The Lebanese Energy Sector A Feasible Reform Plan

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Executive Summary

The Lebanese public face a lack of energy availability and reliability as well as pollution and disparity. Ultimately the cause of the issues boils down to EDL's triple monopoly and political deadlock. There have been previous attempts at resolving the energy crisis, such as reform recommendations suggested by Minister Gebran Bassil in his policy paper, the 2012 study by Farouk Fardoun and his detailed rehabilitation recommendations of the sector, as well as the Ministry of Energy's joint energy project with the UNDP DREG. These attempts were not fully implemented or not implemented at all because of the burden they represented on the fiscal budget and the severe politicization of the institution. The proposal to deregulate the energy market and make way for competition in the energy sector, with careful supervision and proper regulation where it's necessary by the NERA aims to put an end to the crisis in the energy sector once and for all.

Introduction:

Access to a dependable and constant stream of electricity, as a chief component of infrastructure services, is vital to all economic activities. It also promotes the enhancement of the standard of living of citizens and the technological development of societies.

In Lebanon, however, guaranteeing such access has remained a major challenge. Even after the end of the civil war in the early 1990s, the country has not enjoyed a satisfactory degree of electricity supply security. Recent figures have shown that electricity consumption per capita has increased at an average rate of 7% per year, whereas electricity generation has always lagged behind[1]. An in-depth analysis of the electricity supply/demand balance shows that the electricity demand in Lebanon surpasses the supply, leading to supply shortages, which in turn trigger recurring power cuts across all parts of the country. Against this backdrop, there is a dire need for action to restore a sufficient level of electricity supply security by way of considering new generation capacity.

Electricite du Liban (EDL), the only official provider of electricity in the country, and private generators have long co-existed. Since the early 1990s, private back-up generators started spreading across the country offering their electricity output for neighborhoods during persistent power disruptions. Clearly, additional subscriptions of private generators are putting a strain on households and industries.

[1] The Lebanese Electricity Woes: An Estimation of the Economical Costs of Power Interruptions; 2016

Background Information

Generation Types

Currently the EDL, which is the sole provider of electricity services in Lebanon, operates both thermal and hydraulic power plants. Six thermal power plants are spread across the country and are responsible for the generation of 2038 MW (Installed Capacity)[2]In addition Hydraulic power plants; Litany (public company), Al Bared and Al Ibrahim (Private Companies) and Kadisha (Property company of EDL), have a total installed capacity of 282 MW. Moreover, the Turkish power barges have an installed capacity of 300MW and 10 MW are provided by the solar power panels installed by EDL. In 2009, 7.5% of the total electricity produced in the country was imported from both Egypt and Syria[i], however both imports have ceased since August 2014. The following table summarizes the installed capacity and actual capacity of each type of electricity generated.

Table 1:

Electricity Generation Capacity in Lebanon		
Type	**Installed Capacity**	**Actual Capacity**
Thermal Production	2,038 MW[ii]	1,253 MW
Hydraulic Production	282 MW	79 MW
Solar Production	10 MW	1.08 MW
Power Barges	300 MW	266 MW
Imports from Syria	120 MW	0 MW
Total	2,750 MW	1,600 MW

Transmission

The EDL Transmission network is composed of three types of high voltage power lines; 66, 150, and 220 kV. Moreover, the network also includes 58 major power

[2] Electricity of Lebanon: Problems and Recommendations, Farouk et al.

substations that convert high voltage into medium voltage[3]. Also, the transmission network system consists of 1615 km lines that are divided as follows; 1336 km of overhead lines and 279 km of underground cables. These cables are used to transfer electricity of various voltages in both the transmission and distribution phases.

Distribution

The Distribution network of EDL is made up of 18,182 transformers which are responsible for downgrading the medium voltage into low voltage to be distributed to the subscribers. This operation is conducted via the cable end boxes of the outgoing medium voltage (MV) cubicles from the main transmission stations[4].

