energy Review: Finance Mechanisms in which they released global renewable energy markets by analyzing investment strategies and resource availability.The European Report Development: Financing Renewable Energy in Developing Countries-Mechanisms and Responsibilities 2011 ⁄ 2012 indicates that the cost of financing renewable energy in developing countries should be met by developed countries according to Kyoto Protocol ,where (Annex 1) developed countries could count the

mitigation of emission in developing countries toward their own emission reduction obligation.

The Macroeconomic situation of Jordan

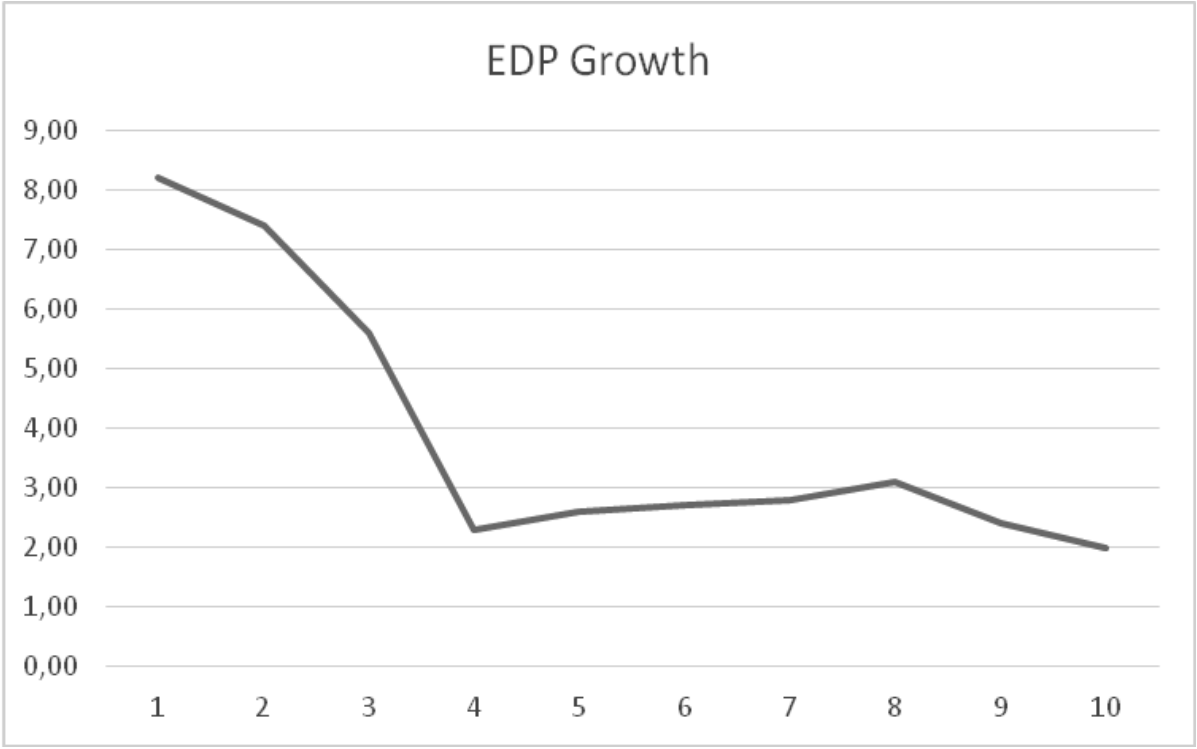
Jordan is classified as a middle-income country that depends on remittances of expatriate workers and foreign aid. The country went through a period of high economic growth since 2000 with average 8% of GDP growth. Following the financial crisis 2007-2008, Arab Spring, rise of oil prices and the inflow of Syrian refugees, it experienced a lot of economic difficulties that resulted in low economic growth, budget deficit, and current account deficit, high rate of unemployment, decline of foreign direct investments (FDI) and high rate of foreign debt.

