

AMERICAN UNIVERSITY OF BEIRUT

PUBLIC PRIVATE PARTNERSHIP IN THE
LEBANESE ENERGY SECTOR

by
JINAN BOU KARROUM

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JINAN BOU KARROUM

Approved by:

Dr. Hiba Khodr, Associate Professor
Public Studies and Public Administration

Advisor

Dr. Nesreen Ghaddar, Professor
Mechanical Engineering

Member of Committee

Dr. Riad Chedid, Professor
Electrical and Computer Engineering

Member of Committee

Dr. Mounir Rached, Lecturer
Progreen Online Program

Member of Committee

Date of thesis defense: February 13, 2020

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AN ABSTRACT OF THE THESIS OF

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Lebanon's energy sector has been suffering for a long time due to shortage of energy supply, ageing assets, lack of experts and mismanagement of its allocated budget. In this dissertation, Public Private Partnership (PPP) is presented as a resort for the energy sector's regulatory challenges when framed within a comprehensive legal framework to properly govern the sector. PPP is the intervention of the private sector in the public services that were initially managed and operated by the public sector. It is a significant method to be used in the developing countries that have budgetary constraints and an inefficient public sector. On the other hand, renewable energy is presented as a technical solution for the electricity sector in Lebanon.

Unlike Lebanon, Jordan is leading the energy sector in the region although it has similar geopolitical and economical challenges and similar resource availability as the case of Lebanon. Two case studies were analyzed, presenting the first wind farm project in Lebanon, Akkar Wind Farm, and the first wind farm in Jordan, Tafila Wind Farm, to highlight the inefficiency of the energy sector in Lebanon and learn from Jordan's success story. Jordan's strength is mainly in its solid regulations that manage the energy sector and fairly involve the private sector. Jordan as well does not suffer from the political disputes that hinder the prosperity of all sectors. The Lebanese Government needs to establish a solid framework which governs the partnership between the public and private sectors in the energy sector while ensuring transparency, accountability, fair competition, clear duties of both sectors and zero political influence.

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CHAPTER I

INTRODUCTION

According to Wang, Xiong, Wu, and Zhu (2018), public private partnership (PPP) is an alternative way of public services procurement to traditional procurement. It is basically the intervention of the private sector in the public services that were initially managed and operated by the public sector. The rise of this method was due mainly to the failure of the public sector to attain satisfactory services to the public, especially in developing countries where debt is crippling the government. Public-private partnership has been adopted by some governments since approximately 40 years ago. It has been applied in infrastructure and public services, some of which are transportation, energy, telecommunication. PPP can be studied on different levels such as economics, management and public administration. PPP is considered reliable given the involvement of the private sector and the sharing of risks between different parties thus leading to less burden on the government that is troubled with debt (Wang et al., 2018). By applying this method to renewable energy projects, many countries would succeed in getting closer to their renewable energy target and in decreasing the gap between the supply and demand of electricity and thus mitigating the disastrous impacts of climate change.

A. Study Objective and Significance

This dissertation aims at focusing on the inefficiency of the energy sector in Lebanon. It presents the public private partnership method of procurement as a solution to resolve the weaknesses in the energy sector through implementing renewable energy

projects with the aid of the private sector. The PPP method is a successful and efficient procurement method subject to having a solid regulations covering the issues of the sector.

To highlight the inefficiencies in Lebanon, a comparative analysis was done comparing a case study in the energy sector in Lebanon with another similar case study in Jordan. One case study illustrates the current failure of the first wind farm in Lebanon and the second one shows the success that Jordan has achieved in its first wind farm. In short, this dissertation attempts to answer the following research questions:

1. What are the gaps in the energy sector in Lebanon?
2. What are the challenges and opportunities of PPP?
3. What are the challenges and opportunities of PPP in the Lebanese renewable energy sector?
4. How can Lebanon learn from Jordan's success story in developing renewable energy to advance its renewable energy sector?

This research will be of significant value to the literature since it analyzes the energy sector in Lebanon after the recent updates that include the enactment of the PPP law, issuance of the new policy paper of 2019 in addition to the economic crisis that affect the energy sector in Lebanon. It also identifies the updates in the wind farm project which is based on PPP and which will contribute to enhancing the energy sector in Lebanon. Another value of the research is the comparison between two developing countries having similar conditions but different achievements in the energy sector. Lebanon and Jordan are neighboring countries with similar climate conditions, natural resources issues, political issues and economical challenges. They also both have ambitious national targets for renewable energy and similar potential in renewable

energy market growth. However, Jordan is leading the energy sector in the region while Lebanon is always failing to implement reforms in the energy sector.

Therefore, some lessons learnt from the Jordanian case will be highlighted to help Lebanon move forward despite the various challenges that await it.

B. Research Methodology

The chapters that follow will present an overview of Lebanon and Jordan's social, economic and political situation in addition to the policy making structure. Then, a highlight on the electricity sector and its regulations for Lebanon and Jordan is introduced. PPP and renewable energy in addition to the link between the two concepts are explained after that. Two case studies are included to highlight the conditions and current status of the first wind farms in Lebanon and Jordan. The data for the case studies are based on secondary and primary data. The latter is gathered through direct interviews with different experts from the public and private sectors in Lebanon and Jordan. The experts added a significant input to my research. The collected data clarified the situations in Lebanon and Jordan and showed the opportunities and challenges facing both countries, particularly in the energy sector. At the end, a comparative analysis is done followed by some recommendations addressed to the Lebanese energy sector.

CHAPTER II

LEBANON

A. Setting the Context: Lebanese Socio-political and Policy Environment

1. Social and Economic overview

Lebanon is in the Middle Eastern region residing on the Mediterranean Sea with an area of 10,452 km². It is considered a mountainous country with parallel ranges of mountains having the Bekaa valley in the middle. Lebanon is bordered by Syria, Palestine and Cyprus across the Mediterranean Sea from the West. It is a developing country with a population of 6.1 Million and \$11,615 GNI per capita which makes the country in the upper middle-income group having good standard of living (Saaf, Brouwer, Peters, & Plataroti, 2018). It was considered a country with a robust economy that relies on the private sector. However, the Lebanese economy suffers from public debt that keeps increasing due to slow economic growth (Haase, 2018). The economy also was disrupted due to the inflow of more than 1 million Syrian refugees to Lebanon. The World Bank estimated the losses incurred on the economy due to the refugees to be around \$4.5bn per year (Salloukh, 2017). McKinsey & Company (2018) confirmed the tragic status of Lebanon when stated that the economy is highly volatile and it is dependent on Lebanese diaspora, regional support and international funds more than the revenue of the local market. The private business rank decreased by 30 grades in 7 years. The foreign direct investments dropped by \$1bn. The budget of the Lebanese government is spent in different sectors. The debt to GDP ratio reaches 149% which is the 3rd highest worldwide. It is estimated that 32% of the budget is debt repayment, 33% of the budget is salaries, benefits, health, education, 24% is spent on OPEX, 5% on

CAPEX and the remaining 6% is the budget allocated to Electricity of Lebanon (EDL) (McKinsey & Company, 2018). The Lebanese economy is capital-scarce as the capital expenses were less than 9% of the total budget in the last decade. The budget is obviously spent on consumption and rather than investments that generate revenue (Araji, Hlasny, Mansour Ichrakieh, & Intini, 2019). On the other hand, the public profit has increased across the years due to the addition of taxes that represent 71% of governmental revenues. The tax returns were mainly from value added services tax and gasoline taxes. In addition, 23% of the income is collected from non-tax revenue sources and the other 6% is from treasury receipts. As part of increasing the revenue, the government sought the privatization of some public utilities such as the telecommunication and had plans for privatizing the electricity, airline, port, and water utilities. However, such reforms were hindered by the government expenditure that exceeded the revenues by 1.5 times, thus causing additional losses. This shows that the sovereign debt of the Lebanese government cannot be diminished (Araji et al., 2019). The economic risks that are facing Lebanon are reflected in the international credit rating standards. Moody's rating indicates an estimate of the investor's loss when there is an event of default. Fitch rating puts an investment grade for each country. Moody's rating placed Lebanon in a category of poor credit quality and very high risk. Same rating was given by Standard & Poor's (Byblos Bank, 2019). Unfortunately, Standard & Poor's (S&P), Fitch and Moody's further downgraded Lebanon to CCC, CC and Caa2. S&P rating for Lebanon is marked with negative outlook. Moody's rating is under review while the outlook of Fitch regarding Lebanon is not applicable. Such low rating assigned by the top credit rating agencies indicate the high risk faced by investors to retrieve their invested money. The situation worsened since September 2019 where the

banks reported deficit in USD inflows and a difference between the official exchange rate and the black market exchange rate widened. Eventually, investors' confidence deteriorated and yield bonds increased since the default risk is higher. The banks had to informally set restrictions on capital flow to avoid large capital outflow ("Emerging Markets Monitor - 09 DECEMBER 2019," 2019). Since there is a limited fiscal capability and mismanagement of the budget, the Lebanese government requested the international community for funds and grants to promote economic growth. The government secured conditionally the required budget from Conférence économique pour le développement, par les réformes et avec les entreprises (Cedre) on April 6, 2018. However, till this date, the government failed to achieve the commitments of Cedre and thus not receiving any financing.

2. Political Situation

As for the Lebanese political situation, Lebanon is distinguished by its sectarian socio-political culture with 18 sects present in the country. The republic is considered a parliamentary democracy. Each sect is represented in the parliament with a fair distribution according to Taif Accord that followed the end of the civil war. Basically, the parliament is divided into two big alliances and each one refers to regional or international country to push forward their political agenda (Khodr & Ruble, 2013). The alliances are comprised of political leaders or political elites working on responding to their related sectarian interests and agreeing on sharing power among them. Thus, forming a weak government that is resistant to reforms and built on corruption (Geha & Talhouk, 2019). The March 14 alliance includes political parties, led by the Future Movement which is the main actor of Saudi Arabia in Lebanon,

advocating western politics against Syria. The March 8 alliance comprises of political parties who are pro-Syrian politics and headed by Hizbollah, the main powerful actor of Iran in the Middle East (Najem, 2012). Most of the political parties have participated in the civil war of 1975. None of the alliances strive for the country's prosperity and sustainable development, instead, they work on getting a bigger share of gains from policies which grant them more power. Such high corruption in governance has been proven by many international reports (Khodr & Ruble, 2013).

In short, the public management is handled by the war lords of Lebanon after the end of the civil war and the public management is tailored to benefit such leaders. The public management also obeys the regional and international actors that have mutual interests with Lebanese politicians. It also supports the voices of armed groups and religious parties. It covers the theft acts, corruption, bribery for profit gain. Further to that, it also allows for the exploitation of natural resources for more financial benefits (Kairouz, El Hokayem, & El Hage, 2016).

The aforementioned alliances keep on fighting whether the orientation of Lebanon should be pro-Iran and Syrian regime or pro-Saudi and anti-Syrian regime. Such clashes led to extended political deadlock (Geha & Talhouk, 2019). On the other hand, and when the government is active, the ministries do not experience a smooth productive environment during their term since they had disputes and conflicts of interest in implementing projects and bills. Such a situation causes deterioration in public services. So the ministries intend to set vague plans and strategies that lack transparency allowing them to be safe from being prosecuted (*An Emergency Action Plan for Rescuing Lebanon's Energy Sector*, 2019).

The history of Lebanese government shows political conflicts leading to power vacuum and discontinuity of the governmental business activities. In the following, the history will be briefed as of 2009 until this date. In June 2009, the alliance of March 14 won the elections and one of the leaders of March 14, Prime Minister Saad Hariri, headed the council of ministers (CoM) in a government colored from different political backgrounds. In January 2011, a dissolution of the council of ministers occurred after the resignation of the March 8 alliance ministers. In June 2011, a March 8 dominant cabinet was formed headed by Prime Minister Najib Mikati ("Lebanon profile - Timeline," 2019). In March 2013, the prime minister resigned amid of tensions over the coming parliamentary elections. Another prime minister, Tamam Salam, of moderate stance, was nominated afterwards. In February 2014, a cabinet was formed after a political deadlock for almost a year. One of the reasons of the formation of the government delays is the Syrian conflict which arose in 2011 (Lund, 2014). In May 2014, the president's term ended leaving the position vacant for a couple of years. Parliament term ended as well, yet the members of parliament extended their term till year 2017 not to leave the government with total power vacuum while the Lebanese Syrian borders were at risk. In December 2016, the existing cabinet resigned and a new cabinet was formed by Prime Minister Saad Hariri (March 14 alliance). In June 2017, the parliament approved a new electoral law for the coming elections that was scheduled after a year. The elections happened in May 2018 and the cabinet resigned automatically. In January 2019, prime minister Saad Hariri formed a new cabinet that resigned in October 2019 amid of mass protests. It is worthy to note that in case the cabinet resigns or the term of the president ends, the cabinet behaves as a care-taker government with limited responsibilities that does not include signing new bills for

implementation (Haytayan, 2017). This means that there is a significant time spent in the last 10 years where the government was not able to implement bills and the period is 4 years and 8 months. It is evident that the political parties in Lebanon do not have the will to convene their political views nor to make or implement policies for the interest of the country welfare (Khodr & Ruble, 2013). Figure 1 below presents a summary of the presidential and ministerial power vacuum in the past decade.

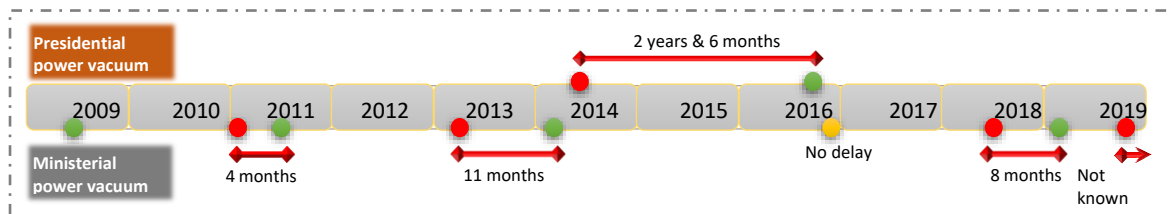


Figure 1: Timeline of power vacuum ("Lebanon profile - Timeline," 2019)

3. Policy Making

The process of policy making relies mostly on politics in all its stages starting from setting of the agenda to the implementation of the policy. In most cases, the policy is formulated and approved and then it is halted and delayed in the implementation stage because of disagreement in the share of gains among the political alliances (Khodr & Ruble, 2013).

Policies in Lebanon are intermingled within the political process (Khodr & Ruble, 2013). They are inherited from the French mandate and from the Turkish government that was governing Lebanon before World War I. The adoption of foreign policies and implanting them in a local environment without taking into consideration local beliefs and values, resulted in a segregation of human groups in Lebanon and a government distinguished in corruption, ignorance, poor management of human and natural resources (Kairouz et al., 2016).

As per Khodr and Ruble (2013), in general the success of policy making process depends on whether it is reliable, open for participation, responsive to various inputs from policy actors and participants and respecting the superiority of the law. According to Khodr and Uherova Hasbani (2013), policymaking in Lebanon is based mainly on politics which is interrelated to regional and international players. Makdisi (2004) states that the Lebanese political status can be briefed by the instability of the political alliances and poor governance which lead to increasing corruption in the country. The Corruption index of Lebanon lost 20 ranks since year 2012. Corruption is considered the second most challenging problem behind economic growth. It comes after the lack of proper legislation and inefficiency of the government. This is reflected in the ineffectiveness of passing laws and activating legislations in addition to the long delays of updating laws and drafting proper policies as per McKinsey & Company (2018). Critical laws have not been established yet, for example, bankruptcy law, secure lending, competition law. These laws are within the pipeline that includes 12 other laws related to protecting the business environment. This is due to the fact that the political parties do not have the will to improve the status quo. The meeting of the parliament happens on average one time per month, having 10 out of 16 committees meeting less than one time per month and 7 of them meeting less than one time in two months. There are 39 laws enacted on a yearly basis in Lebanon relative to 100 laws in France and 500 laws in the United States. Therefore, Lebanon regulations rank in the 40th percentile worldwide (McKinsey & Company, 2018).

The solution for this corruption is to transfer the sectarian/consociation system to a democracy system which will lead to independence of foreign agendas and more

transparency in the management of sectors (Makdisi, El- Khalil, American University of Beirut. Faculty of, & Sciences. Institute of Financial, 2013).

B. Energy Sector: Participants and Process

Lebanese people live in good standard and this requires a high energy supply to meet the demand. The demand is met currently by importing fuel products from abroad which is estimated to be 7.3 Mtoe (2013). About 47% of Total Primary Energy Supply (TPES) imports, mainly oil, is used to supply the electrical power plants. Moreover, 29% of the TPES, particularly gasoline, is used for transportation. The remaining percentage of TPES imports are consumed in residential, commercial and industrial sectors. Therefore, almost half of TPES imports are used in electricity production. Lebanon's electricity sector accounts for the highest consumption of energy resources (Ibrahim, Fardoun, Younes, & Louahlia-Gualous, 2013).

1. Electricity Sector Status

The electricity generation, transmission and distribution in Lebanon is monopolized and owned by the public institution, EDL. To start with the generation network, it constitutes of 7 major power plants. Zouk, Jieh and Al Hrayshe power plants operate on heavy fuel oil (HFO) fired steam turbines. Deir Ammar and Zahrani are implemented to work on natural gas while Tyre and Baalbeck function on diesel fired open cycle gas turbines. However, none of these plants are functioning on natural gas (NG) and use diesel oil (DO) is used instead as shown in the table below (Ministry of Energy and Water, 2019).

Table 1: The capacity of the existing power plant (Ministry of Energy and Water, 2019)

Owner-ship	Name of the Facility	Fuel Type	Installed Capacity (MW)	Effective Capacity in 2018	Total Cost with Average Barrel Cost	Effective Capacity % (2018)
EDL	Zouk 1 Thermal Power Plant	HFO	607	440	14.75	72.5%
EDL	Jieh 1 Thermal Power Plant	HFO	343	180	19.39	52.5%
EDL	Zouk 2 ICE Power Plant	HFO/NG	198	157	10.83	79.3%
EDL	Jieh 2 ICE Power Plant	HFO/NG	78	63	11.19	80.8%
EDL	Zahrani I CCPP	DO/NG	469	420	13.62	89.6%
EDL	Deir Ammar I CCPP	DO/NG	464	430	14.96	92.7%
EDL	Baalbeck Open Cycle GT	DO	64	57	20.26	89.1%
EDL	Tyr Open Cycle GT	DO	72	56	21.44	77.8%
EDL	Richmaya-Safa Hydro	-	13	3	3.66	23.1%
EDL	Naameh (Landfill Gas)	-	7	7	1	100.0%
Existing Barges	Power Barge Zouk	HFO/NG	187	195	13.95	104.3%
Existing Barges	Power Barge Jiyeh	HFO/NG	187	195	14.03	104.3%
Existing IPP	Litani Hydro	-	199	47	3.97	23.6%
Existing IPP	Nahr Ibrahim Hydro	-	32	17	2.65	53.1%
Existing IPP	Bared Hydro	-	17	6	2.65	35.3%
Existing IPP	Kadisha Hydro	-	21	15	2.65	71.4%
Existing IPP	Hrayche Thermal Power Plant	HFO	35	46	20.13	131.4%
Power Wheeling	Imports from Syria	-	276	69	15.35	25.0%
Total			3,269	2,403		72.5%

There is no consistency in the numbers of the generation capacity of Lebanon since the above numbers refer to the capacity in 2018 reported by the Ministry in 2019 do not match with the numbers reported by the Council of Development and Reconstruction in 2017 shown in the following statistics. As per year 2017 statistics, the annual average production of these plant is about 1,536 MW equivalent to annual peak of 2,194 (at 70 % load factor), while the demand is estimated to have an annual average of 2,494 MW equivalent to annual peak of 3,534 MW. Consequently, covering the demand requires an addition of 1,340 MW of power. This is resulting in a 61% of gap.

Due to the insufficient supply, the load shedding in Lebanon is estimated to last for 3 to 12 hours per day based on the geographical area. The private generators are covering the gap between the supply and demand of electricity since the early 1990s even though there is no legal framework regulating this business. Private generators impose exploitive tariff rates on the Lebanese household with an average of 45 USD cents/kWh (Bouri & El Assad, 2016) since they act like monopolies in local areas. The private generator owners have a revenue of \$1 bn per year. The Ministry of Economy attempted to protect customer rights in year 2015 when it allowed the Lebanese citizens to report any violations of pricing policies. In year 2019, the Ministry of Energy and Water (MoEW) and the Ministry of Economy (MoF) requested the private generator owners to install meters on every household and charge 24 USD cents/kWh (Hourri, 2019).

The challenges that are facing the generation network are various. The operational cost of the power plants is high since the installed power plants mostly use diesel oil and heavy fuel oil which are of high cost worldwide. The power plants are ageing and their effective capacity is decreasing as shown in the table above. On

average 72.5% of all of the power plants are operating as of 2018 (Ministry of Energy and Water, 2019). Moreover, there is no margin of reserve which always leads to shortages in electricity supply. There is also very low share of renewable energy which threatens energy security (McKinsey & Company, 2018).

As for the transmission and distribution networks, the technical losses reach 16.5% because of ageing assets. The distribution network suffers from additional non-technical losses that reach 21% (Ministry of Energy and Water, 2019). Thus, the end users suffer from receiving a low quality of energy (McKinsey & Company, 2018).

EDL revenues do not cover the costs due the tariff rates that remain unchanged since 1994 (Bouri & El Assad, 2016). Lebanon's residential tariff rates is 10 USD cents/kWh. Industrial tariff rates are 10 USD cents/kWh in Lebanon (McKinsey & Company, 2018).

The generation cost is estimated to be \$0.9bn, transmission cost is \$0.1bn, distribution cost is \$0.3bn and the tariff losses account for \$0.2bn. This deficit is covered by governmental subsidies accounting to \$1.5bn.

2. Electricity Regulations

To tackle the challenges of regulations in the energy sector, I will study the participants involved in the legislation process. As per Awdeh, Jomaa, and Zeaiter (2019), the only decision makers in the energy sector are ministries and there is no independent regulatory control. The sector is thus falling victim to the existing corruption within the government and the process requires a lot of reforms. Policies in all sectors face the same problems mentioned but the reason why the energy sector is

crucial to be studied is because it drains the government fiscal resources from the state budget.