Concessions

Lebanon has different types of concessions from generation, transmission and distribution. EDL provides these companies with electricity at reduced rates (ranging from 59L.L./Kwh to 75 L.L. /Kwh)[5], which the companies in turn transmit and distribute them to the 82,000 subscribers[6]. The Table below summarizes the concessions granted by EDL.

Table 2:

Concession Granted in Lebanon		
Name	**Date of initiation**	**Number of subscribers**
Concession of Zahle	1910	45,000
Concession of Jbeil	1950	24,000
Concession of Bhamdoun	1931	4,000
Concession of Aley	1924	10,000

[3] Electricity of Lebanon: Problems and Recommendations, Farouk et al
[4] Ministry of Energy & Water, G.Bassil, Policy paper 2010
[5] Ministry of Energy & Water, G.Bassil, Policy paper 2010
[6] Power Sector Development Programme 2006-2009, Charbel Nahhas

Legal

Currently there are two decrees and one law which are responsible for the regulation of the electricity sector in Lebanon. Decree 16878/1964 which is responsible for the creation of EDL and decree 4517/1972 which provides the EDL with exclusive authority to generate, transmit and distribute electricity. Law 462, which was passed by the parliament in September 2, 2002; includes a detailed structure of the regulation of the Electricity sector, including the creation of the National Electrical Regulatory Authority has yet to be implemented[7].

Administration

EDL employs 5027 Full time employees, with an average age of 52 years, and an attrition rate of 63% exists in the domain[8]. Moreover, the administrative positions are provided to non-qualified personnel and highly skilled engineers are transferred to low level departments, which hinders the efficiency of the work system. Also, the lack of computerization and operational studies as well as the knowledge in the field represent a hurdle in the track for innovations and efficiency[9]

Losses

Total losses to the system are estimated to be around 40%, 15% being technical losses, 20% non-technical losses and 5% uncollected bills[10]. The uncollected bills are worth

[7] Electricity of Lebanon: Problems and Recommendations, Farouk Fardoun et al
[8] Ministry of Energy & Water, G.Bassil, Policy paper 2010
[9] Parliament hastily votes for 2018 budget, Shikrallah Nakhoul
[10] Ministry of Energy & Water, G.Bassil, Policy paper 2010

$1.3 billion, with the private sector responsible for $950 million and the public sector responsible for $350 million.

Financial

EDL

Between the years 2007-2010 the yearly financial deficit of EDL averaged $1.5 billion, moreover subsidies from 1992 to 2009 reached $6.4 billion, accumulated to $8 billion (interest not included)[11]. In addition, $1.33 billion was transferred to EDL in 2017, and it is estimated that $1.4 billion will be transferred for the year 2018.

National Economy

Electricite de France and the World Bank in the public expenditure review (PER) have calculated the Value of Lost Load (VOLL) to be between 200 and 2,000 $/MWh. This has put the losses to the national economy (including the cost of private generation) at $2.5 billion in 2009.

Moreover, between the periods of 2009-2014, the total losses to the Lebanese economy amounted to $23.23 billion, the VOLL being 700 $/MWh.

Problem Identification

Lebanon's energy problem is multifaceted. When it comes to power provision, the Lebanese public experiences a lack of constant availability of electricity, unreliability, pollution as well as disparity between different regions of the country**.** EDL is unable to provide 24/7 electricity. Thus, the deficiency in electricity provision.

[11] Ministry of Energy & Water, G.Bassil, Policy paper 2010

Even when existing power plants operate in full capacity, producing around 2700 MW, the supplied amount does not cover the demand at peak time. Moreover, owing to the aging of the plants, and the technical losses incurred in the transmission and distribution networks, the supply/demand disparity increases, leaving the country with "almost 1300-1500 MW power shortage"[12] Furthermore, considering that EDL does not provide the sufficient amount of electricity, Lebanon has a de facto secondary supply of electricity. Residents rely on private operators during outages "who charge anywhere between four to eight times more than the state-owned electricity company"[13]. Thus, leaving the household/business with two electricity bills and rendering the procurement of full-time electricity in Lebanon expensive.