Table1. Percentage Growth of Gross Domestic Product during 2007- 2016

Year	GDP Growth
2007	8.2
2008	7.4
2009	5.6
2010	2.3
2011	2.6
2012	2.7
2013	2.8
2014	3.1
2015	2.4
2016	2.0

Source: Central Bank of Jordan Annual Reports.

Chart 1


EDP Growth
9,00
8,00
7,00
6,00
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4,00
3,00
2,00
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1
2
3
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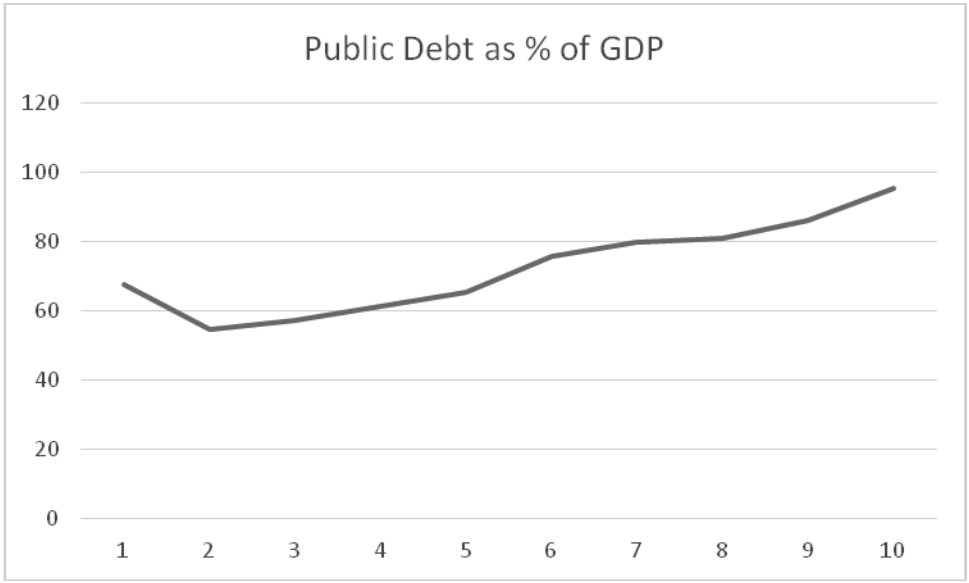
5
6
7
8
9
10

Due to the decline of foreign direct investments (FDI), remittances of Jordanians expatriates and tourism receipts as well as foreign aid, debt levels have increased substantially - Table 2.

Table 2. Public Debt as a% of GDP in Jordan 2007-2009

Chart 2



Year	Public Debt as % of GDP
2007	67.6
2008	54.5
2009	57.2
2010	61.1
2011	65.4
2012	75.6
2013	79.9
2014	80.9
2015	85.9
2016	95.5