Khodr and Uherova Hasbani (2013) argues that the NGOs actions can impact policies. The private sector, on the other hand, can affect the governmental decisions on projects. MoEW and other ministries base their decisions on university research and NGO findings. Such research is 90% funded by international donors and 10% funded through local universities. However, most of the times the agenda of the minister does not match the results of academia and thus leading to a stagnant energy sector. Khodr and Uherova Hasbani (2013) confirms Awdeh et al. (2019)'s statement that the minister of energy and water in Lebanon mostly influences the policy making since no independent regulatory has control over the ministries and the situation remains unchanged since the citizens do not have the necessary awareness to lobby for their rights.

The energy issues are managed mainly by the MoEW supported by the ministry of environment (MoE) and MoF. MoEW sets the tariff rates and manages the sector regulations. The price related policies are agreed with the ministry of finance and then accepted by the council of ministers. As for the Ministry of Environment, it provides support to the MoEW in matters related to the energy efficiency and renewable energy. For the energy issues that require more than MoEW, the Council of Ministers establishes committees that include actors from different backgrounds (Khodr & Uherova Hasbani, 2013). The Lebanese Centre for Energy Conservation (LCEC) is another stakeholder in the energy sector in Lebanon. It is a technical agency affiliated with MoEW. It develops national plans and strategies related to sustainability, energy

efficiency, renewable energy and green buildings and supports the government in implementing them (United Nations ESCWA, 2018).

In the following, the history will be briefed as of 2009 until the date of this thesis, highlighting the names of the Ministers of Energy and water that belong exclusively to one political party for almost a decade. In June 2009, when the council of ministers was formed, Gebran Bassil, who's coming from the Free Patriotic Movement (FPM), a member of the March 8 alliance, was the minister of MoEW. Between January and June 2011, Gebran Bassil acted as caretaker Energy Minister since the cabinet resigned. In June 2011, the minister Gebran Bassil headed the MoEW for another term. During March 2013 and February 2014, Gebran Bassil acted as a caretaker Energy Minister for another term. In February 2014, the minister Arthur Nazarian, was in charge of MoEW. He belongs to the Tashnag party which is an ally to FPM ("FPM and Tashnag reaffirm alliance," 2018). In December 2016, the minister Cezar Abi Khalil took over the MoEW. He belongs to FPM as well. Between May 2018 and January 2019, Cezar Abi Khalil acted as a caretaker energy minister due to the resignation of the cabinet. In January 2019, minister Nada Boustani who is also considered a member of FPM, managed the MoEW. Nada Boustani was in charge until October 2019 when the government dissolved. Then, Nada Boustani acted as a caretaker energy minister as of the date of completion of this thesis. As per Khodr and Uherova Hasbani (2013), even if the same political party handles a ministry for consecutive ministerial terms, we can't say that there is a continuity in the policies. This is because of the persisting conflicts between the political parties that does not allow passing evidence-based policies, instead, ministers tend to implement policies based on power gaining, bargaining and political competitions.

Given the political corruption Lebanon that is directly affecting the energy sector, PPP is presented as a solution that has proven to produce successful projects in developing countries. Based on Shediac, Abouchakra, Hammami, and Najjar (2008), the increase in PPP projects investment by 1% contribute in the growth of GDP by 0.3% and thus boosting the economy. According to the World Bank findings, PPP projects can create 215,000 jobs in Lebanon. The following section presents all the laws and regulations, including PPP law, that were developed in Lebanon since year 2000 that affected or had the intention to affect the electricity sector.

On September 5, 2002, law number 462 was passed. It aims at unbundling the Lebanese power sector and forming a regulatory authority. The way to reach such objective is through public private partnerships. The law indicates that the distribution and the generation networks should be managed by licensed joint stock companies at first owned by the Lebanese government. The board of directors is assigned by the Council of Ministers. When the joint stock companies become partially or fully privatized, the board of directors is designated by the company's general assembly. Within 2 years of establishing the privatized company, the shares of the public sector should be sold to the private sector on a condition that they do not exceed 40%. This is done through a tender and the winning bidders sell electricity to the government through an agreed PPA. Then, the council of ministers will instruct to sell the total shares to the private sector within a specified period. On the other hand, the law dictates the establishment of the National Electricity Regulatory Authority (NERA) responsible for monitoring the electricity sector. It is recognized by its independency on the financial, technical and administrative levels. Most importantly, it allows the public to access all the documents, data and budgetary statements thus proving its transparency (Republic

of Lebanon, 2002). Unfortunately, the law was never implemented (United Nations ESCWA, 2018). On November 11, 2006, a new law numbered 775 was published. The law gives the council of ministers the right to grant licenses for private companies to generate electricity for one year based on the recommendation of the Minister of Energy and Water. The law is applicable for a specific period until NERA is activated (Republic of Lebanon, 2006). Yet, the consequences of the Israeli war on Lebanon in 2006 prevented the implementation of this law (Khodr & Uherova Hasbani, 2013). Similarly, law number 288 that was enacted on April 30, 2014, granted the council of ministers the right to provide licenses for the private sector to produce electricity within 2 years based on the proposal of the Minister of Energy and Water and the Minister of Finance. Similar to law number 775, law number 288 was only applicable until NERA is established (Republic of Lebanon, 2014). However, NERA was never established, and the ministries did not grant any license until passing of law number 54/2015. The latter extended the applicability of the law number 288 until April 30, 2018 (Republic of Lebanon, 2015). Law number 129 was enacted on April 17, 2019. This law extends the validity of law number 288 for 3 more years. It also gives the authority for the MoEW to issue tenders for power plants construction. It also mentions that the power plant bids will be subject to the Central Inspection, Tender Management directorate. However, the bids that are based on PPA basis won't be part of the Central Inspection. Then, the Council of Ministers submitted this law number 129 to the parliament. However, the Constitutional Council of Lebanon filed an appeal regarding the article of law number 129 related to PPA tenders that infers lack of transparency in tender management (Republic of Lebanon, 2019). Such law delays the establishment of NERA and keeps the full authority with the ministry making it playing a “guardianship” role rather than

“implementation” role ("The Government Monitor No. 3: Scrutinizing Lebanon’s Electricity Plan," 2019).

In a parallel event, there were efforts to privatize the governmental institutions before year 2000 including EDL as part of the reform of the energy sector. On May 31, 2000, the Lebanese government enacted law number 228 titled “Regulating privatization operations and defining its terms and fields of implementation”. The law established the High Council of Privatization managed by the Council of Ministers and includes the Minister of Finance, Minister of Economy and Trade, Minister of Labor besides the minister in charge of the project scope. HCP was entitled to prepare the privatization policy, specify the time required to privatize a public institution and assess the latter’s financial and economic status to assign a budget for its privatization. Additionally, the law includes the duty of the private sector to deliver a good quality of goods and services in an affordable price since the rights of the consumers should be a priority. Moreover, the law stipulates the protection of national labor rights when the private sector takes over. It also protects the public funds of the privatization of a public institution as per the international economic and financial standards. The law noted the case when the license takes a monopolistic nature thus requiring the government to evaluate and update the prices of the project occasionally as well as requesting update of the used technology. Further to that, the law allows the Lebanese Republic to have the golden share of any privatized project having a monopolistic nature (Republic of Lebanon, 2000). This law was an introduction to the privatization of the governmental institutions including EDL.

On September 7, 2017, the PPP law number 48 was enacted in Lebanon. The timing and content of the law cannot be distanced from the international donor

conference Cédre which was scheduled on April 6, 2018 (Takieddine & Kalaydjian, 2018) since the presence of the law makes it more attractive for the international donors to donate money to the Lebanese government as the law leads to promising investments if done in coordination with the private sector. The law aims at improving the tendering process of projects by making the process more legit and professional. To start with the process, a committee for the project is created to select the appropriate private partner for transparency purposes. It is set for the projects in the fields including but not limited to telecommunication, electricity and civil aviation sectors. The law has given the authority to the HCP to evaluate the potential projects whether they are economically, financially, technically and legally feasible. The committee also determines the qualifications of the private partner that can take part in the project. The private partner should be involved in financing and administering the project. It could carry at least one of these activities: designing, building, constructing, developing, restoring, equipping, maintaining, rehabilitating and operating the project. Moreover, the law includes the basic contractual requirements. One of which is that the private partner should form a joint stock company to be part of the PPP project. The law also indicates that the private partner should not transfer its shares to a third party without the consent of the Council of Ministers (Republic of Lebanon, 2017). As per HCP, the PPP law stipulates transparency in the planning and implementation of project through the involvement of several stakeholders. The tendering process of a PPP project flows as per Figure 2 below.

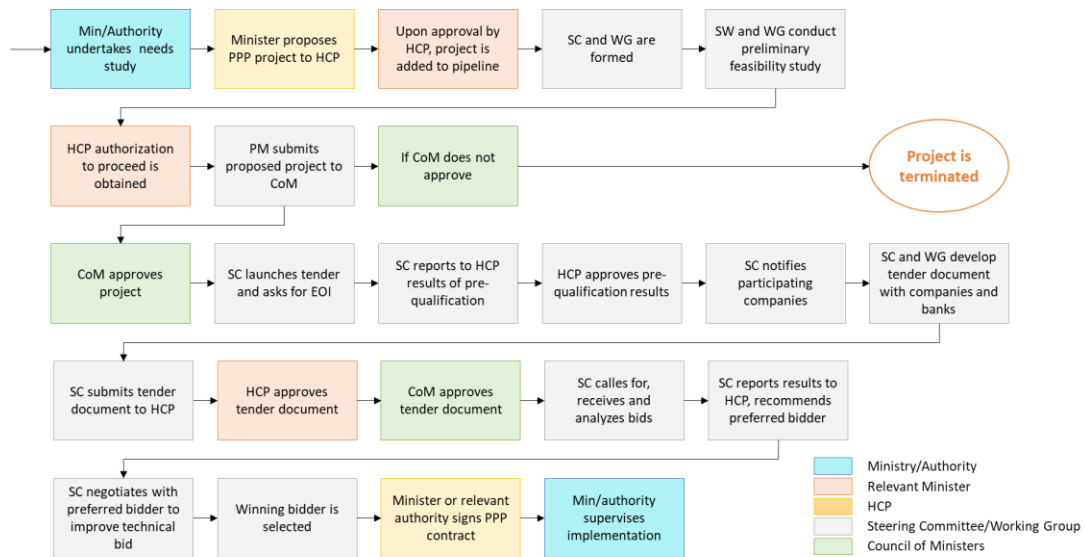


Figure 2: Tendering Process of PPP (High Council for Privatization and PPP)

As shown above, the process is based on three levels: the council of ministers, the HCP, and the project committee that includes the HCP and the related ministries. The project committee is also supported by a consulting team in addition to the related stakeholders. Further to that, the law stipulates the formation of the PPP unit which constitutes of experts of partnerships with private sector having financial and contractual background (High Council for Privatization and PPP). As a summary of the laws, a timeline is presented in Figure 3 .

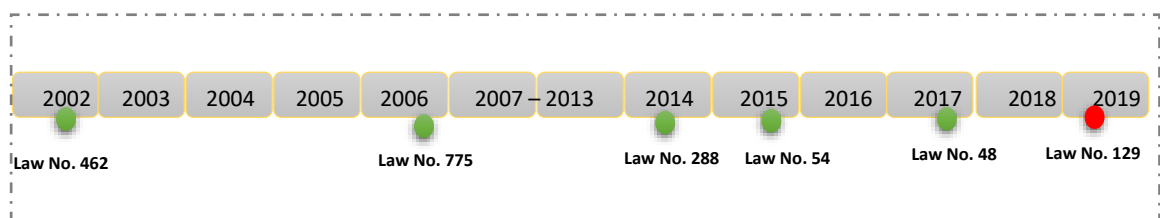


Figure 3: Timeline of Electricity Regulations in Lebanon

3. Interviews related to the Regulations

In order to know more about the HCP, an interview was conducted with a manager at HCP on March 21, 2019. HCP stated that every project that includes the private sector involvement in at least one of the following activities: “design,

installation, construction, development, restoration, equipment, maintenance, rehabilitation and operation,” (Republic of Lebanon, 2017), should be subject to the law number 48. It is not applicable to already existing projects. The law follows the Anglo-Saxon law which is generic and not detailed driven, similar to French laws, which makes the law applicable to all sectors so that each project has its own detailed contract. As per the HCP, the law took 10 years to be issued. It was a long and tough process since it aims at restricting the authority of the ministries. When the HCP was working on establishing the law and in order to research the importance of public private partnerships, HCP referred to the Council of Development and Reconstruction (CDR) which always depend on traditional procurement methods to execute projects. HCP asked CDR about the percentage of projects that exceeded the original budget and the timeline of execution. CDR estimated that 25% of the executed projects exceeded the agreed budget and 35% of them exceeded the planned timeline. In traditional procurement projects, if the contractor encountered higher costs in the project execution, he used to ask for variation order which incurred additional costs on the government. Therefore, the high percentages of projects that go beyond the planned budget and timeline were a good incentive to move forward with the PPP law. The HCP handles the tendering process for the PPP projects. Since there are limited resources allocated to the HCP, a few number of projects can be handled on yearly basis. The available resources can only accommodate up to 7 projects per year where 90% of the budget is paid to a foreign consultant. The first stage of the tendering process is a submission of a proposal or a prefeasibility study by a ministry or a public entity for the HCP to decide if it is feasible to proceed with the project. The HCP general secretariat submits his recommendation to the HCP board to further study the project. HCP board

constitute of the Prime Minister, the Minister of Justice, the Minister of Finance, the Minister of Economy and Trade and the Minister of Labor. The HCP board has equal rights and decisions are taken by consensus, yet the minister in charge has the right of veto. The HCP talks to lenders to check if the project is bankable. It also checks if some international private companies are interested in the project. HCP takes into consideration the feedback collected from these companies, whether it is positive or negative since it may affect the progress of the project. The HCP establishes a steering committee that incorporates a representative of involved ministry, the HCP Secretariat General, the Ministry of Finance and the regulatory authority of the sector if available. Then, the HCP appoints an international consultant to perform a full feasibility study including legal, technical and financial aspects in exchange of 3 to 4 MUSD. In addition, a shadow bid is initiated for the sake of knowing the market price of the project. Then, an expression of interest is issued for the companies to apply during the prequalification phase. For bidders who were prequalified, a request for proposal (RFP) is issued after being prepared by the Steering Committee based on some consultations and approved by the HCP board and the Council of Ministries. The HCP, consultant and representative of ministries participate in studying the bids. HCP stated that more stakeholders are involved in the process since they increase the transparency and guarantee consensus at a later stage. In the RFP stage, each bidder will get a technical and financial score. The financial score is not only related to the prices; it is also linked to the robustness of the financial model. The HCP board takes the decision of the awarded bidder based on the scores. The ministries can only negotiate for changing some technical specifications with the bidder with the highest scores. Then the winning bidder signs the contract with the concerned ministry. The steering committee studies

the bids. A project management office (PMO) is then formed to be the interface between the project company and the steering committee. Among its members, the PMO includes the local or international consultant in addition to selected members. The PMO submits reports about the progress of the project to the steering committee which in turns review them and hands them to the concerned ministry. The reports show the extent of the project company compliance with the project objectives. The HCP role ends once the bidder is awarded. Then, the involved ministry will handle the project progress. HCP stated that the PPP law does not incorporate concession projects since they are embedded under Article 89 (Republic of Lebanon, 1973). Concession projects have a distinctive nature. They enjoy a monopoly over a specific geographic area and the private sector collects bills directly from the end users unlike the PPP projects.

The HCP added that the projects that are in the pipeline are not related to energy and water sector since MoEW wants to handle their own projects alone and not through an independent agency. The law exempts the private sector to be owned by a Lebanese shareholder for objectivity purposes since mainly politicians are the biggest investors in the country. The HCP confirms that the law provides comfort to the private sector since the latter knows that the decision is in the HCP's hands and not the ministry itself. The law also shows professionalism and offers confidence to the involved parties as it requires the presence of international arbitration in case of dispute. HCP asserts that the key factor behind the success of every project is the political consensus.

Another interview was conducted on March 22, 2019 with the senior expert of MoEW who denied the HCP statement about the Ministry's rejection of including their projects within the PPP projects managed by the HCP and attributed their exclusion from the PPP law due to the absence of law number 48 practical decrees.

Ghassan Beydoun, former Director General of the Directorate of Exploitation at the Ministry of Energy and Water and current Ministry of Finance Advisor, was also one my interviewees who met me on December 11, 2019. Mr. Beydoun confirmed that the projects under the Ministry of Energy and Water do not go through the HCP to keep the authority of the Minister above all other governmental bodies. Mr. Beydoun said that the minister claims that the Constitution of Lebanon gives full authority to the Ministries and any regulation that limits the minister's authorities is attacked. Mr. Beydoun says that there is evidence from the Constitution of Lebanon that the Council of Ministers should be accountable against the Chamber so their decisions shall be well studied and effective. As the article 66 of the Constitution states: "Only Lebanese who satisfy the conditions for becoming deputies may assume ministerial posts. The ministers shall administer the Government's services and shall be entrusted with applying the laws and regulations, each one pertaining to matters relating to his department. Ministers shall be collectively responsible before the Chamber for the general policy of the Government and individually responsible for their personal actions" and article 70 states that "The Chamber of Deputies shall have the right to impeach the Prime Minister and ministers for high treason or for breach of their duties" (Republic of Lebanon, 1973). The main problem in Lebanon is that the Council of Ministers is formed out of the parties represented in the Chamber of Deputies. This presents a conflict of interest in the government leading to non-accountability of elected officials. The ministers are also businessmen who are interested to stay in power and to implement regulations for their own benefit without the inspection of an independent party. Mr. Beydoun said that there should be an independent party that manages the tendering process of projects. This party shall organize and monitor the bidding process,

ensure a serious and free competition and evaluate the bids and validate whether the winning bidders are implementing based on their proposal.

CHAPTER III

JORDAN

A. Setting the Context: Jordan Socio-political and Policy Environment

1. Social and Economic overview

Jordan is in the Middle East region with an area of 89,342 km². Jordan's land consists of three main topographical areas: Jordan valley, the mountain heights plateau and the eastern desert. Jordan is bordered mostly by land with Syria to the north, Palestine to the west, Iraq to the north east, Saudi Arabia to the south in addition to the Dead Sea which is located to the west and the Red Sea to the south-west. It is a developing country with a population of 9.7 Million and 5,092 USD per capita income which makes the country in the lower middle-income group (Kumaraswamy, 2019), knowing that the population was 6.5 Million in 2008 before the Syrian refugee influx (Ricardo, Tim, Miguel Angel, Ana, & Jorge, 2019). It is considered a country of a small size economy due to lack of natural resources and the government's dependence on foreigner's financial aid. In the 20th century, Jordan did some reforms to improve the economy some of which were privatization, increasing the fuel prices by removing the subsidies and trade liberalization. The reforms enacted by the government boosted the economic growth by attracting foreign investments and creating jobs (Al-Majali, 2018). As per Ricardo et al. (2019), Jordan's economy accelerated between years 1999 and 2009. The economic prosperity was reflected on the income per capita that soared by 38%. However, the economic growth was followed by economic downturn after the Syrian and Iraqi crises. The growth decelerated by 2.5% during the period of 2009-2018 and thus resulting of a cumulative loss of 14%. Regardless of the incurred losses, the

economy proved to be robust since it grew during the hard period at a decelerating rate. The debt to GDP ratio increased from 55% to 94% in 2018. The Jordanian economy was supported by the International Monetary Fund (IMF) stand-by arrangement which extended for a longer period due to the deterioration of the regional situation (Ricardo et al., 2019). The latter was reflected in the S&P's rating of Jordan which indicates that it is "highly vulnerable to external factors."

2. Political Situation

Jordan, an Arab kingdom, is a constitutional monarchy employing a parliamentary system. The executive and legislative powers are handled by the council of ministers on one hand and the parliament on the other hand. The parliament consists of two chambers: The Senate and the Chamber of Deputies. The king, prime minister and the chief of royal court are concerned with foreign policy and military. Foreign policy is significant to secure the budget supporting the national economy. The strategy of appointing the council of ministers differs between King Hussein and King Abdallah, his successor. The role of the king is to appoint the council of ministers and the Senate (Tbaishat et al., 2018). The appointment procedure that was adopted in King Hussein's era was mostly bureaucratic based on ethnicity, tribal and family background. The council of ministers used to lack authority to take decisions unless the decisions are approved from a higher level. Ministers did not have a political base or connection to the parliament. They are only considered strong if they have a good relationship with the prime minister. When King Abdallah reigned over, the unemployment was almost 20% and the debt of the country was increasing. King Abdallah appointed technocrats in

the council of ministers, having business and technical experience, to implement neoliberal reforms (Yom, 2009).

The Chamber of Deputies are elected by citizens through a secret ballot. The ministers are responsible against the Chamber of Deputies regarding the enacted policies. However, the parliament does not take part in the agenda building or policy formulation. On one hand, the prime minister proposes laws and the parliament, the Senate and the king can either approve, amend or reject, on the other hand (Tbaishat et al., 2018). Tbaishat et al. (2018) concluded that the most important policy players is the cabinet headed by the prime minister and its bureaucracy. Thus, the decision making process is centralized by the elite. The political culture in Jordan does not support pluralistic democracy in policy (Tbaishat et al., 2018).

King Abdallah had further bonded with the United States and the Western governments in general after his father. The lack of natural resources made Jordan close to the First World countries to grow its economy (Yom, 2009). The US is the biggest donor to Jordan with aid reaching 1.522 billion USD in 2017 (Kumaraswamy, 2019). The political system is developed by King Abdallah as a “liberalized model of closed authoritarianism” (Yom, 2009). The international community promotes the kingdom’s liberalized policy and strengthens the autocratic state since the latter endorses western policy in the Middle East (Yom, 2009). The regime works exhaustively on political economy, local and foreign policymaking that lead to finance security and regime sustainability (Kumaraswamy, 2019).

3. Policy Making

When King Abdallah took power, he introduced neoliberal reforms to boost the economy. The King focused on three main reforms: microeconomic structural adjustments, privatization of state-owned assets, and promotion of free trade. In the first reform, the government almost removed subsidies on food and fuel, however at the same time, it promoted local produce. Such a step reduced the public debt. For the second reform, the Executive Privatization Commission was established in 1996 to manage the privatization of national assets. These reforms have induced foreign direct investments and transformed the governmental role from an economic influencer to a regulator. The privatization strategy made the government sell its shares in more than 50 companies. The budget spent on privatization was almost 3 billion USD and the budget attracted from foreign investments exceeded 1 billion USD. As mentioned, the King promoted trade with global markets and attracted aggressively foreign investment, thus accelerated the integration of the Jordanian economy with the global economy. Privatization of the public institutions was done through selling stocks on Amman Stock Exchange. Other ways of privatization were through leasing, management or franchising contracts (Kasumba & Aldhuaina, 2015). Yet Yom (2009) argues that private enterprises had major governmental stakeholders and others were owned by investors affiliated to the royal party.