Source: Ministry of Finance

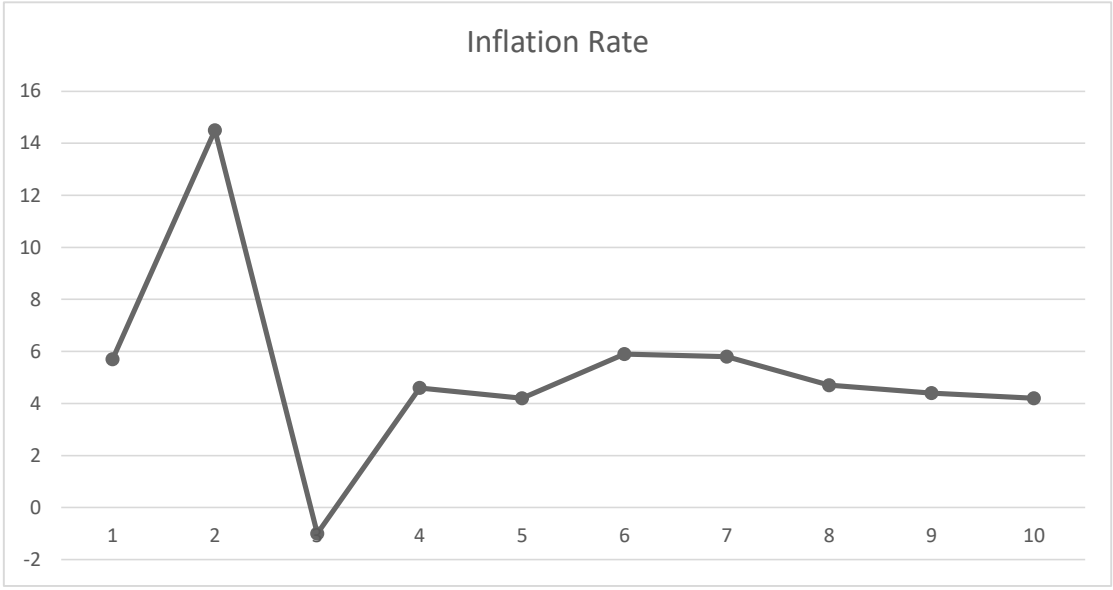
In the wake of financial crisis, inflation in Jordan was volatile, reaching 14% before becoming negative in 2009. The sound monetary policy and fixed exchange rate have helped to result in stability as it is shown in table3.

Table 3. The Rate of Inflation in Jordan 2007-2016

Year	Inflation Rate
2007	5.7
2008	14.5
2009	- 1
2010	4.6
2011	4.2
2012	5.9
2013	5.8
2014	4.7
2015	4.4
2016	4.2

Source: Vivid Economic based on World Development Indicators and IMF.

Chart 3



Renewable Energy in Jordan

Jordan has tremendous wind, solar and biomass energy potential which can only be realized by large-scale investment. In 2007, Jordan adopted a new strategy for the years 2007-2020 concentrated on the following items:

1. Diversifying the energy resources.

2. Maximizing the utilization of domestic oil shale and gas resources.

3. Expanding the renewable energy projects

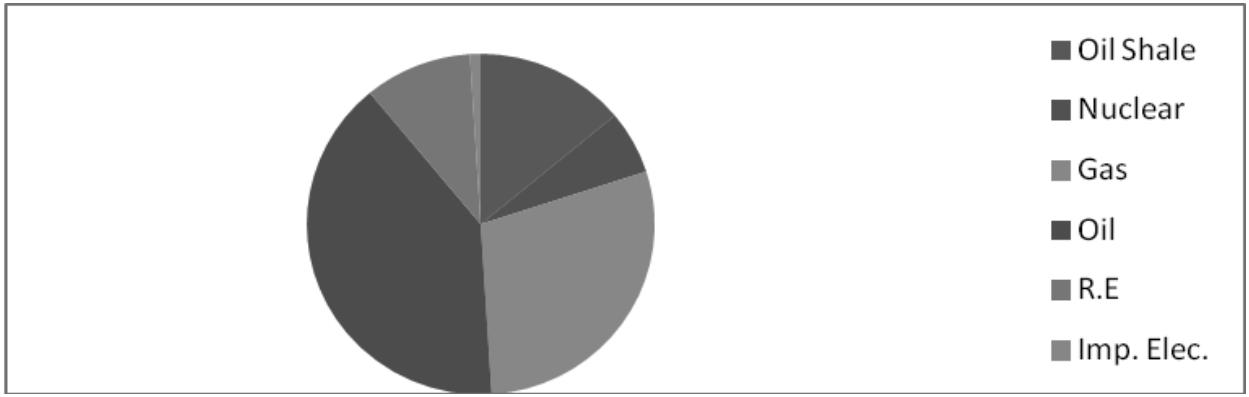
4. Applying energy efficiency measures.

5. Generating electricity from nuclear plant.

In order to achieve the above targets, Jordan has to make efforts to remove all technical, legal and financial barriers. Regarding renewable energy, the strategy aims at increasing energy mix from 2% in 2007 to 7% in 2015 and 10% in 2020 by creating 2300 MW from wind, solar and biomass and ultimately reduces consumption based on fuel by 20% as it shown in figure 1.