The King has always insisted to divert the policies to have a constant supply of energy resources with affordable prices. He is also working on having the energy sector reliant on nuclear plants. However, nuclear deals are suspended. Developing domestic energy supplies endorses energy security, if not through nuclear, energy security can be supported by renewable energy resources as solar and wind. Renewable energy projects

prospered in recent years with the help of the private and public sector initiatives (Kumaraswamy, 2019).

B. Energy Sector: Participants and Process

A high percentage of energy resources, estimated to be 97%, used in Jordan is imported from abroad. The electricity sector consumes 42%, of the energy resources (Ricardo et al., 2019). Jordan used to rely on natural gas imported from Syria and Egypt to produce electricity. However, after the Egyptian and Syrian crises, the flow of natural gas has been interrupted and Jordan had to find alternative sources to cover the shortage.

1. Electricity Sector Status

The electricity sector was then fed by 39% of diesel oil, 36% of heavy fuel oil and 25% of natural gas. Jordan imports heavy fuel oil mainly from Saudi Arabia. Further to that, Jordan started importing natural gas from Israel after an agreement that will last for 15 years (Holtz & Fink, 2015). Jordan is a sterile land which lacks natural resources for economic sustainability (Kumaraswamy, 2019). In order to ensure energy security, Jordan directed its focus to renewables with storage technologies rather than nuclear plants which remain to be politically risky and less financially feasible and which contracts have been suspended (A. Ahmad & Ramana, 2018).

Generation costs increased significantly between 2011 and 2014, increasing the difference between the government's revenues and costs. The government has built infrastructure to decrease the cost of imported liquefied natural gas (LNG). The government also signed long term PPAs to secure energy supply. However, the supply

of LNG was disrupted because of political crisis in Egypt, in 2011. Thus, Jordan was forced to import diesel oil and heavy fuel oil during the period when oil became expensive. The change in revenues and costs of NEPCO is shown in Figure 4 (Ricardo et al., 2019).

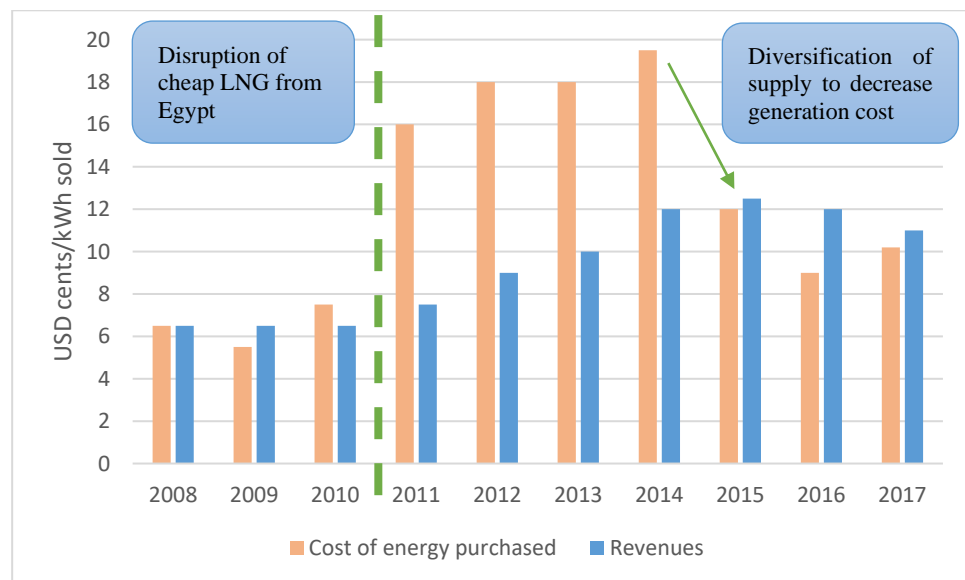


Figure 4: NEPCO costs and revenues (Ricardo et al., 2019)

The structure of the electricity sector in Jordan is clearly illustrated in Figure 5. The electricity sector consists of four private companies handling the generation which are the Central Electricity Generating Company (CEGCO), the Samra Electric Power Company (SEPCO), the Amman Power Generation Company (AES Jordan) and Al Qatraneh Power Generation Company. The generated power is sold through PPAs to the state-owned company National Electrical Power Company (NEPCO) that manages the transmission network. The transmission network is built as a corridor that covers most of the country from North to South. However, its capacity is low which incurs an additional burden to the grid. The distribution network is handled by the public shareholding companies having regional exclusivity: Jordan Electricity Company (JEPCO), Irbid District Electricity Company (IDECO) and Electricity Distribution

Company (EDCO). NEPCO is the major company in the electricity sector. It foresees the needed capacity and contracts with generation companies to provide the required supply. It also procures energy resources for the power plants. Similar to Lebanon, the tariff rates of end users are low and do not cover the generation and transmission costs. NEPCO in return takes responsibility of covering the costs (Holtz & Fink, 2015). However, the government is gradually removing the subsidies on the electricity tariff rates, especially for industrial customers since the electricity sector is contributing to 19% of the public debt (Obeid, 2019). Jordan's residential tariff rate is 12.1 USD cents/kWh. The industrial tariff rate is 12.5 USD cents/kWh in Jordan (McKinsey & Company, 2018).

The Ministry of Energy and Mineral Resources (MEMR) set a plan for the energy sector on the level of regulations, policies and action plan. The Ministry works on providing citizens with better quality of energy of all forms at a lower cost. Its role is also to attract investment for electricity generation, oil production and harvesting the renewable energy resources. The Ministry supports as well studies that enhance energy efficiency and promote renewable energy in different projects (United Nations ESCWA, 2017).

The Energy and Minerals Regulatory Commission (EMRC) has a legal presence in the government. However, it has an independent financial and administrative particularity. It was established in 2014 through law number 17 which dictated the merging of the Electricity Regulatory Commission (ERC), Jordan Nuclear Regulatory Commission (JNRC) and the Natural Resources Authority (NRA) into one regulatory authority, EMRC. The authority is self-governing, yet it reports to the MEMR. EMRC's roles include issuance of by-laws such as tax-exemption, direct

proposal and renewable energy and energy efficiency fund by-laws ("Energy and Minerals Regulatory Commission (EMRC)," 2019). This authority is also in charge of regulating tariff rates, supervising the entities within the electricity sector in addition to giving licenses to power producers (Al-omary, Kaltschmitt, & Becker, 2018).

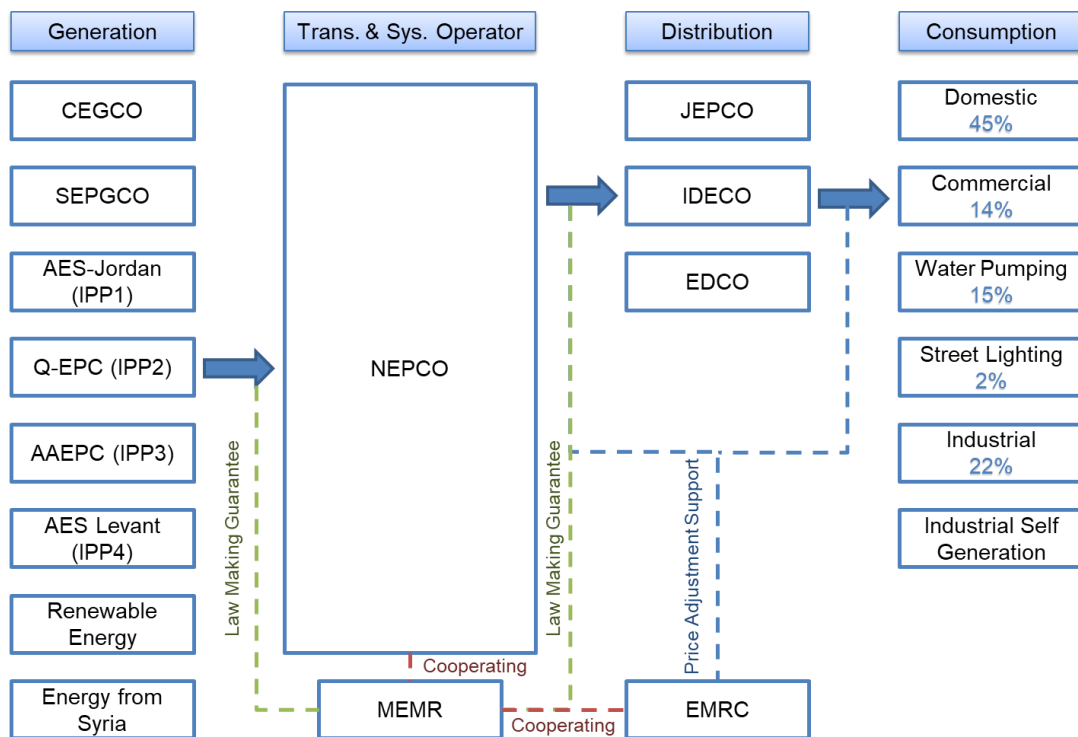


Figure 5: Electricity Sector System in Jordan (United Nations ESCWA, 2017)¹

2. Electricity Regulations

In year 2002, law number 64 was enacted to manage the energy sector in Jordan. It was called: "Temporary Law: General Electricity Law". Its purpose is to promote IPP projects as an introduction to a liberalized market. The law establishes a new energy regulator "The Electricity Regulatory Commission" which has a role of giving licenses for suppliers of the generation and distribution networks and regulate

¹ Note that the percentages are updated as per the 2018 figures of NEPCO: Report (National Electric Power Company, 2018))

them to supply electricity to customers. It also studies the compliance of the projects with regulations. The Regulatory defines as well electric tariffs, connection fees, subscription charges... Besides, it gives recommendations to the ministry regarding the methods used in the energy sector to evolve from a single buyer model to a liberalized market (The Hashemite Kingdom of Jordan, 2003). Law number 64 became a permanent law on April 12, 2012 when the government issued the renewable energy and energy efficiency law number 13 (The Hashemite Kingdom of Jordan, 2012). Based on this law, Jordan has created incentive methods to promote renewable energy and energy efficiency measures. It has identified convenient sites to harvest the renewable energy resources and set a plan to grant licenses for renewable energy projects that are based on long term PPAs. In addition, it has opened the opportunity for investors to submit unsolicited expression of interests through a procurement method called direct submission proposal, allowing investors to propose, identify and develop projects as well as awarding Engineering, Procurement and Construction (EPC) contracts via public procurement method (Salman, Casarotto, Bucciarelli, & Losacco, 2018). The direct proposal by-law number 50 allows the ministry to issue calls for proposal to the investors to apply for strict tendering procedures related to utility scale projects. The seller signs PPAs with the transmission or distribution companies. Direct Submission Proposal contracts were created in Jordan for the renewable energy projects supplied by the independent power producers. The contractors operate the assets in exchange of a guaranteed tariff rate. The process starts when the Ministry of Energy and Mineral Resources (MEMR) awards the successful bidder with a Memorandum of Understanding which allows the developer to commence with the financing, design, and to contribute with the construction and operation and maintenance of the project. Jordan

initiated three rounds of direct submission proposal. For each round, MEMR selected the areas with priority to build the renewable energy plant ("Direct proposal submission scheme," 2015). Round 1 has a capacity of 200 MW in solar farms and 420 MW in wind farms, round 2 has a capacity of 200 MW in solar farms and 100 MW in wind farms, round 3 has a capacity of 200 MW in solar farms and 100 MW in wind farms. EMRC has also issued, in 2014, a reference list of prices which set a ceiling for electricity prices. The maximum price for solar PV to be sold to NEPCO is 0.14 USD/kWh and that for wind energy is 0.11 USD/kWh. An additional 15% feed-in tariff can be added to the price in case all the equipment is manufactured locally provided that the capacity does not exceed 500 MW renewable energy connected to the grid. Another step done by NEPCO as part of law number 13 is increasing the capacity of the grid by the development of the Green Corridor that can accommodate the new installed capacity. This project included the expansion of 2 transmission lines with 400kV for 150km and 132kV for 51km. The project also consisted of reinforcing 3 existing transmission lines with 132kV for 100km in addition to the construction of one new substation with 400/132kV, 1200MVA (Zawaydeh, 2017).

Law number 13 of 2012 was amended in 2014 under law number 33 of 2014 to have the renewable energy equipment exempted from custom duties and sales tax (The Hashemite Kingdom of Jordan, 2014). By-laws no. 10 and 13 were issued later in year 2015 related to tax exemption and custom duties waiving of renewable energy equipment and associated devices (The Hashemite Kingdom of Jordan, 2015). In 2015 as well, bylaw number 49 was created to introduce the establishment of the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) which aims at achieving RE targets of Jordan and one of its responsibilities is related to attracting foreign

investments to fund renewable energy projects. It receives its funding from the national budget and grants. The fund is open to local and foreign private companies implementing renewable energy projects in Jordan. The fund offers subsidized loans and public equity fund to support private sector. There is a board of directors consisting of the Energy Minister, Secretary General of the Environment, Planning and International Cooperation and Finance Ministers in addition to three members, representatives of the private sector (Zawaydeh, 2017). A summary of the energy laws and their timeline are presented in Figure 6 and Figure 7 respectively.

As a consequence of the supportive RE laws, Jordan is ranked first in the Middle East and North Africa region and third globally as stated in a Bloomberg report ("Jordan 3rd in renewable energy growth globally, 1st in region'," 2018). In Table 2, all the renewable energy projects are shown along with their status of commissioning and other details as of year 2019. These projects are a consequence of the regulations mentioned previously.

Table 2: Renewable energy projects in Jordan (MEMR, 2019)

#	Type	Location	Ownership	Contract Type	Capacity (MW)	Round No.	Cost (MUSD)	Status	Commercial Operation	Remarks
1	PV	Ma'an	Private/Sakr Ma'an	Direct Submission Proposal	20	I		Commissioned	COD: 2016	
2	PV	Ma'an	Private/Ennera	Direct Submission Proposal	10	I		Commissioned	COD: 2016	
3	PV	Ma'an	Private/Shams Ma'an	Private/Direct Submission Proposal	50	I		Commissioned	COD: 2016	
4	PV	Ma'an	Private/Anwar Al Ared	Private/Direct Submission Proposal	20	I		Commissioned	COD: 2016	
5	PV	Ma'an	Private/Al Zanbaq	Private/Direct Submission Proposal	10	I		Commissioned	COD: 2016	
6	PV	Ma'an	Private/Zahrat Al Salam	Private/Direct Submission Proposal	10	I		Commissioned	COD: 2016	
7	PV	Ma'an	Private/Al Ward Al Joury	Private/Direct Submission Proposal	10	I		Commissioned	COD: 2016	
8	PV	Ma'an	Private/Ared Al Amal	Private/Direct Submission Proposal	10	I		Commissioned	COD: 2016	
9	PV	Ma'an	Private/Sun Edison Italy with EPC Adwaa Ma'an	Private/Direct Submission Proposal	20	I		Commissioned	COD: 2016	
10	PV	Ma'an	Private/Scatec Solar	Private/Direct Submission Proposal	10	I		Commissioned	COD: 2016	

#	Type	Location	Ownership	Contract Type	Capacity (MW)	Round No.	Cost (MUSD)	Status	Commercial Operation	Remarks
11	PV	Ma'raq	Private/Philadelphia Solar	Direct Submission Proposal	12	I	23	Commissioned	COD: Oct 2015	
12	Wind	Ma'an	Government	EPC	80		149	Commissioned	COD: 2017	Phase 1 of 66 MW is operational since September 2016 Phase 2 of 14 MW is operational since August 30, 2017 This project was paid from a Gulf Grant (http://auptde.org/Article_Files/Jordan.pdf)
13	Wind	Tafila	Private/JWPC	Direct Submission Proposal	117	I	287	Commissioned	COD: Sep 2015	
14	Wind	Tafila	Private/Mass Energy	Direct Submission Proposal	100			Under Construction	Financial Closure in Feb 2018 Expected COD Dec 2019	
15	Wind	Fujj Shobak	Private/KEPCO	Competitive Bidding/BOO	89.1		181	Commissioned	COD: July 2019	https://www.renewablesnow.com/news/koreas-kepco-opens-89-mw-wind-park-in-jordan-672962/
16	Wind	Ma'an Al Rajef	Private/Green Watt	Direct Submission Proposal	86	I	186	Commissioned	COD: Oct 2018	
17	PV	Al Quweirah	Government	EPC	103	II	128	Commissioned	COD: July 18, 2018	Gulf Grant/ constructed by TSK group and Enviromena Power Systems (http://auptde.org/Article_Files/Jordan.pdf)
18	PV	Al Azraq	Government	EPC	2.17			Commissioned	COD: April 2015	Spanish debt exchange/ constructed by ATERSA (http://www.jordantimes.com/news/local/photovoltaic-plants-inaugurated-azraq)

#	Type	Location	Ownership	Contract Type	Capacity (MW)	Round No.	Cost (MUSD)	Status	Commercial Operation	Remarks
19	PV	Al Azraq	Government	EPC	3			Commissioned	COD: April 2015	Spanish soft loan/ constructed by Ennera (http://www.jordantimes.com/news/local/photovoltaic-plants-inaugurated-azraq)
20	PV	Al Azraq	Government	EPC	1			Not Awarded yet	Expected COD: 2020	Spanish soft loan/ not awarded yet
21	PV	Al Azraq	Government	EPC	5			Not Awarded yet	No information available	Second European grant aiming at expansion of a power plant through adding PV panels
22	PV	Mafrq	Royal Jordanian Air Force		10			Commissioned	COD: May 2018	
23	PV	Amman/ Al Mouqer	Private/Masdar		200		240	Under Construction	Financial Closure in Jan 2018 Expected COD: March 2020	
24	PV	Zaatari Camp	Government	EPC	12.9		17.5	Commissioned	COD: Nov 2017	This project is funded by the government of Germany via KfW Development Bank and developed by the EPC Belectric Gulf
25	PV	Amman/Em Qaseer	Government	EPC	46.33		42.31	Under Construction	Expected COD: early 2020	This project is funded by the government of Germany via KfW Development Bank and developed by the EPC Belectric Gulf
26	PV	Mafrq	Private/Fotowatio Renewable Ventures (FRV)	Direct Submission Proposal	50	II	98.4	Commissioned	COD: Nov 2018	https://www.ebrd.com/work-with-us/projects/psd/frvempire-al-mafrq-solar-pv-project.html
27	PV	Mafrq	Private/FRV + Hareon Swiss Holding	Direct Submission Proposal	50	II	76	Commissioned	COD: Nov 2018	https://www.mottmac.com/releases/mafrq-i-solar-project-reaches-financial-close-jordan
28	PV	Mafrq	Private/ACWA Power	Direct Submission Proposal	51			Commissioned	COD: Dec 2018	

#	Type	Location	Ownership	Contract Type	Capacity (MW)	Round No.	Cost (MUSD)	Status	Commercial Operation	Remarks
29	PV	Mafrag	Private/Jordan Solar One	Direct Submission Proposal	20	I		Commissioned	COD: 2016	
30	PV	Safawi/Mafrag	Private/FRV and ATC	Direct Submission Proposal	51			Commissioned	Financial Closure in Sep 2017 COD: Apr 2019	
31	PV	Al-Rishah	Private/ACWA Power	Direct Submission Proposal	50			Commissioned	Financial Closure in Dec 2017 COD: Dec 2019	
32	PV	Amman/Al Madouna	Private/AES and Mitsui	Direct Submission Proposal	50			Commissioned	Financial Closure in Jan 2018 COD: Sep 2019	
33	Wind	Shobak	Private/Al Cazar	Direct Submission Proposal	45			Commissioned	Financial Closure in Dec 2017 COD: Jul 2019	
34	Wind	Tafilah	Private/Abour Energy Company PSC (Xenel)	Direct Submission Proposal	50			Under Construction	Financial Closure in Sep 2018 Expected COD in Apr 2020	
35	Wind	Tafilah	Private/Daehan (KOSPO)	Direct Submission Proposal	51.75		113	Under Construction	Expected COD in Apr 2020	
36	PV	Al-Husainya	Private/Philadelphia Solar	Direct Submission Proposal	50	II		Under Construction	Financial Closure in Jan 2018 Expected COD in	

#	Type	Location	Ownership	Contract Type	Capacity (MW)	Round No.	Cost (MUSD)	Status	Commercial Operation	Remarks
									December 2020	
37	PV	Aqaba	Private/Shamsana	Direct Submission Proposal	10	I		Commissioned	COD: 2016	
		Total			1566.25					

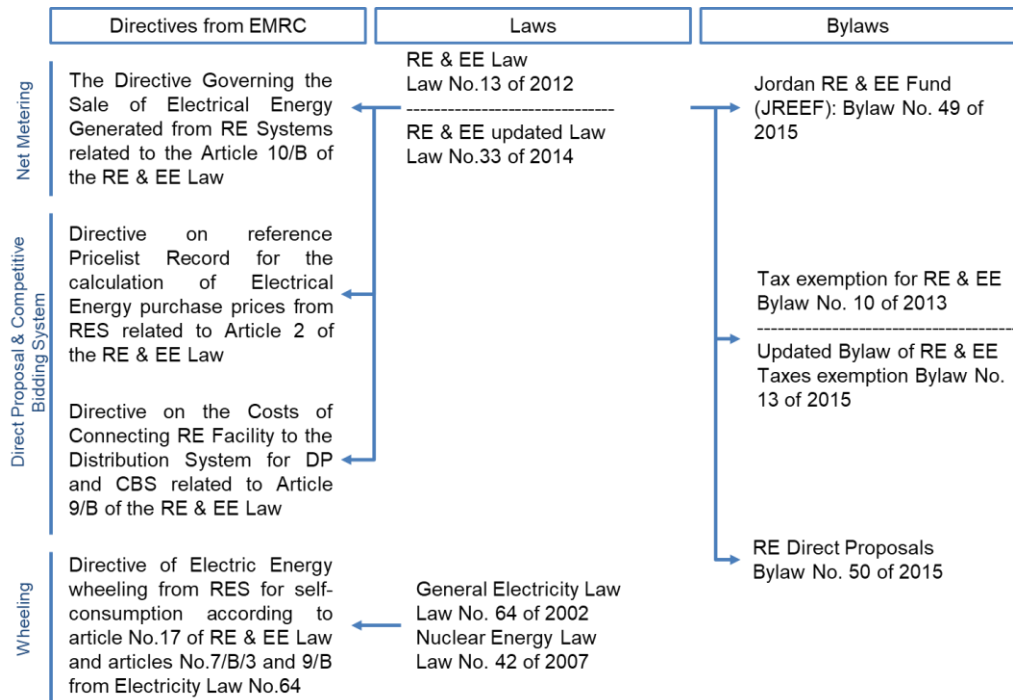


Figure 6: Main features of renewable energy legal framework (United Nations ESCWA, 2017)

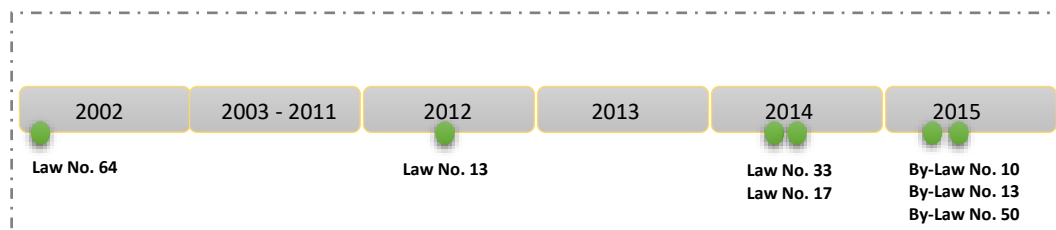


Figure 7: Timeline of Energy Regulations in Jordan

3. Interviews related to the Regulations

In this regard, I travelled to Jordan for few days to conduct interviews with some Jordanian energy experts. On September 26, 2019, I met Eyad Arafat, the Chief Financial Officer of Philadelphia Solar, a leading PV module manufacturer in Jordan. My question to him was related to the reason the renewable energy sector is booming in Jordan. He answered that the main reason was that the energy sector used to drain the governmental resources since almost all the oil and gas are imported from abroad. So, the government of Jordan decided to address the problems of this sector to reduce the governmental budget depletion. As a result, the Energy and Minerals Regulatory

Commission was established and it had a significant role in renewable energy promotion. Another interview was conducted on the same day with Tarek Alamad, CEO at the European Jordanian Renewable Energy Projects LLC, a renewable energy company operating in Jordan and MENA region. I asked why Jordan's renewable energy is more advanced than Lebanon from his experience. He started by the political reason which is that decision making in Jordan is done in a Top-Bottom way, so in case the King is convinced with the idea of renewable energy, then this idea ought to be implemented by the related ministries. On the regulation side, the efforts of the Renewable Energy law have begun in year 1996 and it didn't see the light until 2012. The law took time but it ended up being very straight forward and inclusive of all conditions. He stressed that the Jordanian efforts started earlier than other Middle Eastern countries with regards to the renewable energy sector. He also added that the general law of electricity that was enacted in 2002 paved the way for the IPP system in the energy sector. Generation after that was ruled by private IPP contracts because the government could not invest in high cost generation. The transmission network remained with the state-owned company because of its strategic position. As for the distribution network, it was privatized. Hence, this modelling of the energy sector structure seemed to be successful while using conventional energy resources, ultimately, it should be successful while using renewable energy resources. Jordan attracts the private investors to invest in the energy sector since it is a stable country that has a currency that is pegged to the United States dollars. In addition, the off-taker of the energy projects would be a state-owned company which has a stable financial situation.

CHAPTER IV

PUBLIC PRIVATE PARTNERSHIP

Public private partnership is when the private sector handles public services which were previously provided solely by the public sector. PPP used to be applied only in the cases where the government is unable to pay for public services. Recently, this partnership is also being used to share risks between the public and private sectors. Public private partnership is not a new concept especially in the low to mid income countries. The innovation in this concept is the continuous reform of the public private relationship. During the start of 1980s, the state's role was deteriorating in favor of the private sector as part of neo-liberalization. In the 1990s, the state's role became more prevalent such that it rectifies market failure and help the private sector to develop (Languille, 2017).

A. Definitional Perspective and Historical Overview

The history of PPP is being presented differently in literature. According to Custos and Reitz (2010), the public services contracts were divided among three eras. The first one is when the private sector was taking over the responsibility of constructing and operating a public utility. The second era is when the public sector retrieved its ownership of the public utilities. The third era started when the public and private sectors partnered to gain more efficient output. Before public private partnership and during the first era of public contracts, there were similar contracts formed for the construction and operation of basic infrastructure. The private sector used to handle the construction and operation and maintenance of the project in exchange of fees paid by

the public sector. Such project models started before the nineteenth century especially for roads and water transportation projects. For example, a private company built a turnpike in Pennsylvania in the year 1792 in return of toll fees. However, other utilities started using this model during the nineteenth century in which the public sector applied the command and control model. The nineteenth century also witnessed the involvement of public sector through ownership and financing of the roads and water transportation projects. The public sector has set subsidies for the private sector that was the cornerstone of the American utilities. The private companies were responsible for building canals, railroads, electrical and water infrastructure. They were working under franchise contracts and they were getting paid through cash, loans, bonds, buying part of the company's shares, tax subsidies, and in some cases land grants. However, such subsidies and incentives have left the state indebted to the private sector. This required a legal reform to reduce the public sector risks.

The second phase of the public/private contracts occurred when the public sector handled the basic infrastructure. One of the projects that were constructed and operated by the state is the construction of the National Road financed by the Federal Fund. Similar projects involved direct financing and ownership of the government.

Such two phases have paved the way to the public private partnership. So in the 1990s, the testing of the PPP concept spread worldwide. The American government adopted PPP in the 1990s after being influenced by the European model. PPP in the United States is not exclusive to the construction, operation and maintenance projects, it also includes some basic government functions (Custos & Reitz, 2010).

Shankar Nayak (2019) argues that PPP have started since the rise of the Roman Empire whereby the postal networks were developed in the Empire according to the

principles of PPP. In addition to that, the establishment of villages in the south-western area of France and the construction of roads and transportation networks in the sixteenth and seventeenth centuries were also based on PPPs. Then, the nineteenth century was the time when PPP developed and grew to include the establishment of railways, tramways, water and sewerage networks. PPP was also used to grow the colonial business when Europe colonized Asia, Africa and America. In the 1900s, the European countries depended on the welfare of the states during and after the wars. On the contrary, the United States developed PPP models in the same period of time.

PPPs then became a worldwide basis for the neoliberal economy which aims at reducing the authority of the state in favor of the private sector for higher profitability. During the 1990s, it was agreed in Washington Consensus that neoliberalism economic policy is the universal policy that should be adopted worldwide. The latter concept refers to the maximum involvement of the private sector in public services and infrastructure (Shankar Nayak, 2019).

Eadie, Millar, and Toner (2013) agree with Shankar Nayak (2019) in his paper when they stated that PPP has been initiated in Europe since the 17th century at the time when the trade between countries started to develop. UK was the leader of the development of the infrastructure based on contracts with private enterprises. Such events occurred in the 18th and the 19th centuries, particularly in 1790s, 1840s and 1890s. Then in 1979 a turning point in the history of PPP policy occurred in the UK. The UK conservative government decided to outsource the public services to the private sector as per “Ryrie’s Rules” that limited the use of PPP to the cases where the private financing is more cost efficient than public financing. In 1989, these standards were revoked since they seemed to be unsustainable which made the public perceive the

private financing as the best alternative in all cases. In 1992, all the public services projects were required to seek private financing based on the “Universal Testing Rule” that aim at increasing the involvement of private sector in the public activities. Recently, UK is considered one of the most developed countries in the PPP policy and it is one of the models that countries follow (Eadie et al., 2013).

PPP is serving as an alternative to traditional procurement methods. The government is initially responsible to provide public goods and services such as infrastructure, energy, telecommunication, safety, health, etc. However, public resources suffer from bad management due to budgetary constraints. As a solution for the available bottlenecks in delivering public goods and services to citizens, policy makers came up with the privatization and public private partnership concepts to assist governments in capital projects.

Many sources have definitions of PPP, yet all of the defined terms converge to the same essence. Public private partnership is a governance scheme or mechanism arranged between the public and private sectors on the institutional level. The Organization for Economic Co-operation and Development (OECD) defines PPP as a contractual agreement between the private and public sector that aims at sharing risks between both parties by which the private partner finances and operates a public service through capital assets. In addition, the World Bank introduced PPP as having the private sector undertake investment projects that were formerly operated and funded by the government. Others described PPP as the handling of public services partially or completely by the private sector (Hilmansson, 2017). According to Hodge and Greve (2007), PPP is considered a substitute of privatization and contracting. It requires a huge effort to integrate the strengths of the public sector with the strengths of the private

sector. As Teisman and Klijn (2002) indicated politicians used public private partnership during setting the agenda for marketing their electoral campaign since the private sector is known of its efficiency thus adding legitimacy to projects. PPP has become a new way of governance and not only a kind of language game as Teisman and Klijn (2002) confirmed.

As seen in the literature and confirmed by Delmon (2010), there is no one set mode that the public private partnerships model impose on projects, PPP is very flexible and it is open to accept various project structures. Each country, sector and project has different cases and challenges and thus the applicability of this model in real life experiences is customized to projects to lead to ultimate efficiency. Therefore, the definition of PPP sets basics to the structure of projects that require the collaboration of the government and the private sector.

The concept of public private partnership would become clearer when compared to other types of partnerships. Privatization, for example, is fully or partially shifting of ownership of the public assets to the private sector. Hence, the day to day operation and production will be handled by the private sector yet the government will only act as the regulator. Concessions, leasing, franchising are under privatization since the risk level is so low or there's no risk at all from the government side. Thus, sharing risks which is the main purpose of public private partnership is non-existent in privatization. As for outsourcing, the government sets all requirements and make all decisions, and the private sector only execute as instructed. However, PPP is the governance of a complex project that the government is not able to manage on its own. In the case of collaborative governance, it is based on cooperative consensus among the parties involved in the project while PPP ensures coordination between the private and

public sectors and joint production and pays no attention to the “collective decision-making process” (Wang et al., 2018). On the other hand, Osei-Kyei and Chan (2017) argues that PPP covers many types of partnerships ranging from outsourcing to privatization.

As per Sabol and Puentes (2014), the different types of PPP in infrastructure are outlined as below:

- Bid-Build: where the private sector is only responsible for construction,
- Design-Build: where the private sector only handles project design and construction,
- Design-Build-Finance: where the private sector provides the project design, financing and construction,
- Design-Build-Finance-Operate-Maintain: where the private sector oversees project design, financing, construction and operation and maintenance.

Literature agrees on the different types of PPP projects. The degree of involvement of the private sector in a project differs from one PPP project type to another. The ownership of the project after the end of its lifetime is debatable as well.

Yescombe (2011) disagrees to a certain extent with Wang et al. (2018). Yescombe (2011) states that PPP projects can be concessions, Power Purchase Agreement (PPA), Build Operate Own (BOO), Build Operate Transfer (BOT), Build Transfer Operate (BTO), Design-Build-Finance-Operate (DBFO), Project Finance for Concessions, the PFI Model. Concessions are the projects where the concessionaire is paid directly from the end user while using the project’s facility which could be a bridge, electricity network, etc. The government’s role is to enact a law or a legislation to choose the concessionaire and regulate the government’s requirement within the

selected public facility. Subsequently, the project starts after the public sector signs a concession agreement with the concessionaire to construct and operate the facility.

However, as per Yescombe (2011), franchises do not belong to the PPP model since they are service concessions and thus they do not involve constructing or upgrading a public facility.

Sharing risks is the major incentive of the public and private sectors to engage together. The financial, construction, operation and maintenance costs are handled by the private sector while the public sector handles the political, financial and legal issues (Haney & Pollitt, 2013). Detailed risk analysis is illustrated in Table 3 below as mentioned by Ke, Wang, Chan, and Lam (2010) and Bing, Akintoye, Edwards, and Hardcastle (2005) where risk allocation is studied based on PPP projects in China and UK respectively.

Table 3: Risks of allocated to private/public sector (Bing et al., 2005; Ke et al., 2010)

#	Category (Ke et al., 2010)	Type of Risk (Ke et al., 2010)	Risk Allocation – Chinese Projects (Ke et al., 2010)	Risk Allocation – UK Projects (Bing et al., 2005)	Handling of risks (Based on examples on common practice) (Ke et al., 2010)
1	Legal system	Approval and permit	Public Sector	Project-based	Public sector should hire legal consultants to handle the legal issues. In addition, those risks can be avoided in the contract as follows: 1- In case the law changes impacted the completion of the project, the private sector will get payments regardless of the results of the project 2- The public sector will cover the incurred costs caused by the change in law
2	Legal system	Uncompetitive tender	Public Sector	Public Sector	
3	Legal system	Change in law	Public Sector	Shared	
4	Legal system	Tax regulation changes	Public Sector	Private Sector	
5	Legal system	Immature justice system	Public Sector	Not mentioned	
6	Government officers	Government's reliability	Public Sector	Not mentioned	
7	Government officers	Government's intervention	Public Sector	Not mentioned	
8	Government officers	Poor Political decision-making	Public Sector	Public Sector	

#	Category (<i>Ke et al., 2010</i>)	Type of Risk (<i>Ke et al., 2010</i>)	Risk Allocation – Chinese Projects (<i>Ke et al., 2010</i>)	Risk Allocation – UK Projects (<i>Bing et al., 2005</i>)	Handling of risks (Based on examples on common practice) (<i>Ke et al., 2010</i>)
9	Government officers	Corruption	Public Sector	Not mentioned	request the support of the state government to decrease the authority of local governments. However, in case of corruption of the state government, the private sector shall reconsider participating in shared projects or shall hire a strong legal consultant that can reserve its rights.
10	Project level	Land acquisition	Public Sector	Public Sector	The public sector can provide incentives to the private company to account for these risks for example facilitating the land leasing process or providing a free land.
11	Project level	Supporting facilities risk	Public Sector	Not mentioned	
12	Project level	Competition (exclusive right)	Public Sector	Public Sector	
13	Project level	Financial risk	Private Sector	Private Sector	Some projects require large capital so the government can support the private sector to find financial resources and decrease the interests on private local banks to lend the project owners and thus decreasing the project cost.
14	Project level	Construction completion	Private Sector	Private Sector	If the private sector is less efficient than the public sector, it is recommended not to engage in such a project. In addition, the private sector should assess the project carefully to decide whether to be part of the bidders or not. On the other hand, the public sector shall provide a safe and secure environment to attract private investment.
15	Project level	Construction/operation changes	Private Sector	Private Sector	
16	Project level	Delay in supply	Private Sector	Private Sector	
17	Project level	Technology risk	Private Sector	Private Sector	
18	Project level	Operation cost overrun	Private Sector	Private Sector	
19	Project level	Residual assets risk	Private Sector	Private Sector	
20	Project level	Consortium inability	Private Sector	Private Sector	
21	Project level	Private investor change	Private Sector	Private Sector	
22	Project level	Organization and coordination risk	Private Sector	Private Sector	
23	Country level	Public/political opposition	Shared	Public Sector	
24	Country level	Ground/weather conditions	Shared	Private Sector	Such risks can be accounted for by extending the project timeline

#	Category (<i>Ke et al., 2010</i>)	Type of Risk (<i>Ke et al., 2010</i>)	Risk Allocation – Chinese Projects (<i>Ke et al., 2010</i>)	Risk Allocation – UK Projects (<i>Bing et al., 2005</i>)	Handling of risks (Based on examples on common practice) (<i>Ke et al., 2010</i>)
25	Country level	Force majeure	Shared	Shared	Both parties should take insurance policies covering such incidents
26	Country level	Environmental protection	Shared	Private Sector	Private sector should check if the project is of political interest or within the public sector long term goals
27	Market level	Interest rate	Shared	Private Sector	The contract may include as follows: 1- A guarantee on a minimum payment for the services 2- Change of tariff based on market demand
28	Market level	Foreign exchange and convertibility	Shared	Private Sector	
29	Market level	Inflation	Shared	Private Sector	
30	Market level	Market demand change	Shared	Private Sector	
31	Project level	Third party reliability	Shared	Private Sector	
32	Project level	Improper contracts	Shared	Project-based	
33	Project level	Tariff change	Shared	Shared	
34	Project level	Payment risk	Shared	Not mentioned	
35	Project level	Subjective evaluation	Shared	Not mentioned	
36	Project level	Insufficient financial audit	Shared	Not mentioned	

Additional terms related to PPP are defined in literature as follows. “Value for Money” (VFM) is a requirement for projects requiring procurement of goods and services to the public. It is used in some countries to analyze the feasibility of public private partnership projects. It is an assessment made to select the optimal procurement method to have best quality delivered at a low cost. VFM refers to the economy, efficiency and effectiveness value of a project through its lifetime. The calculation of VFM includes comparison between the cost of traditional procurement method, the cost of PPP project and the cost of the bid price of private sector while taking into consideration the discount rate and risks. This is done through more than one technique: cost benefit analysis, UK method of Public Sector Comparator (PSC) and competitive

bidding. PSC is one of the most popular methods that tells the government the cost of financing a project through public funds while accounting to the net present value of costs, forecasted risks and life cycle costs to deliver the same output relative to the same project financed by private sector. Life cycle costs include construction, operation and maintenance and capital improvement costs to be paid during the project life cycle. In addition, in PSC, the risks transferred to the public sector are quantified. PSC does not only take into consideration the costs of the project, it also considers intangible benefits and costs which help to come up with a realistic assessment (Ismail, 2013).

On the other hand, Power purchase agreements (PPA) are one of the PPP contracts widely used in the energy sector. They are Performance-Based Contract (PBC) which is a framework that establishes a just agreement between the utility and the generator. PPAs have been used widely especially in Europe, USA and Latin America. For example, 1.2GW capacity of wind energy had their PPAs signed in Germany during the year 2013. In years 2016 and 2017, 34.5GW capacity of renewable energy projects signed PPAs in the USA. PPAs depend on the Levelized cost of energy to specify the price of the energy sold per kWh. Some buyers set a limit for the minimum energy sold and if the seller couldn't commit to the limit, penalties are incurred accordingly. PPAs can include terms related to the construction, operation and maintenance, insurance, interconnection with the grid, and other aspects that impacts the cost (Bruck, Sandborn, & Goudarzi, 2018).

Engineering, Procurement and Construction contract (EPC) is public procurement method handled by the private sector that provide engineering services and construction to build big infrastructure projects. The EPC contractor delivers the facility

to the client at a guaranteed price and timeline. The EPC contract ends once the construction, testing and commissioning phases end (McNair, 2011).

B. Advantages and Disadvantages of PPP

PPP has proven to be of great value in many cases while in others, PPP failed to attain its purpose. PPP helps governments to utilize private sector resources in order to deliver better goods and services for the public. Developing countries are in need of PPP since they experience a budget deficit that prevents them from constructing, operating and maintaining major infrastructure. PPP can also help reduce poverty. As per Savas (2000), poor policies enacted by the government are one of the significant reasons behind poverty. As Savas (2000) suggested that decreasing the role of public sector in the public services can mitigate poverty by creating new job opportunities and enhancing the economic cycle. Bad policies also encourage the growth of black market as Savas (2000) confirmed that in Peru, for example, registering a new business takes roughly 289 days, in addition it takes 26 months to license a taxi operator. Another example from Lebanon, 42% of firms expect to give a bribe when getting a construction permit and 30% of firms said that they believe they have to give a bribe to secure a government contract. Such examples prove the importance of private sector intervention in public services projects. According to Ghore (2001), PPP also requires the government to be more transparent and accountable in managing and delivering public services to the citizens since PPP involves the private sector intervention.

As per Wang et al. (2018), the projects based on the PPP scheme benefit from the skills and management of the private sector. For instance, the private sector is a lead of the technological advancement that the world is witnessing. Most of the

governmental employees do not have the skills to ensure the advancement of the public institutions. Thus, the governments employ private companies specializing in the Information and Communications Technology (ICT) domain to boost their work efficiency and facilitate the interaction with citizens (Bovaird, 2004). Bigger projects can be attained with the help of private sector funding since the government has budgetary constraints and thus cannot implement many capital projects especially in developing countries. Furthermore, the private sector can provide affordable and better services to the end users. Finally, this scheme enables risk sharing between the public and private sectors (Wang et al., 2018).

However, PPP has faced oppositions to its theoretical and practical uses. On the conceptual level, PPP is resisted because it diminishes the political influence on the projects and promote decision making unlike the traditional public administration. As such, PPP is usually considered unfavorable from politicians that fear losing control on governmental institutions. Some politicians changed their perspective about PPP when some projects proved successful. Further to that, the new public administration methods opposes PPP, specifically the long-term agreement, since it halts competition between potential providers on the long run. On the practical level, trade unions fight PPP as they consider it risking their jobs. They also show concern that the private sector is profit driven which affect the conditions of employment. Some employees still complain about the management of the private sector while others found the new working environment as more just. End users also resist PPP fearing the soar of prices in the public services. Yet, when the service quality becomes improved after adopting PPP, the end users usually show satisfaction (Bovaird, 2004). Weaknesses of PPP glimmer when the government has no strong regulations that protect its rights against

the exploitation of the private sector. As Forrer, Kee, Newcomer, and Boyer (2010) confirmed the government should not only form the PPP contract with the private sector, but also it should establish strong regulations and monitor the projects through its lifetime. The government also should be fully aware of its responsibilities and the duties of the other parties. Moreover, the management of the project should stay in the hands of the public sector to ensure project accountability and achieve public satisfaction. Further to that, Verma (2010) pointed out that PPP contracts are meaningless if the award of bidders process in PPP contracts is not transparent. This is a serious concern. The government should be open to the private sector about the procurement rules. Clear deadlines and guidelines should also be communicated to the private sector to ensure fair competition between all bidders. The government must also provide equal chances of help to all bidders... On the other hand, Ke, Wang, Chan, and Cheung (2011) highlights the risks of the PPP projects some of which are that the government intervention is considered a dangerous risk that can lead to the failure of the project. Poor political decision making, corruption and immature juristic system can deviate the purpose of the project to serve the politicians' interests. Thus, a major element in the PPP project that makes it successful is the absence of political interference and the dominance of the law. Despite the challenges facing PPP, this model achieved success in many countries mainly United States and United Kingdom (Almarri, 2019).