Chart 4 . Energy mix in 2020.

Oil shale 14%, imported electricity 1%, renewable 10%, oil 40%, gas 29%, nuclear 6%



Source: Ministry of Energy and Mineral Resources

In order to implement this strategy, a Law on Renewable Energy and Energy Efficiency was passed in 2012. This law establishes a regulatory and incentives for renewable energy production and provides investors with 100% exemption from tax for 10 years.

The law allows local and international companies to directly negotiate their projects with the Ministry of Energy. In addition, the government has established a new Energy Fund to support the infrastructure development of new renewable energy facilities The government of Jordan has established the RE and EE Fund to provide the necessary investment needs for the development stages of EE and RE activities. The long- term vision of the fund envisages support of technical assistance studies, interest rate subsidies and guarantee facilities through 5 windows. Currently the fund has limited resources and is capitalized by domestic funds.

The transition from fuels to renewable energy resources will require capital investments, technology transfer and skilled human resources, through a package of investments estimated at about $2.1 billion up to 2020.In 2012, the Ministry of Energy and Mineral Resources announced that it has qualified 34 international and local companies for investment in renewable energy projects especially in solar and wind power projects. This number has been increased to 48 in 2016. With over a capacity reaching 1000MW.

To meet its renewable energy targets, the Government of Jordan, through the Ministry of Planning and International Cooperation, has received financing in the amount of USD 1 million from the Global Environmental Facility (GEF) through the World Bank and Euro 1.56 million from the French Global Environmental Facility (FFEM) through the Agence Francaise de Development (AFD) for the development of a framework for supporting Energy Management in Jordanian industrial and service sectors as it is presented below:

Table 4

AFD project Span the energy sector, USAID Projects & Other Agencies.

Project	Partners	Duration	Amount
Energy Efficiency and Renewable Energy Credit Line	Capital Bank Cairo-Amman Bank	2011-2014	$ 53 mln. Credit line € 300.000 technical assistance grant
Energy Efficiency in Lighting	Ministry of Energy and Mineral Resources Ministry of Planning	2009-2012	€ 422.000 grant
Support of JREEEF Implementation of Energy Efficiency Road Map Budget	Ministry of Energy and Mineral Resources	2008- 2012	€ 156 mln grant
	Ministry of Energy and Mineral Resources	2012-2013	€500.000 grant
	Ministry of Planning	2012-2013	€156 mln loan

Table 4
USAID Projects

Project	Partners	Duration	Amount
Electricity Utility Transmission and Distribution Partnership	National Electric Power Partnership	2009-2013	$ 1.4 mln grant
Electricity Regulatory Commission Partnership	Electricity Regulatory Commission	2009-2012	$660.000 grant

Table 5
Other Development Agencies in the green economy in Jordan

Development Agency	Project	Duration	Amount
World Bank Global Environment Facility	Promotion of Wind Power Market	2008-2013	$ 6mln grant
World Bank Global Environment Facility	Energy Efficiency Investment Support Framework	2009-2013	$ 1mln grant
International Finance Corporation	Clean Technology Fund		
European Union	Support for Jordan CSP Program	N/A	$ 72mln concessional loan
UN Environment Program	Renewable Energy & Energy Efficiency	2011-2013	€35mln grant
Government of Spain	Efficient Lighting in Jordan	2012-2013	$ 50.000 grant
	1 MW PV Power Plant in Azraq	2010-2013	$ 5mln debt swap

Source: Adam Smith International "Study of Mechanisms to Incentivize the Financial Sector to Scale up Financing to Green Investment in Jordan", May, 2013.

Presently, Jordan has 3 wind farms, 39 solar energy companies, 2 biomass plants, 7 photovoltaic projects and 21companies that deal with energy efficiency.

The Banking System and Renewable Energy

The Jordanian banks used to finance small business in the energy sector but there is no disclosure regarding the amounts of extended credits to this sector. In general banks are keen to finance RE & EE projects. Based on the discussions with some officials of commercial banks, we can say that banks prefer financing micro RE projects more than micro EE projects. This is because banks lack experience in evaluating the related risks.

In harmony with the Energy Master Plan, the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) signed in 2016 an agreements with some commercial banks and the Jordan Loan Guarantee Corporation (JLGC) to finance renewable energy projects. The agreement is supported by the Central Bank of Jordan which allows banks to use money allocated for this purpose at low interest rates ranging from 1.0% to governorates and 1.75% to the governorate of the capital.

Table 6
Advances extended to commercial banks by the Central Bank of Jordan for Energy Sector during period 2014- 2016

In Million Dinars*

Year	Extended Advances	Number of projects	Interest Rate Charged by banks
2014	11.4	26	5.71%
2015	11.1	25	5.08%
2016	24.5	51	4.75%
Total	47.0	102	

Source: Central Bank of Jordan, Department of Public Debt.
*Jordanian Dinar= 1.4 US$

From the above table, we can notice that the advances extended by the Central Bank of Jordan to commercial banks for the purpose of financing renewable energy and energy efficiency projects increased from JD 11.4 million in 2014 to JD 47 million in 2016, which consists a 412% increase.

The commercial banks have a mix of funding resources that include internal resources, Central Bank of Jordan and French Development Agency (AFD)

Table 7
Commercial Banks which signed agreement with JREEEF and JLGC

Name of Bank	Internal Funds	CBJ Funds	AFD Funds
Housing Bank	√		
Cairo Amman Bank	√	√	√
Bank of Jordan	√		
Capital Bank	√	√	√
Al.Eitehad Bank	√	√	
Al Ahli Bank	√		
Jordan Kuwait Bank	√	√	

Source: Jordan Loan Guarantee Corporation &.Tarreq. F. and Nezhad.H. Access to Finance, Survey for Energy Efficiency and Renewable Energy Projects (USAID).July, 2014.

The Jordan Loan Guarantee Corporation which signed the above mentioned agreement with banks is ready to provide partial loan guarantees to enable the eligible companies and individuals to obtain bank financing. The program includes:

1. Maximum limit of financing of small and medium-size for the purpose of generating energy from renewable resources is JD 350.000 for 5 years.
2. Maximum limit of financing for photovoltaic systems in households is JD 3000 for the period of 5 years.
3. Maximum limit for financing solar heaters for individuals is set at JD 500 for the period of 36 months.

In response to the growing number of companies and energy suppliers, banks are ready to finance the accredited ones at good terms. Up to now, JLGC has guaranteed 2 loans for financing PV system installations in schools.

Conclusion:

Competitive financial sources for the development of the renewable energy and energy efficiency are very important. The structured financial programs are new and many banks are monitoring the development of this sector. Banks are ready to finance if the Energy Service Providers (ESP) will be able to overcome challenges and prove their creditability. All the above mentioned processes which have been taken by the Government of Jordan to develop the renewable energy sector will lead to reduce the dependency on imported oil, budget deficit and will create more jobs for Jordanians provided that all bureaucratic problems, distorted tariffs, lack of capacity and dearth of reliable data to support effective decision making are tackled properly. In addition, the government of Jordan can count on some developed countries to help it in this regard based on international protocols and agreements on climate change.

Recommendations:

In the light of the study's results and in order to scale-up lending by financial institutions, we may recommend the following:

1. Setting –up a special green bank based on international experience in this regard.

2. The Government of Jordan should provide technical assistance to developers of renewable energy and energy efficiency projects and to financial institutions.

3. Relaxing prudential banking regulation in terms of reserve ratio and capital adequacy ratio, so banks will be able to extend more credits to energy sector.

4. Banks should disconnect between renewable energy projects requirements and bank lending requirements.

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