C. Lebanon's Experience with PPP Projects

After the civil war, Lebanon needed the private sector to rebuild the infrastructure. In 1994, the telecommunication sector granted licenses to "Global

System for Mobile (GSM)” mobile operators, Cellis and Libancell. The licenses were based on BOT contracts having an escalated revenue sharing scheme that last for 10 years. The companies covered 80% of Lebanon and increased the international coverage to 67 countries. Tariffs were fixed by the government making them one of the lowest in the world. The expertise of the private sector contributed in advancing the mobile telecom sector on the technical level and on financial level as revenues soared in a fast pace. However, the contract ended by a dispute between the government and the operators. The dispute was mainly contractual since the contracts abstain the operators to provide the services more than 125,000 subscribers per operator. Yet, both operators exceeded this number because of market growth. Moreover, the operators introduced new services that were not included in the contract. The Ministry of Post and Telecommunications (MPT) ended up managing this clash, given that it was not prepared to hold this responsibility in the absence of the independent regulatory authority. The arbitration was done based on the Lebanese laws while appointing an international mediator to close the issue (Jamali, 2004). However, the contracts were not clear enough to reach an agreement between the parties. This experience was a failure for the Lebanese government for the following reasons: there was no trust between the public and private sector in regards to disclosing of information of the private sector and the competence of the public sector (Yamout & Jamali, 2007).

Waste management was also delegated to a private company, Sukleen, through a BOT contract. The Lebanese government delayed the payments due to Sukleen since the government claims that the price agreed between Sukleen and the previous minister was very high. The lack of transparency of the contract terms with Sukleen was also one of the problems in this experience. Another suspicious PPP

project was the touristic place, Jeitta grotto, which was handled by a private company. No decree or regulation, as per Article no. 89 from the Constitution, was issued regarding granting the license to a private company (Antar, American University of Beirut. Faculty of, Sciences. Department of Political, & Public, 2011).

Therefore, lack of clear regulations are the main hindrance of having a successful public private partnership in Lebanon.

Although Lebanon experienced failures in PPP projects, however, it is still presented as a regulatory solution due to the following:

1. The government drastic economic situation prevents the public sector from investing in capital projects which are urgently needed for Lebanon,
2. The public sector in Lebanon is inefficient and lack technical expertise,
3. Private sector is strong in Lebanon in terms of technical expertise and financial capabilities,
4. Private sector provides services with high quality since their profit is dependent on the quality of the delivered service,
5. Projects are considered bankable when the financial capability of the involved parties are clear in the project. PPP provide a risk sharing scheme which offers more confidence to the lenders.

CHAPTER V

RENEWABLE ENERGY

In the following chapter, I will highlight the importance of the renewable energy that can be presented as a solution for the bottlenecks of the energy sectors when associated with the private sector.

A. Renewable Energy: Opportunities and Challenges

Renewable energy is a clean source of energy that minimizes the environmental hazards, generates less waste and is characterized by its sustainability. Solar, wind, biomass and geothermal energy are known to be the major renewable energy resources. They are distinguished by producing almost zero emissions of GHG and other air pollutants, excluding the case of biomass power plants (Panwar, Kaushik, & Kothari, 2011). As per Cedrick and Long (2017), renewable energy is considered as a strategic source in some countries since it provides a significant amount of energy to the citizens. It is a reliable and cost efficient. In addition, it promotes energy security through decreasing the dependence on fossil fuel.

As part of the solution for Lebanese case, increasing the electricity generation can decrease the gap between the supply and demand of electricity. The usage of renewable energy can decrease dependence on fossil fuel thus leading to diversification of the energy portfolio and thus increasing the energy security. Further to that the addition of renewable energy to the grid will enable Lebanon to meet its COP21 target of achieving a 12% renewable energy share by year 2020 in which Lebanon committed to it in year 2009 Copenhagen Climate Summit (Ayoub, Assi, Hammoud, & Assi). In

2009, the Council of Ministers committed to the target based on political reasons and not on technical reference. Later, a National Renewable Energy Action Plan (NREAP) was established for Republic of Lebanon (2016-2020) that set a defined plan to achieve that target (United Nations ESCWA, 2018). In September 2018, the Government of Lebanon committed to a 30% renewable energy target to be reached in year 2030 (Moore & Collins, 2019). The addition of the renewable energy to the electrical grid is subject to the preparation of an appropriate regulatory frameworks that allows such addition. The regulatory issues are resolved after passing the PPP law. The updated policy paper of the electricity sector in Lebanon indicates that the renewable energy projects will contribute in increasing the generation capacity whereby the solar farms will add approximately 840 MW and the wind farms will add roughly 600 MW as well (Ministry of Energy and Water, 2019). In the following, solar and wind energy systems will be discussed briefly.

It is estimated that the global potential of wind power ranges between 630,720 and 1,489,200 TWh/year (Bataineh & Dalalah, 2013). As for the solar technical potential, it is estimated that the solar PVs can produce 613 PWh/year (Korfiati et al., 2016).

To start with solar energy systems, they consist of solar modules made up of photovoltaic (PV) cells that use the PV effect. The PV effect relies on the reaction with photons having an energy that is at least equal to the band gap of the PV material. The modules generate electricity once solar radiation reaches them directly or indirectly. The energy density of the solar system is low since the solar modules should be scattered on a huge surface to generate enough power. For illustrative purposes, a 300 Watt polycrystalline panel is 1.956 x 0.992 x 0.055-meter size. The other major component in

the solar energy system is the inverter that converts the DC power to AC power to transfer power to the grid (Panwar et al., 2011).

Wind energy systems have the second highest capacity installed worldwide in the renewable energy category after hydropower. The results of climate change may impact negatively or positively the nature of wind in certain areas in the world. However, the wind potential remains huge worldwide of which 9,000TWh/year can be utilized due to economic reasons or other constraints. The technology behind wind energy systems is in a mature stage since it's been used for a long time. Basically, the wind turbines convert the rotational energy of the aerodynamic designed blades to electrical energy used to operate the generator. The wind power can be transmitted easily through the grid even if the turbines are installed in remote areas (Panwar et al., 2011). One wind turbine can generate up to 5.3 MW depending on the technology used (Rahman, Mohammad, & Hossain, 2018).

Each energy resource has its own levelized cost of energy (LCOE) which is the cost required to produce a unit of energy over the lifetime of the project. The LCOE is used to compare different types of energy resources. It is considered by the governments and inter-governmental agencies to select the best technology to use. Recently, the cost of renewable energy resources is decreasing and the cost difference between the latter and the thermal power plants is decreasing as well. This is due to the fact that the renewable energy technologies are now more innovative and more affordable. The cost includes the capital cost, operation and maintenance, and financing costs. This measurement does not take into consideration the transmission and distribution incurred costs based on the technology. It only studies the generating plant itself (Bruck et al., 2018).

Lebanon is committed to achieve 12% renewable energy in year 2020 and 30% in year 2030. LCEC developed the National Renewable Energy Action Plan to accomplish the 12% target. Table 4 shows the targeted capacity to be installed by year 2020.

Table 4: RE resources electricity shares in year 2020 (MoEW/LCEC, 2016)

Energy Resource	MW	GWh	Ktoe
Wind	200.0	595.7	128.7
PV, CPV	150.0	240.0	51.8
Distributed PV	100.0	160.0	34.6
CSP	50.0	170.6	36.8
SWH	1,053,988 m ²	685.5	148.1
Hydropower	331.5	961.9	207.8
Geothermal	1.3	6.0	1.3
Bioenergy	-	771.5	166.6
Total Renewable Energy	-	3,591.2	775.7
Total Primary Energy Demand	-	29,578.7	6,389.0

With regards to the wind and solar projects in Lebanon, according to MoEW/LCEC (2016), Lebanon has wind power potential of about 12,139 GWh/year that is 76.2% of the electricity demand of year 2010. Regarding the capacity factor of the wind farms in Lebanon, it is approximately 25.6% and ranges between 22% to 42.1%. According to Hassan (2011), in the aim of having a realistic outlook on the wind potential in Lebanon, pessimistic assumptions were taken into consideration while studying the target of wind power capacity in Lebanon. A capacity of 1.5 GW is the wind potential power after reducing the power outcome by 10% and accounting only for the terrains having maximum 8-degree slope. Moreover, given the intermittency of wind power and the variable parameters affecting the wind power output, MoEW/LCEC (2016), a capacity of 500 MW is considered as a safe target for Lebanon to achieve by the year 2020 or 2030.

MoEW/LCEC (2016) indicates that there is a big potential for solar PV power plants in Lebanon which can accommodate a capacity of 87.6 GW of solar plants. After excluding CSP plants from the study and the space allocated to them, a capacity of 3.904 GW of solar PV power plants can be realistically built and operated in Lebanon. The targets set to be achieved is 150 MW by year 2020, 200 MW by year 2025 and 300 MW by year 2030.

In light of the above mentioned studied estimations, Lebanon has a big potential in solar and wind resources. The Table 5 and Figure 8 show that the renewable energy resources have a lower LCOE than conventional resources which makes them more attractive for governments to consider. Even if their capital cost seems to be higher, however, the O&M cost is much lower than the conventional power plants. It is also evident that the LCOE of the existing power plants is very high compared to the renewable energy plants and newly constructed conventional power plants.

Table 5: Levelized cost of electricity for new generation resources(McKinsey & Company, 2018)

	Plant Type	Utilization (%)	Capital Cost (USD/W)	LCOE (USD/MWh)
LCOE of Power Plants with different energy resources if built in Lebanon	Solar PV	20-25	1-1.3	40-60
	On-shore Wind	25-40	1.4-2	40-80
	Off-shore Wind	45-50	2-4	60-100
	State of art CCGT	90	0.8	90
	State of art OCGT	90	0.8	115
	Solar PV + battery	20-25	3	160
LCOE of Existing Power Plants in Lebanon	Power Barges			90
	Zahrani			125
	Al Hrayshe			130
	Baddawi			132
	Zouk			134
	Jieh			160
	Baalback			190
	Tyre			200

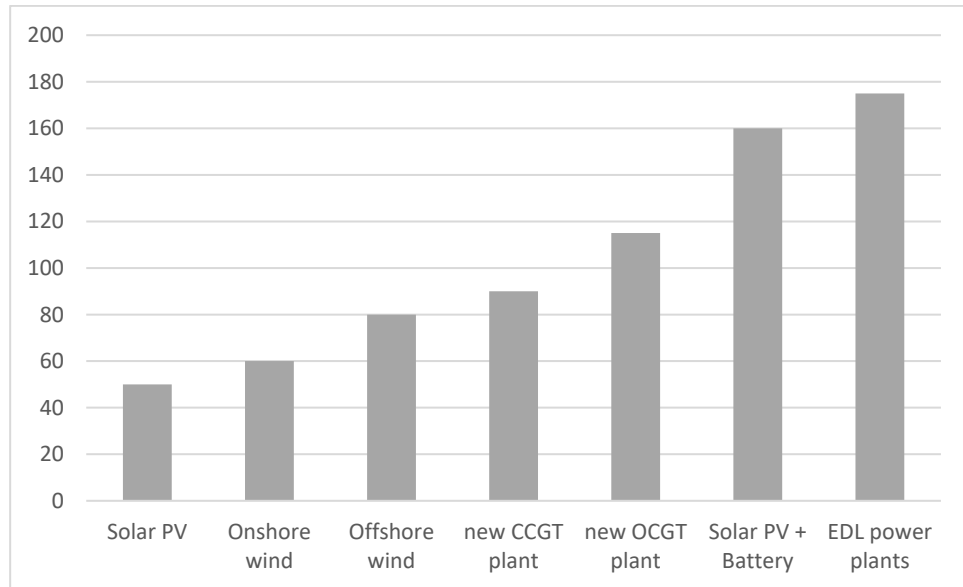


Figure 8: Average levelized cost of energy (LCOE) of different technologies versus EDL power plants (McKinsey & Company, 2018)

B. Renewable Energy and PPP

The procurement of the energy services has changed through time after governments started having larger amounts of debt that grew in 1970s and 1980s. During the 1980s, the electric utilities were still owned by the government and they were characterized as monopoly vertically integrated utilities except in the USA where the ownership of the utilities was mixed between private and public sector. They were monopolies because of their high capital costs and high sunk costs. Such monopolies began to crash after the rise of the neoliberal economy in addition to the failure of the state management of utilities. Public utilities were not transparent, overstaffed, and imposing one service to the customer that have no choice to select the best service in market. These were the motives behind enhancing the existing system and changing the procurement of utility services (Sovacool, 2013).

According to Martins, Marques, and Cruz (2011), the electrical utilities need a lot of investment to improve their status quo and to ensure their accommodation of the

growing energy demand while taking into consideration the alarming carbon emissions. Therefore, public private partnership models came as a solution to such capital energy projects. They're being developed in utilities as in other infrastructure related projects.

Using renewable energy projects under the PPP framework, an abundant percentage of clean energy share will be added to the grid thus the countries will get closer to the renewable energy target and hence complying with environmental standards. The assets used in the renewable energy projects will be operated and maintained by the private sector over the period of the project which would be around 20 to 25 years. The end user pays a low tariff while the government does not carry any financial burden. Finally, the social impacts are considered minimal (United Nations Economic Commission for Europe Working Party on Public Private Partnership, 2017). The public sector can cooperate with the private sector to provide the financing of capital projects.

Effective policies are a major factor in motivating the private sector to engage in renewable energy projects. There are different instruments that are adopted by governments in order to promote the use of renewable energy resources. Feed-in tariff (FiT) is one of the instruments that witnesses a huge success across many countries. It is applied when an Independent Power Producer (IPP) sells electricity from an energy resource to the utility at a predetermined rate, FiT, specified by the government. In most cases, the cost of FiT is added on the end user bill. Another measure taken by governments to avoid the monopolistic nature of utilities is allowing other parties to contribute in renewable energy generation through enacting regulations and policies that permit the access to grid as Public Private Partnership and other energy related laws (Carley, Baldwin, MacLean, & Brass, 2017).

Renewable energy is presented as a technical solution to Lebanon due to the following:

1. There is not enough supply covering the electricity demand of the Lebanese citizens due to insufficient installed capacity feeding the grid,
2. Lebanon is highly dependent on fossil fuels to power the electricity sector. However, this threatens the energy security since fossil fuels are imported from abroad and there is no backup plan to feed the grid,
3. Lebanon has a big potential of renewable energy resources,
4. Lebanon has committed to achieve RE targets to the international community,
5. LCOE of the RE sources is much lower than the conventional sources.

CHAPTER VI

CASE STUDY - AKKAR WIND FARM

A. Project Overview

Before the year 2008, the idea of establishing a wind atlas for Lebanon arose. So the United Nations Development Programme (UNDP) initiated the CEDRO project in collaboration with the Ministry of Energy and Water through which a detailed study on the wind currents and movements was done. The objective of the study was mainly to identify the sites that have high wind potential and to show the wind capacity in Lebanon for policy makers to act. The results of the study show that Lebanon has a potential of 6.1 GW to be produced from onshore Wind Energy. If the study took into consideration all the worst case scenario assumptions, 1.5 GW would be the potential of wind energy in Lebanon (Hassan, 2011). Wind Atlas was thus published in 2011 and it was considered a baseline for future wind energy bids. As shown in Figure 9, the sites blessed with high wind energy are located in Akkar.

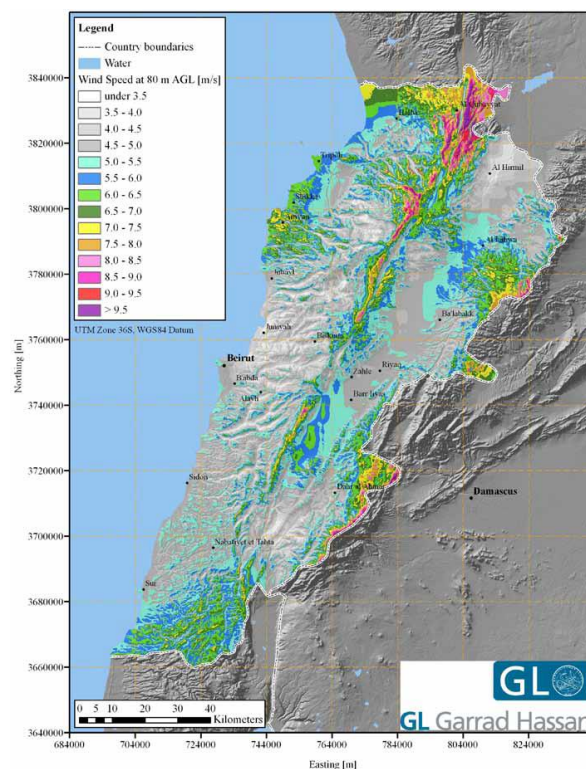


Figure 9: Central estimate wind map of the Republic of Lebanon at 80 m above ground (Hassan, 2011)

On a parallel side, LCEC set the National Renewable Energy Efficiency Action Plan (NREAP) in 2010 for the years 2011 – 2015 based on the “Policy Paper for the Electricity Sector” that was issued by the MoEW. The initiative number 6 in NREAP is about promoting electricity generation from wind resources.

Based on the policy paper and NREAP, the MoEW called for expression of interest (EOI) in September 2012 followed by a request for proposal (RFP) in March 2013 as per Mr. Rani Al Achkar, Director of Engineering and Planning at LCEC, who presented the milestones of the wind project in International Beirut Energy Forum 2018. The EOI and RFP were studied by a ministerial committee consisting of MoEW, EDL and LCEC in addition to an international consultant. At first, 26 companies showed interest confirmed by MoEW/LCEC (2016). On June 2013, four offers were received and three of them were qualified. The qualified offers proposed to be in Akkar area with power capacity of 62.1 MW, 62.1 MW and 82.5 MW (Al Achkar, 2018). The budget

needed for such a project is between 340 to 490 MUS\$ (MoEW/LCEC, 2016). Those offers were granted a preliminary approval by the Council of Ministers in July 2017. The price of the PPA was reduced from the proposed price of 12.45 cents USD/kWh to 11.3 cents USD/kWh ("أية خطة لطاقة الرياح أقرّ مجلس الوزراء أمس؟", 2017). As mentioned by Mr. Al Achkar, the offers' approval was managed by an inter-ministerial committee which comprised of MoEW, MoF, Ministry of Justice (MoJ), the Prime Minister, EDL and LCEC, in addition to 2 international consultants and Regional Center for Renewable Energy and Energy Efficiency (RCREEE). Following the approval, the technical and financial negotiation was initiated by the MoEW, LCEC, 2nd international consultant and RCREEE. However, the ministry wanted to negotiate the PPA with the winning bidders for review and amendments. The PPA was supposed to be signed within three months following July 2017. However, a final approval on the licenses was issued in November 2017 through a ministerial decision number 43 (Al Achkar, 2018). After that, the PPA was signed on February 2018 by the 3 awarded bidders which are Sustainable Akkar, Hawa Akkar and Lebanon Wind Power after reducing the price to 10.75 cents USD/kWh and increasing the capacity of the wind farms to 68.3 MW, 68.3 MW and 82.5 MW (Al Jawhari, 2018). The land allocated for the wind farms is shown in **Error! Reference source not found.** As per Al Achkar (2018), in July 2018, the interim conditions satisfaction date was planned to be reached. However, as of February 2020 it is still under progress. Before August 2019, the companies should have obtained the final measurements on energy yield assessment based on MEASNET standards for a period not below than six months. The companies also should have set the final site layouts and coordinates for the wind turbines. They should finalize the grid and network study in addition to grid connection requirements of EDL. Moreover, the

companies should have a guaranteed facility power curve for the plants. The schedule, project tracks, decommissioning plan, environmental and social impact assessment as well as bird migration protocol should be ready by August 2019 to start with the financial closure of the wind projects. Such requirements are crucial to reach the conditions satisfaction date. The deadline of achieving financial closure and completing construction is set to be February 2021.

According to the initial planned schedule, the construction of wind farms should have its commercial operational date (COD) in year 2015 as per UNDP/CEDRO (2013). After updating the schedule, the construction date should have started during August 2019 and ended by February 2021. However, the wind farms construction is not initiated yet since the companies did not reach financial closure. Figure 10 shows the timeline of Akkar wind project.

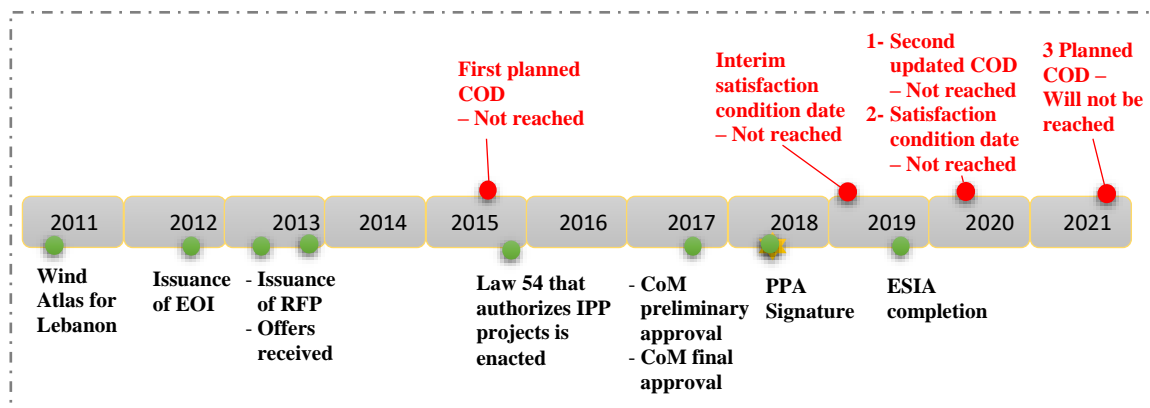


Figure 10: Timeline of Akkar Wind Farm

As per Zankoul and Khoury (2014), the wind farm construction steps start with a topographical survey which is summarized by collecting elevation data and contour lines of the land. Then, the internal roads have to be prepared to carry trucks and cranes at a specific width, slope and weight. On the selected land, the construction of the turbine foundation and the excavation of electrical cable trenches are implemented.

After that, the contractor loads the electrical cables in the trenches. Then, the wind turbines are erected as a final step. For the Lebanese case and according to Zankoul and Khoury (2014), the topographical team shall have a target of 13,355 m²/day. The road construction includes some activities to align the roads to a specific slope and widen the roads to a specific width. The foundation of the turbine involves installation of steel reinforcement and concrete. Then, laying the electrical cables consist of excavation of standardized trenches and loading the cables in them. Finally, the wind turbine installation is the erection of the tower, installing of the nacelle and the blade hub while sticking the blades all together (Zankoul & Khoury, 2014).

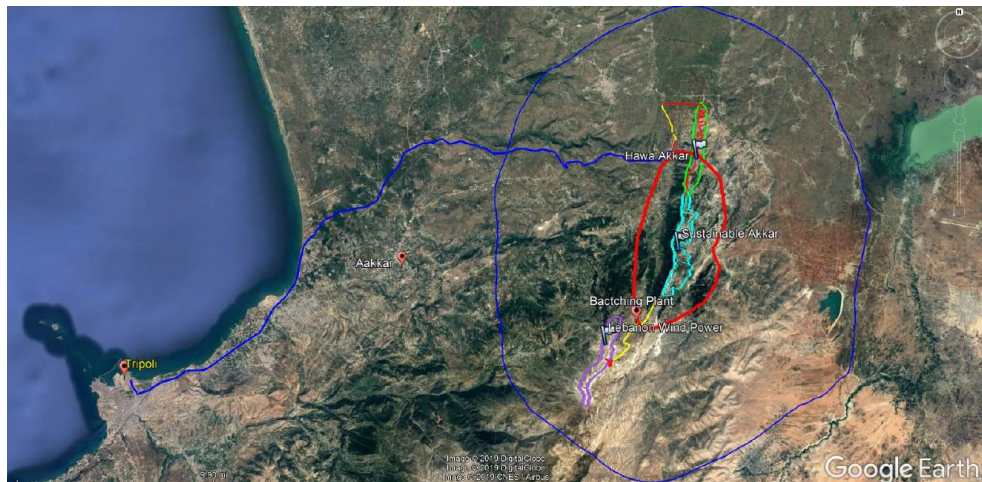


Figure 11: Hawa Akkar, Sustainable Akkar, Lebanon Wind Power lands and their proximity to Tripoli port (Volume I: ESIA Report Sustainable Akkar Wind Farm, Lebanon, 2019)

B. Interviews related to the Project

The obstacles that faced the projects were discussed with Emad Abdessater, Engineer at Hawa Akkar, one of the winning bidders. The following were some delay highlights on the wind project:

- Delays were faced in the resources assessment stage since there was a lack of wind data. Therefore, the predevelopment phase started in 2010. The wind measurements were taken on a 60-meter height. Once Hawa Akkar was

awarded the bid, the World Bank, EBRD and other investors rejected the measurements already taken in 2010 since they need more accurate ones.

Then, Hawa Akkar and other awarded bidders have done micro siting. They used instrumentation and measurement and installed 4 met masts in Akkar.

- The bid for the wind project was issued in 2013 by LCEC, 3 years after the wind assessment.
- The tender was not awarded until law number 54 was enacted by the parliament in 2015.
- A grid impact assessment was also required from the winning bidders without much cooperation from the Ministry of Energy and Water which also incurred delays to the project.
- A grid connection study was done with the assistance of the Ministry of Energy and Water as well as EDL.
- In 2017, the government was still negotiating the PPA with the winning bidders. The negotiation delayed the process. Based on a documented interview with the Chairman of LCEC, the PPA was awarded.
- Delays in preparing the design of the project occurred because of the weak coordination among different parties. For example, as per Hawa Akkar, contractors from the Ministry of Transportation implemented recent bridges and roads that are not per the standards which oblige Hawa Akkar and the other winning bidders to study the road access again and take the cost of road rehabilitation into consideration.
- Another milestone in planning was to do a Social environmental impact assessment that included: Public hearing, Bird migration study, Social

assessment (Job opportunities, Transportation, Land acquisition). The companies had 18 months to complete the assessment. It was completed in July 2019.

- Securing land rentals was one of the biggest obstacles since dealing with the resistance of local communities was a challenge that consumed additional time and cost. This was also confirmed by Sustainable Akkar who stated that finalizing rental agreements is still under progress as of date January 20, 2020.
- Geotechnical studies were completed for one lot of land which belongs to Lebanon Wind Power but still ongoing for Hawa Akkar and Sustainable Akkar.
- Lebanon Wind Power, Hawa Akkar and Sustainable Akkar are finalizing the design of access roads. Sustainable Akkar is also having conflicts and once resolved, it will resume internal roads agreements which are solved for the other two companies as confirmed also by Sustainable Akkar as of date January 20, 2020.

C. PPA Main Articles

Three PPAs were signed between Sustainable Akkar, Hawa Akkar, Lebanon Wind Power on one hand and the government of Lebanon represented by the Ministry of Energy and Water on another hand on February 1, 2018. The PPA came as part of accomplishing Lebanon's renewable energy target which is 12% of the energy mix by 2020. It is based on the law number 288 of 2014 which allows the CoM to grant licenses to private sector temporarily for 2 years until the Electricity Regulatory Authority is

formed in addition to law 54 which extends the duration of law 288 until April 2018. The licensed private company shall acquire or lease the land, design, finance, construct, own, operate and maintain RE projects and sell all the generated electricity. The PPA governs the conditions of selling electricity to the government for 20 years and it can be either terminated earlier or extended upon the agreement between the parties. The main articles in the PPA are detailed in **Error! Reference source not found.** It is worth noting that the PPA articles reflect risk allocation in a PPP project.

Table 6: PPA (Ke et al., 2010; Lebanon, 2018)

#	Category	Type of Risk	Article No.	Allocation Risk	PPA Content
1	Legal system	Approval and permit	6	Private Sector	The seller shall acquire any authorization required (permits, licenses...). In case any authorization is revoked, the project company shall inform the client.
2	Legal system	Uncompetitive tender	NA	Not covered	Not covered in the PPA
3	Legal system	Change in law	19.2	Shared	The parties have to meet when a change in law event happens and agree. If they did not agree, then the matter is identified as dispute.
4	Legal system	Tax regulation changes			
5	Legal system	Immature justice system	28.2	Shared	Any dispute shall be referred to and finally resolved by arbitration under the London Court of International Arbitration Rules and governed by the Lebanese Laws.
6	Government officers	Government's reliability	NA	Not covered	Not covered in the PPA.
7	Government officers	Government's intervention	NA	Not covered	Not covered in the PPA.
8	Government officers	Poor Political decision-making	NA	Not covered	Not covered in the PPA.
9	Government officers	Corruption	NA	Not covered	Not covered in the PPA.
10	Project level	Land acquisition	2.1(b) and 2.3(a)	Private Sector	The private sector is solely responsible for acquire land lease.
11	Project level	Supporting facilities risk	7.4	Private Sector	The seller will be solely responsible for the provision or procurement, at its sole cost, of any electricity, water or other inputs required for use as part of the construction of the Facility in accordance with the PPA.
12	Project level	Competition (exclusive right)	NA	Not covered	Not covered in the PPA. This item should be covered before PPA stage.
13	Project level	Financial risk	2.1 (b) 5.1	Private Sector	The seller has to finance the project. The seller has also to provide a development bond prior or on the condition satisfaction date.
14	Project level	Construction completion	5.1	Private Sector	The seller has to provide a development bond as a guarantee that it would achieve the COD.
15	Project level	Construction/operation changes	5.6	Private Sector	The seller has to provide a performance bond which is released after 24 months of the COD and thus guaranteeing a good performance of the plant.

#	Category	Type of Risk	Article No.	Allocation Risk	PPA Content
16	Project level	Delay in supply	10.4, 10.5 and 20.8 (g)	Private Sector	The late or non-delivery of equipment, machinery, plants or materials caused by the breach or negligence acts is not part of force majeure. The seller shall pay liquidated damages to the client in case it fails to achieve the COD on time.
17	Project level	Technology risk	24 and 20.8 (i)	Private Sector	Mechanical or electrical breakdown or failure of equipment, machinery or plant owned or operated by the party affected is not considered a force majeure. The seller is responsible to provide the insurance of the project and the facility and the insurance must be approved by the client.
18	Project level	Operation cost overrun	2.3 (c)	Private Sector	The seller accepts all risks associated with the undertaking of the Project including the operation and maintenance of the facility and the generation of electricity by the facility.
19	Project level	Residual assets risk	24.7	Private Sector	At the expiration of the term, the seller shall decommission and remove the facility from the site and remove the client's assets from the site. In case the term is extended upon the agreement of both parties, the payment terms will be amended to reflect any reduction to the capital cost component of the charge rate and any increase in the cost of operation of the facility.
20	Project level	Consortium inability	21.4 and 22.4	Private Sector	If occurred before COD, the seller should have any amount due and the development bond payable to the client. If occurred within 24 months after COD, the seller should have any amount due and the performance bond payable to the client. Otherwise, the client has the right to purchase the facility from the seller.
21	Project level	Private investor change	31.1	Private Sector	The seller must: (a) not sell, assign or transfer its interest under the PPA; and (b) ensure there is no Change in Control in respect of the seller, (each a Transfer) to any other person or company (Transferee) without the client's prior written consent. In all cases, Transfer of more than 49% of Joint-Venture shares is prohibited before two years from the COD.
22	Project level	Organization and coordination risk	23	Shared	The claimant party must commence legal proceedings or any deductions must be made in respect to any claim.
23	Country level	Public/political opposition	20.8 (f)	Private Sector	This is one of the events that are not considered a force majeure. In particular, any strikes, lock-outs or other industrial disturbances or restraints of labor that are specific to the seller shall be of the seller's responsibility.

#	Category	Type of Risk	Article No.	Allocation Risk	PPA Content
24	Country level	Ground/weather conditions	20.8	Private Sector	These event do not constitute a force majeure: foreseeable weather or adverse wind conditions, any event where the seller's staff.
25	Country level	Force majeure	20.7	Public Sector	After the COD, in case there is governmental force majeure event, then the seller shall either receive payments for deemed delivered electricity or the client may extend the term to a period covering the force majeure duration. This is upon client's absolute discretion.
26	Country level	Environmental protection	7.7 and 11.2	Private Sector	The seller should submit an ESIA Report to the client. The ESIA Report is binding for the seller through the whole Term of the Agreement.
27	Market level	Interest rate	17.4 (a)	Private Sector	One of the seller's obligations is to finance the project so any risks regarding the financing is of the responsibility of the private sector.
28	Market level	Foreign exchange and convertibility	1.2 (o)	Shared	The applicable currency under the PPA is USD. All amounts payable is in USD.
29	Market level	Inflation	NA	Not disclosed	Not disclosed in the available PPA.
30	Market level	Market demand change	12.6 (c)	Public Sector	Planned interruptions shall not exceed in the aggregate 2% of the guaranteed electricity output per contract year and within such limit, shall not be considered as deemed delivery events.
31	Project level	Third party reliability	NA	Shared	The responsibility is held by the party that hires the third-party.
32	Project level	Improper contracts	NA	Not covered	Not covered in the PPA. PPA is the contract.
33	Project level	Tariff change	NA	Private Sector	Schedule for the payment is already set in the PPA.
34	Project level	Payment risk	5.7 and 22.1 (b)	Public Sector	If the client failed to pay the seller, the seller has the right to terminate the contract after giving at least 45 business day notice to the client. The client must reimburse the seller for the termination costs. The client presents to the seller a letter of credit or a demand guarantee as a security for the client's obligation to pay amounts owed under the PPA.
35	Project level	Subjective evaluation	NA	Not covered	Not covered in the PPA. The evaluation is done before the PPA signature.
36	Project level	Insufficient financial audit	NA	Not covered	Not covered in the PPA.

CHAPTER VII

CASE STUDY - TAFILA WIND FARM

A. Project Overview

Jordan's geographic location makes it a country rich in solar and wind resources that can exceed the energy demand by 100 times by year 2050 as per (Holtz & Fink, 2015). Wind power became more attractive because of the decrease in the prices of new technology, higher capacity of wind turbines, easier accessibility to power stations and disruption of oil supply.

The wind atlas showing the wind speed across Jordan was issued in year 1987. The National Energy Research Center (NERC) measured the wind on different levels 10, 30, 40, 50 and 60 meters during the period of 2001 and 2008. The wind power has high potential in some selected areas. In the North, the areas are Hofa, Ibrahimya and R. Moneif areas, Tafila 2 and Zabda in the middle and Fujaij 40 and Aqaba 5 in the South as shown in Figure 12. As per the study conducted by Bataineh and Dalalah (2013), Tafila had the highest wind potential among the 7 studied sites taking into consideration the climatologic, technical and economic factor.

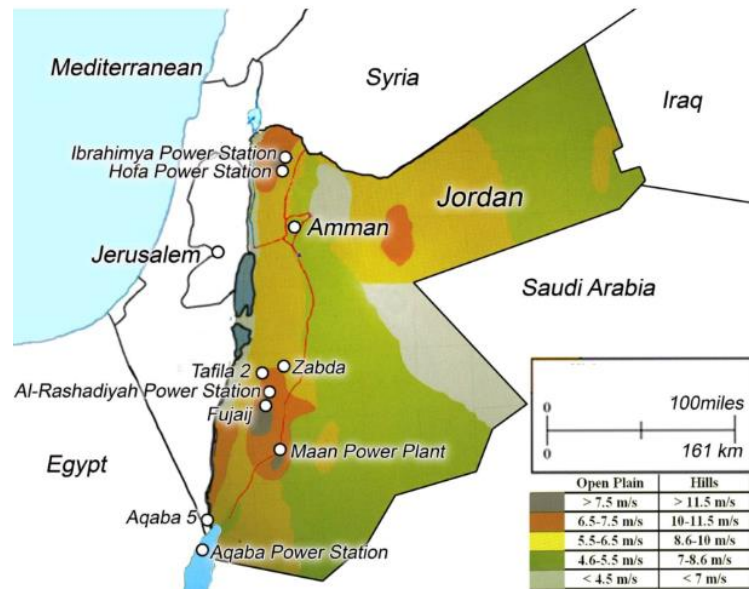


Figure 12: Wind Atlas of Jordan (Bataineh & Dalalah, 2013)

In June 2011, the Ministry of Energy and Mineral Resources in Jordan signed an MoU with Efthyvoulos Paraskevaides Global Energy (EPGE) Ltd to implement a wind farm project during 2 years. The signature was part of Round I renewable energy projects based on the law number 13 related to direct submission proposal process which was under study in 2011 and was issued in 2012 to cater for such projects. EPGE held the responsibility to construct a project that is financially, technically and environmentally feasible. A team of sponsors came on board of EPGE comprising of Inframed Infrastructure, a fund originated in Paris to invest in Mediterranean region, and Masdar Power, a developer in Abu Dhabi having a huge portfolio of renewable energy projects. Inframed owns 50%, Masdar owns 31% while EPGE owns 19% of the project. The partnership is formed under a company called Jordan Wind Energy Project (JWPC). IFC cooperated with EPGE to structure the project in order to be financially doable. IFC also assisted the ministry in its negotiation with JWPC. The contractual agreements were the basis of the renewable energy projects in Jordan, as it is the first developed wind farm. In the last quarter of 2013, the condition satisfaction phase was

accomplished whereby a PPA, an EPC contract and finance documents were signed. The PPA was signed at a price of 0.085 JD/kWh as part of Round I prices. The size of the project is 117 MW and its cost is 287 MUSD. Therefore, the project raised 77% of the capital cost to reach a financial close from the following banks: European Investment Bank (EIB) as the lead financier providing 25% of the amount, International Finance Corporation (IFC), Netherlands Development Finance Company (FMO), Europe Arab Bank (EAB), OPEC Fund for International Development (OFID) and Danish Export Credit Agency (EFK) in addition to the Capital Bank of Jordan who took part of the project. The remaining 23% were equity funded by Inframed Infrastructure, Masdar Power and EPGE (Abdul Rahim, 2015). It was the first private wind project that successfully raised debt in the Middle East and North Africa region excluding Morocco. During the second quarter of 2014, the construction period started and lasted for 21 months. The turbines were erected in the first quarter of 2015. In September 2015, the power plant was commissioned. It will be operating for the next 20 years (JWPC, 2019). A timeline is presented in Figure 13 to clearly show the progress of events.

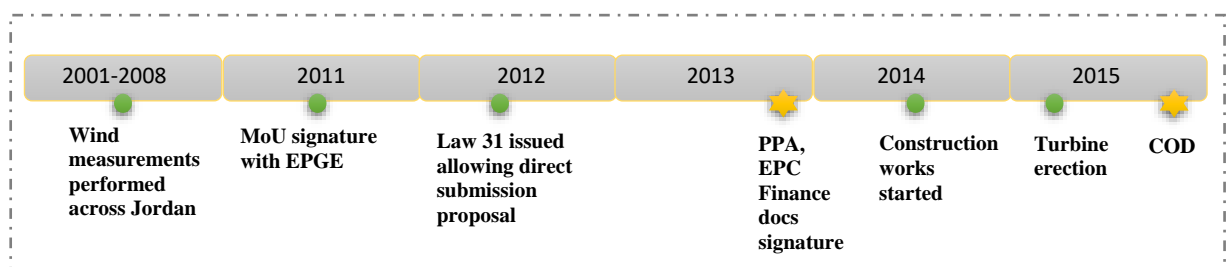


Figure 13: Timeline of Tafila Wind Farm

As per R. Ahmad, Hasan, and Al-Rawashdeh (2018), the project cost was divided into the following:

1. Capital cost = 287 MUSD:

- Turbine (38 turbines supplied by Vestas V112, 3.075 MW each):
rotor, blades, gearbox, tower and transformer = 64%
- Civil works: site preparation, foundation = 16%
- Grid connection: substations (2 transformers of 80 MVA each) and cabling = 11%
- Others: consultancy, planning and design = 9%

2. Operation and maintenance cost = 4.8 MUSD:

- Spare and repair parts = 26%
- Administration = 21%
- Land lease = 18%
- Insurance = 13%
- Power from the grid = 5%
- Others = 17%

The challenges that faced the project included land acquisition, tax framework, preparation and review of project documents (PPA, financing documents...), securing permits and environmental assessment (submission of Environmental and Social Action Plan, Environmental and Social Impact Assessment, Environmental and Social Mitigation and Monitoring Plan, Environmental and Social Management System in addition to all the IFC requirements). During the construction phase, the challenges were the import and transport of equipment, the harsh wind conditions during the turbine erection and crane logistics (JWPC, 2019). In the construction phase, many road investigation and trial runs were done on the route of transport. The roads constructed to transport the equipment are of 28 km length and numerous civil works were done to allow the vehicles to pass. About 400m³ each foundation was laid for the 38 turbines.

There are two substations built on site to connect to NEPCO's transmission network. Underground trenches were evacuated to accommodate 161 km of MV cables. Shipping of components was completed in 3 months. The port where the components arrive is small but has a dedicated customs office to finish up the customs declarations. A fleet of 12 transportation trailers and trucks moved over the roads for about 4 months transporting the components. Unloading and assembly of equipment on site took 5 months to be completed with the use of local and imported cranes. Commissioning was performed by an expert team. After that, a health, safety and environment document was developed. At the end, an operation and maintenance team was formed to manage the wind farm (Vestas).

The benefit cost ratio of the project is 1.26 and its payback period is 7 years. The power plant sells electricity to NEPCO which is the off-taker. It supplies 83,000 households and mitigates greenhouse gas emissions by 235,000 tons of CO₂ yearly (R. Ahmad et al., 2018). It supplies 3% of Jordan's generation power.

B. Interviews related to the Project

I had a Skype call with Mr. Michel Jallad, Manager of Tafila Wind Farm on October 14, 2019. Mr. Michel said that as part of direct proposal submission, four wind farms were awarded and one of them is Tafila wind farm Round. The competition between the bidders was based on technical evaluation, completion time of the project and the completion time of financial closure. The tender left the freedom for the bidders to build up to 120 MW wind farm per consortium. Mr. Michel answered my question on how political risks were accounted for in the contract by saying that the government had to put guarantees to the lenders of the project who needed their money back under solid

securities. However, the critical period was during the development phase where no securities were provided. The developer had to study the market, choose an optimal area, place met masks, and secure a land at their own expense taking into account the risk of not securing the project. The developer then has to talk to the lender if they reached financial close in order to sell shares. The developer took the risk before there was a regulation in Jordan that supports this type of project. This was an incentive to push the government to act. The developers and renewable energy advocates used newspapers and public action to promote RE as a valuable asset for the government that provides energy security. As per Mr. Jallad, all the parties were difficult to deal with including the Ministry and the lenders. Mr. Jallad's recommendation for the project in Lebanon was to have a local person to get the land as renting the land was one of the biggest challenges in Jordan. Another recommendation was to hire a reliable technical company to do the wind analysis since proper data leads to accurate results.

As per my interview with Majd Abouafifeh, planning engineer at Vestas, the company handling the EPC and operation and maintenance of Tafila wind farm, that happened on September 26, 2019, he said that the project started with feasibility study and placing metrological masts for 3 years. He answered the question regarding the challenges facing the initiation of the project. He pointed out that the local communities were one of the biggest hindrances. The government contributed in helping the company to rent the lands from the local people. The client in coordination with the developer of the farm has to do a community integration plan (CIP). The Corporate Social Responsibility (CSR) department of the client and the developer attempted to integrate the community as per the plan. Mr. Majd said that CSR department does events for the communities in Ramadan to feed people. However, the local communities

always request to take part of the project either by being employed or by using their machineries. Another challenge was the limitation of machines in Jordan, for example, the crawler crane is imported from Spain and the installation contractor came to Jordan to assist in using it. Another vehicle imported from abroad was the extendable truck. The limitation of big machinery led sometimes to disassembling the components and then assembling them on site. This process usually takes approximately 5 days. All these challenges increased the cost of the project since they were unexpected obstacles that were came up in the later stages in the project. Mr. Abouafifeh also answered my questions about the opportunities that they had in this project. He said that the government exempted the temporary and the permanent goods used in the wind farm from customs. Corporate tax is also exempted as appeared in the research. Mr. Abouafifeh also declared that the there is only 50MW left from the green corridor project that is constructed by the transmission company.

C. PPA Main Articles

The PPA is signed bet ween JWPC and NEPCO during the last quarter of 2013. The PPA came as part of accomplishing Jordan's renewable energy target which is 10% of the energy mix by 2020. It is based on the Renewable Energy and Energy Efficiency law number 13 of 2012 that allows developers to apply through the direct proposal submission method. This method enables developers to develop, design, finance, construct, own, operate and maintain RE projects and sell electricity to the transmission or distribution companies. The PPA governs the conditions of selling electricity to NEPCO for 20 years' subject to any earlier termination or expected

renewal according to the terms of the PPA contract. The main articles in the PPA are shown in Table 7:

Table 7: PPA (Jordan, 2014; Ke et al., 2010)

#	Category	Type of Risk	Article No.	Risk Allocation	PPA Content
1	Legal system	Approval and permit	12.1	Private Sector	The seller shall acquire any authorization required (permits, licenses...).
2	Legal system	Uncompetitive tender	NA	Not covered	Not covered in the PPA.
3	Legal system	Change in law	13.11	Public Sector	NEPCO shall compensate the project company with the supplemental charges with respect to increased costs
4	Legal system	Tax regulation changes	13.11.1	Public Sector	NEPCO is responsible to compensate any change in law
5	Legal system	Immature justice system	17.1	Shared	The agreement shall be governed by the Laws of Jordan. Disputes shall be resolved as per the International Chamber of Commerce (ICC) rules and the arbitration shall be conducted in London, England.
6	Government officers	Government's reliability	NA	Not covered	Not covered in the PPA.
7	Government officers	Government's intervention	NA	Not covered	Not covered in the PPA.
8	Government officers	Poor Political decision-making	NA	Not covered	Not covered in the PPA.
9	Government officers	Corruption	NA	Not covered	Not covered in the PPA.
10	Project level	Land acquisition	12.2.7	Private Sector	The private sector is solely responsible for acquire land lease.
11	Project level	Supporting facilities risk	12.3.2	Private Sector	Prior to the Commercial Operation Date, the Project Company shall be responsible for arranging for the supply of all electrical energy and capacity required for construction of the Facility.
12	Project level	Competition (exclusive right)	NA	Not covered	Not covered in the PPA. This item should be covered before PPA stage.
13	Project level	Financial risk	4.5.1 and 13.4.7	Private Sector	The project company has to finance the project. The project company has also to provide a performance bank guarantee (6 MUSD) prior or on the COD. The guarantee shall be reduced to 3 MUSD and be kept until the end of term. The seller has to provide a development bond as a guarantee that it would achieve the COD. The inability to obtain or maintain adequate funding for the project is not considered a force majeure.
14	Project level	Construction completion		Private Sector	
15	Project level	Construction/operation changes		Private Sector	

#	Category	Type of Risk	Article No.	Risk Allocation	PPA Content
16	Project level	Delay in supply	5.7, 5.8 and 13.4.6	Private Sector	The late or non-delivery of equipment, machinery, plants or materials caused by the breach or negligence acts is not part of force majeure. If the project company foresee delays while constructing the plant, it shall notify NEPCO about the delays and agree together to adjust the project schedule. NEPCO may terminate the contract in case the project company did not achieve the COD after several extensions due to delays incurred by the company.
17	Project level	Technology risk	11.1 and 13.4.8	Private Sector	Mechanical or electrical breakdown or failure of equipment, machinery or plant owned or operated by the party affected is not considered a force majeure. The project company is responsible to provide the insurance of the project and the facility.
18	Project level	Operation cost overrun	12.1.1	Private Sector	The project company shall provide a proper maintenance and operation of the facility in all material respects in accordance with Laws of Jordan, operating procedures, Operating protocol, dispatch instructions for at least a lifetime equal to the term of the agreement.
19	Project level	Residual assets risk	21.3	Private Sector	In case of purchase of facility and upon the expiration of the term, both parties should appoint an independent engineer who shall do a valuation for the facility, taking into account, by way of demonstration and not exclusion, the capital investment, the book value of the facility, the duration of the term, deemed decommissioning costs and other relevant factors.
20	Project level	Consortium inability	14.3 and 14.6	Private Sector	In case of Project Company default, NEPCO has the right to claim the full amount of the performance bank guarantee and shall be entitled, but not obliged, to purchase the facility with a price equal to the outstanding debt amount. If they choose not to purchase the facility, the lenders can exercise their step-in rights
21	Project level	Private investor change	20.3	Private Sector	None of the Initial Shareholders shall transfer any Shares after the expiry of a period of two (2) Years from the Commercial Operation Date except with the prior written approval of NEPCO
22	Project level	Organization and coordination risk	15.5.3	Shared	Upon assumption by the indemnifying Party of the control of the defence of a claim, suit, action or proceeding, the indemnifying Party shall reimburse the

#	Category	Type of Risk	Article No.	Risk Allocation	PPA Content
					indemnified Party for the reasonable costs and expenses of the indemnified Party in the defence of the claim, suit, action or proceeding.
23	Country level	Public/political opposition	13.3.5, 13.6.1, 13.7.1 and 13.8.2	Public Sector	Industrial disturbances are considered a force majeure. The affected party shall not be liable for any delay or failure in performing its obligations under the PPA to force majeure. If the force majeure happened before COD, the parties should meet and discuss how they can shift the schedule. If the force majeure happened after COD, and it affected the Project Company from making available all the Energy Output, NEPCO shall compensate the Project Company through making payments equivalent to the energy loss.
24	Country level	Ground/weather conditions	13.3.9 and 13.7.1	Public Sector	If the weather conditions were adverse leading to unacceptable safety conditions before COD, then this event is considered a force majeure. In this case, the affected party shall not be liable for any delay or failure in performing its obligations. The parties shall consult each other concerning the effect of the event on the implementation schedule.
25	Country level	Force majeure	13.7.1 and 13.8.2	Public Sector	If the force majeure happened before COD, the parties should meet and discuss how they can shift the schedule. If the force majeure happened after COD, and it affected the Project Company from making available all the Energy Output, NEPCO shall compensate the Project Company through making payments equivalent to the energy loss.
26	Country level	Environmental protection	1	Private Sector	The Project Company has to conduct Environmental Impact Assessment, Environmental and Social Monitoring and Mitigation Plan and shall comply with the approved plans.
27	Market level	Interest rate	NA	Private Sector	Schedule for the payment is already set in the PPA.
28	Market level	Foreign exchange and convertibility	8.2	Private Sector	The Tariff is fixed for the term of the PPA and, save as to fluctuation of the exchange rate of the legal currency of the United States of America and the Jordanian Dinar and shall not be adjusted for inflation.
29	Market level	Inflation	NA	Not disclosed	Not disclosed in the available PPA.
30	Market level	Market demand change	8.1.2	Public Sector	Curtailment by NEPCO can be done for planned maintenance, emergency and unplanned interruption, on a condition that NEPCO will make a payment to the project company in relation to the energy loss output during the billing month resulting from curtailment.

#	Category	Type of Risk	Article No.	Risk Allocation	PPA Content
31	Project level	Third party reliability	NA	Shared	The responsibility is held by the party that hires the third-party.
32	Project level	Improper contracts	NA	Not covered	Not covered in the PPA. PPA is the contract.
33	Project level	Tariff change	NA	Private Sector	Schedule for the payment is already set in the PPA.
34	Project level	Payment risk	14.2, 14.4 and 14.7	Public Sector	If NEPCO failed to pay the Project Company, the Project Company has the right to terminate the contract after notifying NEPCO and MEMR. If neither parties did not have cure for the default, NEPCO shall pay the obligation of facility termination payment.
35	Project level	Subjective evaluation	NA	Not covered	Not covered in the PPA. The evaluation is done before the PPA signature.
36	Project level	Insufficient financial audit	NA	Not covered	Not covered in the PPA.

CHAPTER VII

COMPARATIVE ANALYSIS

The factors that affect private investments can be categorized in three groups. First, the government involvement in private participation in infrastructure (PPI) that is clearly shown when it provides an attractive environment for investors to safely capitalize their money. Energy policies such as feed-in tariffs and the national renewable energy targets can be considered incentives for investors (Somma & Rubino, 2016). Lebanon and Jordan have both set targets for using renewable energy, however, only Jordan has authorized tax exemption on renewable energy equipment and provided incentives for developers to invest in the renewable energy sector.

The second group includes the macroeconomic environment that is directly affected by the population and GDP growth, in addition to political stability of the country. The political stability shows the social and political interrelation in a given country. As the political stability increases, the investor requires less return on investment since the country political risk is low (Somma & Rubino, 2016). According to the IMF World Economic Outlook (April 2019), Jordan's real GDP growth is estimated to be 2.2% while that of Lebanon is 1.3%. While the political stability and absence of violence/terrorism percentile rank for the two countries are as follows as per the Worldwide Governance Indicators project (World Bank): 28.1% for Jordan and 8.6% for Lebanon. This rank indicates that Jordan is more politically stable than Lebanon. Thus Jordan prices and guarantees should be less than Lebanon and more attractive to investors.

The third group involves the regulation status of the country. It is mainly related to its adequacy to the investors and its proper implementation besides to its independency. The rule of law indicator shows that how much the law are independent of political interventions in the private investments which provides more confidence to investors of the guaranteed return on investment (Somma & Rubino, 2016). As indicated by the Worldwide Governance Indicators project (World Bank), the regulatory quality percentile rank of Jordan is estimated to be 57.7% and that of Lebanon is 40.9% while the rule of law percentile rank is 61.1% and that of Lebanon is 21.2%. Apparently, Jordan regulatory status is much better than Lebanon. The reason behind that is the presence of a national regulatory agency in Jordan and its absence in Lebanon which allows for political involvement (Somma & Rubino, 2016).

In the below sections, the case study of the first wind farm in Lebanon and the first wind farm in Jordan are compared. After that, a broader comparison is made per country.

A. Comparison between the Case Studies

The Akkar Wind Farm and Tafila Wind Farm is compared based on the project conditions, timeline, contributory factors.

Table 8: Akkar versus Tafila Wind Farms

Attributes	Akkar Wind Farm	Tafila Wind Farm
Project size	219.1 MW	117 MW
PPA price	10.75 cents USD/kWh	0.085 JD/kWh \approx 12 cents USD/kWh
Project price	340 to 490 MUSD	287 MUSD
Project duration	20 years	20 years
Date of the beginning of project negotiation	EOI submission in 2012	MoU signature in 2011
Date of issuance of relative regulation	Law no. 54 in 2015	Law no. 13 in 2012

Attributes	Akkar Wind Farm	Tafila Wind Farm
PPA signature date	February 2018	Last quarter of 2013
COD	Planned in 2021 (cannot be achieved since the financial closure is not yet reached)	September 2015

As shown in the Table 8 above, both projects were under negotiation during the same period 2011-2012. Tafila wind farm has successfully achieved its commercial operation date in October 2015 while Akkar wind farm has failed to complete financial closure, construction and grid connection as of the date of the completion of the thesis.

The endless delays facing this project are attributed to the following reasons:

1. It is the first wind project in Lebanon, many studies are needed to satisfy the lenders requirements in addition to a regulatory framework that manage such projects,
2. Not enough data ready to be presented to banks to allow the project to be bankable,
3. Preparation and negotiation of the PPA took a long time to agree on the terms, price and size of the project,
4. Securing land rentals are delaying the project since it was of the responsibility of the Private Sector and leasing/acquiring a land from local communities continues to be one of the big challenges that is not yet solved,
5. Weak enforcement of regulations incurs more delays since other indirectly involved parties do not implement projects as per the standards which add burden on the Akkar wind farm developers, especially with respect to road access,

6. Lack of assistance from EDL and the Ministry of Energy and Water to accomplish grid connection study because of not prioritizing the wind project,
7. Financial closure of the project is still not achieved. It is getting harder because of the current situation of the Lebanese bad credit rating which is not incentivizing the foreign financing institutions to invest in this project.

Although Tafila wind farm was the first wind project developed and constructed in Jordan, the developers in coordination with the government have successfully overcome the impediments and challenges in less than 4 years. The project in Jordan was based on the direct submission proposal and not competitive bidding. Price and size negotiation were not a source of delay for the project since they were predefined by the government. The biggest challenges faced were the formation of the PPA and securing land rentals with local communities. The government, through the Ministry of Finance, supported the developer to secure financing by providing guarantees to account for political insecurities as per the PPA. The developer's efficiency and persistence to continue the project were the main reason for its success. The developer received help from reputable companies to do the feasibility studies that allow them to gain guarantees from lenders that their project is bankable. No regulations of renewable energy in Jordan were enacted at the time of the project negotiation. The lenders pushed the developers to expedite the negotiation with the government for the project to continue its development stage.

Since PPAs are the cornerstone of the public-private partnership projects in the energy sector such as Akkar and Tafila wind farms, it is important to highlight the

content of the PPA of the projects under study. The Table 9 below presents the risk allocation among the projects stakeholders in the PPA of the wind farm in Lebanon and Jordan. The risks that were taken into consideration were studied in literature for PPP projects implemented in China and UK (Bing et al., 2005; Ke et al., 2010).

Table 9: Number of risks allocated to public and private sectors (shared), public sector alone and private sector alone in the PPP projects in Lebanon, Jordan, China and UK

Risk Level	Lebanon	Jordan	China	UK
Country Level	1 Public Sector 3 Private Sector	3 Public Sector 1 Private Sector	4 Shared	1 Public Sector 1 Shared 2 Private Sector
Market Level	1 Public Sector 1 Shared 1 Private Sector 1 Not disclosed	1 Public Sector 2 Private Sector 1 Not disclosed	4 Shared	4 Private Sector
Project Level	1 Public Sector 2 Shared 12 Private Sector 4 Not covered	2 Public Sector 1 Shared 12 Private Sector 4 Not covered	3 Public Sector 6 Shared 10 Private Sector	2 Public Sector 1 Shared 11 Private Sector 1 Project based 4 not mentioned
Government Officers	4 Not covered	4 Not covered	4 Public Sector	1 Public Sector 3 Not mentioned
Legal systems	3 Shared 1 Private Sector 1 not covered	2 Public Sector 1 Shared 1 Private Sector 1 Not covered	5 Public Sector	1 Public Sector 1 Shared 1 Private Sector 1 Project based 1 Not mentioned
Total	3 Public Sector 6 Shared 17 Private Sector 9 Not covered 1 Not disclosed	8 Public Sector 2 Shared 16 Private Sector 9 Not covered 1 Not disclosed	12 Public Sector 14 Shared 10 Private Sector	5 Public Sector 3 Shared 18 Private Sector 2 Project based 8 Not mentioned

Based on the PPA comparison between the Lebanese and Jordanian case, it is apparent that the public sector risk allocation in Jordan is higher than Lebanon. The shared risks between the public and private sectors are higher in Lebanon than in Jordan. This can be attributed to the fact that Jordan is economically and politically more stable than Lebanon so lenders do not have problems of allocating risks on the public sector in Jordan more than in Lebanon. As per Ke et al. (2010), the optimal way

of distributing risks is not to allocate them solely on the private sector but pass them fairly and in a minimal way among stakeholders.

As seen in the comparison made above between the different attributes of Akkar and Tafila wind farms, the project’s challenges are similar between Lebanon and Jordan in regards to local communities and PPA challenges. However, both projects differ in the Lenders’ confidence in the country where the credit rating of Jordan is better than Lebanon and this may incur delays for the developer to achieve stricter requirements.

In short, the delay of the wind farm project is not mainly project specific. It ought to be attributed to other broader reasons.

B. Policy Comparison

The energy sector structure differs in Lebanon and Jordan. Energy policies are a major factor affecting the energy sector and its prosperity. The Table 10 presents the energy laws and regulations of both countries. It shows clearly the inefficiency of policy making and implementation in Lebanon versus Jordan.

Table 10: Timeline of energy policies in Lebanon and Jordan

Year	Lebanon			Jordan		
	Law No.	Main Content	Status	Law No.	Main Content	Status
2002	462	<ul style="list-style-type: none"> - allows for the privatization of generation and distribution sectors - establishes of Electricity Regulatory Authority 	Not Implemented	64	<ul style="list-style-type: none"> - Authorizes IPP projects - Establishes Electricity Regulatory Commission 	Implemented
2006	775	<ul style="list-style-type: none"> - gives CoM the permission to grant temporary licenses for one year for private generation upon the recommendation of MoEW 	Not Implemented			

Year	Lebanon			Jordan		
	Law No.	Main Content	Status	Law No.	Main Content	Status
2012				13	- issues direct submission proposal process - creates incentives to promote RE and EE	Implemented
2014	288	- gives CoM the permission to grant temporary licenses for two years for private generation upon the recommendation of MoEW and MoF	Not Implemented	1. 33 2. 17	1. Exempts RE equipment from custom duties 2. Merges Nuclear Regulatory Commission and Natural Authority into EMRC	Implemented
2015	54	- gives CoM the permission to grant temporary licenses until April 30, 2018 for private generation upon the recommendation of MoEW and MoF	Implemented in 2018			
2017	48	- promotes PPP projects	Implemented (not for energy sector related projects)			
2019	129	- gives CoM the permission to grant temporary licenses for 3 years for private generation upon the recommendation of MoEW and MoF - Cancels the formation of Electricity Regulatory Authority	Retrieved by Constitutional Council of Lebanon			

Table 10 shows that the law enforcement power is weak in Lebanon where most of the laws related to the energy sector are not implemented or experience delayed implementation. However, in Jordan, laws are respected and implemented on time and

thus more efficient work is done in the energy sector. Not to forget the long delays caused by government formation in Lebanon where the cabinet resignation and the process formation occurred many times and through a long time. Given that the process time between the resignation and formation of the cabinet limits the powers of the cabinet, during the last 10 years the government was not able to implement bills for a period of 4 years and 8 months.

Based on the above timeline and the arguments, case studies, interviews presented in the previous chapters, the challenges and opportunities of Lebanon and Jordan are shown in Table 11 below.

Table 11: Challenges and Opportunities encountering Lebanon and Jordan on different levels.

	Lebanon		Jordan	
	Challenges	Opportunities	Challenges	Opportunities
Political	<ul style="list-style-type: none"> - On-going political conflicts which lead to political deadlock - Sectarian political structure and power sharing scheme based on sectarian interests and regional agendas thus leading to high corruption - There is a conflict of interest between the council of ministers and the parliament since the ministers are politically affiliated and part of the parliament. This cancels the concept of minister's accountability against their people. 	<ul style="list-style-type: none"> - In light with the revolutionary political situation in Lebanon, there is an opportunity for protestors to request a council of ministers with technocrat people who are not politically affiliated 	<ul style="list-style-type: none"> - The kingdom is located within an insecure region. It is highly dependent on funds and aids from the West due to their close ties. However, any political change may affect the economy and political status of the country 	<ul style="list-style-type: none"> - King Abdullah's neoliberal reforms led to having a technocrat council of ministers which is helping in boosting the economy
Energy policies	<ul style="list-style-type: none"> - Ineffectiveness in passing of laws and activating legislations - Long delays to update laws and drafting policies - Lack of law enforcement - Lack of accountability of policy makers - No clear legislative framework - Lack of connection between academia and policy makers - Lack of involvement of civic activists in the policy making process 	<ul style="list-style-type: none"> - Reforms in the energy sector are urgent amidst the economic crisis that Lebanon is passing through 	<ul style="list-style-type: none"> - No feed-in tariff bylaw enacted yet - Some urgent issues (such as economic prosperity through removing subsidies) in the country might drift the priorities of the government away from renewable energy 	<ul style="list-style-type: none"> - Solid regulations and strong legislative power. Comprehensive renewable energy laws, bylaws and decrees - It is obligatory to have 20% local contribution in the renewable energy projects - There are local certifications given to renewable energy projects for

	Lebanon		Jordan	
	Challenges	Opportunities	Challenges	Opportunities
	<ul style="list-style-type: none"> - Political based energy policies instead of evidence based policies - Lack of an independent regulatory authority managing the energy sector - One political party is handling the energy ministry for almost 10 years in a row. This party is fighting to keep the energy decisions in their hands. Thus, not pushing forward to establish the independent regulatory and not passing the energy tenders to the High Council of Privatization and PPP as per law no. 48 			<ul style="list-style-type: none"> the developers to comply with. - Tax exemption on renewable energy equipment
Energy Sector Structure	<ul style="list-style-type: none"> - Monopolistic structure of the energy sector where EDL is the only seller of electricity with high capital cost - There is a few competent employees in the governmental institution 		<ul style="list-style-type: none"> - Limited local market size 	<ul style="list-style-type: none"> - Privatization of the distribution and generation networks led to an efficient sector leading the region in renewable energy generation - Ability to export electricity to neighboring countries
PPP	<ul style="list-style-type: none"> - No trust between the public and private sectors since they both don't disclose the required information. The private sector does not trust in the competence of the public sector. - Lack of clarity in contract terms - Risk on private sector since there is no legal stability - Weak regulations that threatens the public sector rights - Highly bureaucratic structure in the public sector that leads to delays (such as securing permits from the government ...) 	<ul style="list-style-type: none"> - Strong private sector presence in Lebanon - PPP diminishes political influence in projects which is one of the requests of the Lebanese citizens for better transparency and accountability of projects - It creates job opportunities and enhances the economic cycle during the economic crisis that emerged in 2019 and still ongoing - The private sector offers better quality and lower tariffs which are urgent needs for Lebanese customers 	<ul style="list-style-type: none"> - PPP projects tend to have more technical and financial complexity than a traditional procurement project 	<ul style="list-style-type: none"> - There is an ease of access for foreign investors to invest in the country - Availability of strong regulations to promote PPP - Risk sharing between private and public sector - Successful method to economic prosperity especially that Jordan has the traits of a competition state - Knowledge transfer and expertise transfer is done from foreign private partners to local staff - With the help of the private sector, Jordan can meet its renewable energy target

	Lebanon		Jordan	
	Challenges	Opportunities	Challenges	Opportunities
		- With the help of the private sector, Lebanon can meet its renewable energy target		

CHAPTER IX

CONCLUSION AND RECOMMENDATIONS

A. Conclusion

Based on the above, Lebanon and Jordan have a few similarities and differences. Both are located in the Middle Eastern region, having similar political insecurities and economic structure. Their neighboring location renders both countries to have similar natural resources. They suffer from the lack of natural resources that force them to have an economy mostly based on imports. Lebanon and Jordan import most of the energy resources to respond to the demand of the market. This makes both economies vulnerable and highly dependent on foreign countries. Therefore, any variability in fuel prices, import taxes, political security in oil exporting countries affects directly the energy security of Lebanon and Jordan.

Although both countries have similar challenges, Jordan surpasses Lebanon in its electricity sector. As mentioned before, Lebanon needs an additional 1,340 MW to cover the whole demand. The shortage is temporarily covered by the private generators. The Lebanese government has failed to provide a good quality of electricity for a long time and proved to be inefficient in implementing plans to enhance the sector. In the above chapters, I scrutinized two case studies, presenting the first wind farm projects in Lebanon and Jordan, Akkar Wind Farm and Tafila Wind Farm respectively. Both projects were first discussed in 2011 - 2012. However, Tafila Wind Farm reached its COD in 2015 while Akkar Wind Farm did not yet reach financial closure in 2020. Thus clearly showing the weaknesses within the electricity sector in Lebanon. This is due to the following:

1. Lebanese government corruption and political disputes causing delays in implementing policies that intend to solve the challenges in the energy sector. However, in Jordan, the regulations were enacted more efficiently without witnessing delays.
2. Absence of national regulatory authority in Lebanon to oversee the energy sector projects. Jordan, on the other hand, has EMRC, the independent regulatory authority, which contributes in drafting laws and thus expediting the process of policy implementation and validation.
3. No regulations governing the renewable energy sector in Lebanon in contrast to Jordan which has comprehensive regulations that provide incentives to the private sector to invest in the renewable energy projects through direct proposal submissions and competitive bidding while ensuring tax exemption of renewable energy equipment.
4. The Lebanese inefficient public sector manages the electricity sector while in Jordan, the generation and distribution are delegated to private companies.

As a conclusion, the energy sector in Lebanon proved to be inefficient. I previously presented the case study as an example of its inefficiency and presented PPP as part of the reforms within the energy sector in Lebanon. A solid regulatory framework is mandatory to have successful PPP projects as in the case of Jordan.

B. Recommendations

Many recommendations should be taken into consideration following the comparative analysis made between Lebanese case and Jordanian case:

1. To solve the political issues and fight corruption, the sectarian/consociation system should be transferred to a democracy system which will lead to independence of foreign agendas and more transparency in the management of sectors. The Council of Ministers which is the executive power in Lebanon should comprise of technocrats and the ministers should be isolated from the parliamentary parties as the case in Jordan.
2. To solve the energy policy issues, it is mandatory to establish a comprehensive legal framework for the renewable energy sector that presents a reform of the sector. In reference to the Jordanian laws no. 64, no. 13 and no. 33, the legal framework for the energy sector shall include the following:
 - a. Formation of the independent regulatory authority to isolate the energy sector from any political influence. The independent regulatory authority role is to promote fair competition between different private companies entering the electricity sector, provide continuity of rules and regulations, and place the electricity sector away from any political influence. In case the formation of a new regulatory authority is impossible amid the challenges that Lebanon is facing, appointing a board of directors for EDL, not affiliated to any political party, would be another feasible solution to render EDL to be an independent party managing the entity in a transparent way. This is because

in the current state, the ministry is managing EDL directly since there are not enough board members to take strong decisions.

- b. Unbundling the generation, transmission and distribution networks since EDL has many problems to oversee all the networks. EDL suffers from shortage in human resources that can manage all the networks. There is an urgent need to unbundle the networks and keep the transmission network under EDL's control to preserve grid stability. This case is experienced in many countries including Jordan.
- c. Licensing private companies to generate electricity from renewable energy resources through direct proposal submission where the PPA price is fixed. In addition to the identification of land use list to prioritize the lands that can be used for renewable energy projects. The direct proposal submission should consist of more than one phase where each phase has different capacity cap and descending price. Jordan has adopted this method of procurement to accelerate the implementation of projects. In this case, the private sector does a full feasibility study on a selected land based on the price defined by the government. The private company reaches financial closure to finance the project. The ministry then grants licenses for the private company or IPP to produce clean energy.
- d. If the development of renewable energy exceeds a certain capacity, then the regulatory authority shall initiate competitive

bidding in order to reduce the price. This condition should also be introduced after the capacity cap is reached by the direct proposal submission. This is to ensure competition between private companies to decrease the PPA price. This rule is adopted by the MEMR in Jordan.

- e. All renewable energy equipment or material imported or manufactured locally shall be exempted from taxes and custom duties. This is very important to create incentives to the private sector to invest in the renewable energy sector. Jordan was one of the first countries in the region to provide such supportive schemes.
- f. Issuing an official grid code for Lebanon which is essential to maintain grid stability and avoid any technical issues in the implementation phases of the energy projects.

The above recommendations tackle the technical aspects of the electricity sector by enacting policies that promote renewable energy as well as the contractual aspects that facilitate the formation of PPP projects in renewable energy projects. However, the current hurdle in Lebanon resides in providing securities to the private sector to invest in the energy sector due to the economic challenges that were mentioned in the previous chapters. As per the latest updates of the Lebanese economic crisis, International Monetary Fund (IMF) might intervene and impose requirements on the Lebanese government to reduce corruption. One of the major sectors that IMF will introduce reforms is the electricity sector. Policy and financial de-risking of electricity projects were implemented in different countries. They are highly recommended to

increase investments in the various sectors. The policy de-risking is reached through a comprehensive legal framework which is discussed in the above points. As for the financial de-risking, the IMF works to place the risk on the development banks, such as the European Bank of Reconstruction and Development (EBRD), through either providing loan guarantees or political risk insurance or public-equity co-investments depending on the severity of the situation.

BIBLIOGRAPHY

- Abdul Rahim, N. (2015). *The Energy Sector in Jordan*. Retrieved from
- Ahmad, A., & Ramana, M. V. (2018). HTRs will not help establish nuclear power in Jordan. *The Jordan Times*.
- Ahmad, R., Hasan, A., & Al-Rawashdeh, H. (2018). EVALUATION THE WIND TURBINES FARM IN THE TOWN OF TAFILA / JORDAN. *International Journal of Development Research*, 08(10), 6.
- Al-Majali, A. A. (2018). Crowding Out Effect of Public Borrowing: The Case of Jordan. *International Review of Management and Marketing*, 8(1), 119-125.
- Al-omary, M., Kaltschmitt, M., & Becker, C. (2018). Electricity system in Jordan: Status & prospects. *Renewable and Sustainable Energy Reviews*, 81, 2398-2409.
- Al Achkar, R. (2018). Main Aspects of Lebanon's Wind Power Purchase Agreements Overview of the 1st Rouch and Perspectives on the Second. In.
- Al Jawhari, G. (2018). "مشروع "طاقة الرياح في عكار" .. حلمنا بإنتاج طاقة نظيفة سيتحقق *El Iktisad*.
- Almarri, K. (2019). Perceptions of the attractive factors for adopting public-private partnerships in the UAE. *International Journal of Construction Management*, 19(1), 57-64.
- Antar, C. G., American University of Beirut. Faculty of, A., Sciences. Department of Political, S., & Public, A. (2011). *Public-private partnerships: a policy option for the improvement of public service delivery in Lebanon*. (Dissertation/Thesis).
- Araji, S., Hlasny, V., Mansour Ichrahieh, L., & Intini, V. (2019). Targeting debt in Lebanon: A structural macro-econometric model. *Middle East Development Journal*, 1-30.
- Awdeh, A., Jomaa, Z., & Zeaiter, M. A. (2019). Exploring The Effectiveness Of Financing Resources In Promoting Economic Growth In Lebanon. *The Journal of Developing Areas*, 53(3).
- Ayoub, M. H., Assi, I., Hammoud, A. M., & Assi, A. (2013). *Renewable energy in Lebanon Status, problems and solutions*.
- Bataineh, K. M., & Dalalah, D. (2013). Assessment of wind energy potential for selected areas in Jordan. *Renewable energy*, 59, 75-81.
- Bing, L., Akintoye, A., Edwards, P. J., & Hardcastle, C. (2005). The allocation of risk in PPP/PFI construction projects in the UK. *International Journal of Project Management*, 23(1), 25-35.
- Bouri, E., & El Assad, J. (2016). The Lebanese Electricity Woes: An Estimation of the Economical Costs of Power Interruptions. *Energies*, 9(8), 583.
- Bovaird, T. (2004). Public-private partnerships: from contested concepts to prevalent practice. *International review of administrative sciences*, 70(2), 199-215.
- Bruck, M., Sandborn, P., & Goudarzi, N. (2018). A Levelized Cost of Energy (LCOE) model for wind farms that include Power Purchase Agreements (PPAs). *Renewable energy*, 122, 131-139.
- Byblos Bank. (2019). *Lebanon This Week*(572).
- Carley, S., Baldwin, E., MacLean, L. M., & Brass, J. N. (2017). Global expansion of renewable energy generation: an analysis of policy instruments. *Environmental and resource economics*, 68(2), 397-440.

- Cedrick, B. Z. E., & Long, P. W. (2017). Investment motivation in renewable energy: a PPP approach. *Energy Procedia*, 115, 229-238.
- Custos, D., & Reitz, J. (2010). Public-private partnerships. *The American Journal of Comparative Law*, 58(suppl_1), 555-584.
- Delmon, J. (2010). *Understanding Options For Public-Private Partnerships In Infrastructure: Sorting Out The Forest From The Trees: Bot, Dbfo, Dcmf, Concession, Lease*: The World Bank.
- Direct proposal submission scheme. (2015). Retrieved from https://ebrary.net/67349/economics/direct_proposal_submission_scheme
- Eadie, R., Millar, P., & Toner, L. (2013). Public private partnerships, reevaluating value for money. *International Journal of Procurement Management*, 6(2), 152-169.
- An Emergency Action Plan for Rescuing Lebanon's Energy Sector*. (2019).
- Emerging Markets Monitor - 09 DECEMBER 2019. (2019). Retrieved from <https://search-proquest-com.ezproxy.aub.edu.lb/docview/2322240758?accountid=8555>. ProQuest Central, from Fitch Solutions Group Limited <https://search-proquest-com.ezproxy.aub.edu.lb/docview/2322240758?accountid=8555>
- Energy and Minerals Regulatory Commission (EMRC). (2019). *Who's Who in Jordan's Energy, Water & Environment (EWE) 2019*. Retrieved from <http://www.jordanewe.com/about-sector/energy-and-minerals-regulatory-commission-emrc>
- Forrer, J., Kee, J. E., Newcomer, K. E., & Boyer, E. (2010). Public-private partnerships and the public accountability question. *Public Administration Review*, 70(3), 475-484.
- FPM and Tashnag reaffirm alliance. (2018). *The Daily Star*.
- Geha, C., & Talhouk, J. (2019). From recipients of aid to shapers of policies: conceptualizing government-United Nations relations during the Syrian refugee crisis in Lebanon. *Journal of Refugee Studies*, 32(4), 645-663.
- Ghere, R. K. (2001). Probing the strategic intricacies of public-private partnership: the patent as a comparative reference. *Public Administration Review*, 61(4), 441-451.
- The Government Monitor No. 3: Scrutinizing Lebanon's Electricity Plan. (2019). Retrieved from <https://www.lcps-lebanon.org/agendaArticle.php?id=101>
- Haase, T. W. (2018). A Challenging State of Affairs: Public Administration in the Republic of Lebanon. *International Journal of Public Administration*, 41(10), 792-806.
- Haney, A. B., & Pollitt, M. G. (2013). New models of public ownership in energy. *International Review of Applied Economics*, 27(2), 174-192.
- Hassan, G. (2011). *The National Wind Atlas of Lebanon: A Report*: UNDP/CEDRO.
- Haytayan, L. (2017). LEBANON IS BECOMING A NEW OIL AND GAS PRODUCER UNDER THE WATCHFUL EYES OF ITS CIVIL SOCIETY. *Alternatif Politika*, 9(2), 300-309.
- High Council for Privatization and PPP. Public Private Partnership. Retrieved from <http://hcp.gov.lb/public-private-partnership/>
- Hilmarsson, H. P. (2017). Capital Intensive Clean Energy Projects: Some Costs, Benefits and Challenges of Using Public-Private Partnerships. *Regional Formation and Development Studies*, 22(2). doi:10.15181/rfds.v22i2.1477

- Hodge, G. A., & Greve, C. (2007). Public-private partnerships: An international performance review. *Public Administration Review*, 67(3), 545-558. doi:DOI 10.1111/j.1540-6210.2007.00736.x
- Holtz, G., & Fink, T. (2015). Analysing the transition of Jordan's electricity system: underpinning transition pathways with mechanisms.
- Houri, S. (2019, January 23, 2019). Khoury, Abi Khalil cooperate on generator subscription fees. *The Daily Star*.
- Ibrahim, O., Fardoun, F., Younes, R., & Louahlia-Gualous, H. (2013). Energy status in Lebanon and electricity generation reform plan based on cost and pollution optimization. *Renewable and Sustainable Energy Reviews*, 20, 255-278. doi:10.1016/j.rser.2012.11.014
- Ismail, K. (2013). Value for money (VFM) assessment framework for Public Private Partnership (PPP) approach.
- Jamali, D. (2004). A public-private partnership in the Lebanese telecommunications industry: Critical success factors and policy lessons. *Public Works Management & Policy*, 9(2), 103-119.
- 'Jordan 3rd in renewable energy growth globally, 1st in region'. (2018, February 11, 2018). *The Jordan Times*. Retrieved from <https://www.jordantimes.com/news/local/jordan-3rd-renewable-energy-growth-globally-1st-region%E2%80%99>
- Jordan, T. H. K. o. (2014). Power Purchase Agreement between NEPCO and Project Company.
- JWPC. (2019). *Tafila Wind Farm*. Retrieved from
- Kairouz, A., El Hokayem, J., & El Hage, U. (2016). Sustainability of Public Management in the Developing Countries: the Case of Lebanon. *Procedia-Social and Behavioral Sciences*, 221, 378-387.
- Kasumba, S., & Aldhuaina, H. A. (2015). Neo-Liberal Public Sector Reforms and Global Electric Capitalism in Selected Arab States and Sub-Sahara African Countries Dr Awwad Alnesafi Assistant Professor, Arab Open University-Kuwait Branch.
- Ke, Y., Wang, S., Chan, A. P., & Cheung, E. (2011). Understanding the risks in China's PPP projects: ranking of their probability and consequence. *Engineering, Construction and Architectural Management*, 18(5), 481-496.
- Ke, Y., Wang, S., Chan, A. P., & Lam, P. T. (2010). Preferred risk allocation in China's public-private partnership (PPP) projects. *International Journal of Project Management*, 28(5), 482-492.
- Khodr, H., & Ruble, I. (2013). Energy Policies and Domestic Politics in the MENA Region in the Aftermath of the Arab Upheavals: The Cases of Lebanon, Libya, and KSA: Energy Policies and Domestic Politics. *Politics & Policy*, 41(5), 656-689. doi:10.1111/polp.12033
- Khodr, H., & Uherova Hasbani, K. (2013). The dynamics of energy policy in Lebanon when research, politics, and policy fail to intersect. *Energy Policy*, 60, 629-642. doi:10.1016/j.enpol.2013.05.080
- Korfiati, A., Gkonos, C., Veronesi, F., Gaki, A., Grassi, S., Schenkel, R., . . . Hurni, L. (2016). Estimation of the Global Solar Energy Potential and Photovoltaic Cost with the use of Open Data. *International Journal of Sustainable Energy Planning and Management*, 9, 17-30.

- Kumaraswamy, P. (2019). The Palgrave Handbook of the Hashemite Kingdom of Jordan. In: Springer.
- Languille, S. (2017). Public Private partnerships in education and health in the global South: a literature review. *Journal of International and Comparative Social Policy*, 33(2), 142-165.
- Lebanon profile - Timeline. (2019). *BBC*. Retrieved from <https://www.bbc.com/news/world-middle-east-14649284>
- Lebanon, T. R. o. (2018). *Power Purchase Agreement - Wind Power Project*.
- Lund, A. (2014). A Government to Fill the Void in Lebanon.
- Makdisi, S. A. (2004). *The lessons of Lebanon: the economics of war and development* (Vol. 38.). London: I.B. Tauris.
- Makdisi, S. A., El- Khalil, Y., American University of Beirut. Faculty of, A., & Sciences. Institute of Financial, E. (2013). *Lebanon: the legacy of sectarian consociationalism and the transition to a fully-fledged democracy* (Vol. no.1, 2013): American University of Beirut.
- Martins, A. C., Marques, R. C., & Cruz, C. O. (2011). Public–private partnerships for wind power generation: The Portuguese case. *Energy Policy*, 39(1), 94-104.
- McKinsey & Company. (2018). *Lebanon Economic Vision*. Retrieved from
- McNair, D. (2011). *EPC Contracts in the Power Sector*. Retrieved from
- MEMR. (2019). *Renewable Energy Projects based on Provinces*. Retrieved from <https://www.memr.gov.jo/Pages/viewpage.aspx?pageID=157>
- Ministry of Energy and Water. (2019). *Updated Policy Paper for the Electricity Sector*. Retrieved from
- MoEW/LCEC. (2016). *The National Renewable Energy Action Plan for the Republic of Lebanon 2016-2020*. Retrieved from Lebanon:
- Moore, H. L., & Collins, H. (2019). Decentralised renewable energy and prosperity for Lebanon. *Energy Policy*, 111102.
- Najem, T. (2012). *Lebanon: The politics of a penetrated society*: Routledge.
- National Electric Power Company. (2018). *Annual Report - 2018*. Retrieved from
- Obeid, J. (2019). *Jordan: A case study in expanding renewable energy*. Retrieved from
- Osei-Kyei, R., & Chan, A. P. C. (2017). Developing a Project Success Index for Public–Private Partnership Projects in Developing Countries. *Journal of Infrastructure Systems*, 23(4), 4017028. doi:10.1061/(asce)is.1943-555x.0000388
- Panwar, N., Kaushik, S., & Kothari, S. (2011). Role of renewable energy sources in environmental protection: A review. *Renewable and Sustainable Energy Reviews*, 15(3), 1513-1524.
- Rahman, M. M., Mohammad, S., & Hossain, M. S. (2018). *Frequency control in micro grid system using solar, wind, fuel cell and biomass energy*. Paper presented at the 2018 International Conference on Innovation in Engineering and Technology (ICIET).
- The Lebanese Constitution, (1973).
- Law No. 228: Regulating privatization’s operations and defining its terms and fields of implementation, (2000).
- Law No. 462: Regulation of the Electricity Sector, (2002).
- Law No. 775, (2006).
- Law No. 288, (2014).
- Law No. 54, (2015).
- Law No. 48: Regulating Public Private Partnership, (2017).

- Republic of Lebanon. (2019). Law No. 129.
- Ricardo, H., Tim, O. B., Miguel Angel, S., Ana, G., & Jorge, T. (2019). *Jordan: The Elements of a Growth Strategy*. Retrieved from <https://ideas.repec.org/p/cid/wpfacu/346.html>
- Saaf, E. J., Brouwer, J., Peters, B., & Plataroti, L. (2018). *Country profile Lebanon*. Retrieved from
- Sabol, P., & Puentes, R. (2014). Private capital, public good: Drivers of successful infrastructure public-private partnerships.
- Salloukh, B. F. (2017). The Syrian War: Spillover Effects on Lebanon. *Middle East Policy*, 24(1), 62-78. doi:10.1111/mepo.12252
- Salman, M., Casarotto, C., Bucciarelli, M., & Losacco, M. (2018). *An assessment of policies, institutions and regulations for water harvesting, solar energy, and groundwater in Jordan*. Retrieved from
- Savas, E. S. (2000). Privatization and public-private partnerships.
- Shankar Nayak, B. (2019). Reification and praxis of public private partnerships in history. *Society and Business Review*, 14(1), 63-70.
- Shediak, R., Abouchakra, R., Hammami, M., & Najjar, M. R. (2008). *Public-Private Partnerships A New Catalyst for Economic Growth*. Retrieved from
- Somma, E., & Rubino, A. (2016). Public-Private Participation in Energy Infrastructure in Middle East and North African Countries: The Role of Institutions for Renewable Energy Sources Diffusion. *International Journal of Energy Economics and Policy*, 6(3), 621-629.
- Sovacool, B. K. (2013). Expanding renewable energy access with pro-poor public private partnerships in the developing world. *Energy Strategy Reviews*, 1(3), 181-192.
- Takieddine, M., & Kalaydjian, M. (2018). The new PPP law: A turning point for infrastructure investments in Lebanon? *Executive Magazine*.
- Tbaishat, R., Rawabdeh, A., Hailat, K. Q., Aladwan, S. A., Al Balas, S., & Al Ajlouny, M. I. (2018). Reforming policy roles in the Jordanian policy-making process. *Journal of Public Affairs*, 19(1). doi:<https://doi.org/10.1002/pa.1886>
- Teisman, G. R., & Klijn, E.-H. (2002). Partnership Arrangements: Governmental Rhetoric or Governance Scheme? *Public Administration Review*, 62(2), 197-205. doi:10.1111/0033-3352.00170
- Law No. 64: General Electricity Law, (2003).
- Law No. 13: Renewable Energy and Energy Efficiency Law, (2012).
- Law No. 33: Amended Law on Energy Law Renewable Energy and Energy Conservation, (2014).
- By-law No. 13: By-law of Provisions and Conditions of Exempting Systems of Renewable Energy Sources and its Devices and Equipments and also the Energy Efficiency equipments from the Customs Fees and Subjecting them to General Sales Tax in Percentage or Amount of (Zero) according to the Paragraph (C) of Article (11) of the Renewable Energy and Energy Efficiency Law No. (13) of 2012, (2015).
- UNDP/CEDRO. (2013). *Wind Power in Lebanon: the Blades are Finally Turning!* Retrieved from
- United Nations Economic Commission for Europe Working Party on Public Private Partnership. (2017). *Draft UNECE Standard on PPPs in Renewable Energy*. Retrieved from

- United Nations ESCWA. (2017). *Case Study on Policy Reforms to Promote Renewable Energy in Jordan*. Retrieved from
- United Nations ESCWA. (2018). *Case Study on Policy Reforms to Promote Renewable Energy in Lebanon*. Retrieved from
- Verma, S. (2010). Government obligations in public-private partnership contracts. *Journal of Public Procurement*, 10(4), 564-598.
- Vestas. Tafila Wind Farm: Case Study - The challenges of the Construction of the First Wind Farm in the Middle East. *Volume I: ESIA Report Sustainable Akkar Wind Farm, Lebanon*. (2019). Retrieved from
- Wang, H. M., Xiong, W., Wu, G. D., & Zhu, D. J. (2018). Public-private partnership in Public Administration discipline: a literature review. *Public Management Review*, 20(2), 293-316. doi:10.1080/14719037.2017.1313445
- Yamout, G., & Jamali, D. (2007). A critical assessment of a proposed public private partnership (PPP) for the management of water services in Lebanon. *Water Resources Management*, 21(3), 611-634. doi:10.1007/s11269-006-9033-3
- Yescombe, E. R. (2011). *Public-private partnerships: principles of policy and finance*: Elsevier.
- Yom, S. L. (2009). Jordan: Ten more years of autocracy. *Journal of Democracy*, 20(4), 151-166.
- Zankoul, E., & Khoury, H. (2014). *Simulation of on-shore wind farm construction process in lebanon*. Paper presented at the ISARC. Proceedings of the International Symposium on Automation and Robotics in Construction.
- Zawaydeh, S. (2017). Economic, environmental and social impacts of developing energy from sustainable resources in Jordan. *Strategic Planning for Energy and the Environment*, 36(3), 24-52.
- أية خطة لطاقة الرياح أقرّ مجلس الوزراء أمس؟ (2017). *Al-Akhbar Newspaper*. Retrieved from https://al-akhbar.com/Home_Page/234859