In addition, the supply is often unstable and unreliable; power cuts occur at random time intervals and at times in quick successions. The supply of electricity averaged 21.22 hours for greater Beirut area and 15.79 hours for the South with an average of 18 hours for the whole country[14]. Such power cuts potentially damage machinery, especially electric home appliances. Power stability is of utmost importance for the country's economy as its absence scares off business investments for the simple reason of the added cost of acquiring reliable power sources alongside extra current regulatory equipment.

The current setup in Lebanon means that meeting the energy needs of the country comes with a cost on the environment. The outdated EDL power plants and

[12] Electricity in Lebanon, understanding the real problem; Khamis, 2018

[13] Plagued by Cuts, Lebanon Survives on Floating Power Plants; Mercer, 2018.

[14] Ministry of Energy & Water, G.Bassil, Policy paper 2010

private generators contribute hugely to air pollution in the country already plagued with different types of pollutants and 17,294 new cases of cancer in 2018[15]. Studies show that Lebanon has the potential to reduce a thousand tons of carbon per year using renewable energy.

Causes

Different factors play their part in the causes of the aforementioned problems. From a technical point of view, EDL's power plants can generate up to 2750 MW of electricity while the amount needed to satisfy Lebanon's needs is 4200 MW. The available infrastructure is somewhat depreciated and does not operate in an efficient manner causing spilling of power during distribution.

The energy sector is effectively a triple monopoly of generation, transmission and distribution assigned to EDL by the Lebanese government. EDL is a public company. This means that the company is affected by geo-political and internal political issues. The debatable advantages of natural monopoly and economies of scale of the energy sector is trumped by the deadlocks ensued by the Lebanese political scene in mitigating the energy problem.

Alternative Solutions

In 2010 Minister Gebran Bassil presented a detailed policy paper for the reform of the electricity sector in Lebanon. the abovementioned plan failed to be fully executed and remained in its initial phase. The power barges, that were a "gap-plug"

[15] cancer today, 2018

fix, still remain. The main issues regarding the failure of implementation of this emergency recovery and reform plan for the development of the sector appear to be political, where numerous conflicts of interest between the ruling political powers have appeared ranging from taxations issues, legal matters, location of power plants, the deals of the power barges…etc. Regional conflicts were also a factor as all hope for Lebanon's potential natural gas supply pipelines was lost with the turbulences in the neighboring countries. While all the debatable issues might change from time to time, one constant emerges, the condemned state of the Electricity sector in Lebanon.

In 2012, the study titled "*Electricity of Lebanon: Problems and Recommendations*" by *Farouk Fardoun, Oussama Ibrahim, Rafic Younes* and *Hasna Louahlia-Gualous* was published. The paper represented a detailed review of EDL (Electricite du Liban); it highlighted the institution's problems at the level of electricity generation, transmission and distribution. Also, the administrative and financial levels were examined. The paper included several recommendations at each level; however, the idealistic recommendations suggested would not be implemented mainly because of the burden the rehabilitation process represents to the country's fiscal budget and to the severe politicization of the institution.

In January 2014, the Lebanese Ministry of Energy and Water announced a joint project with the United Nations Development Program (UNDP) called the Small Decentralized Renewable Energy Power Generation Project (DREG) which was executed in coordination with the Lebanese Center for Energy Conservation (LCEC). The project's aim was to help Lebanon fulfill its promise to increase production in renewable energy to 12% by 2020. The 1908 solar (photovoltaic) panels generate

approximately 938,000 kilowatt-hours per year, devoting important cost savings at Liban Cables also reducing greenhouse gas emissions of 751 tons per year. Even though this solution seems promising, it was only implemented on a small scale with the goal of enabling the retirement of one of Liban Cables's eight generators. Also, the project was implemented using donor grants. However, this can serve as a feasibility study and a test implementation for the market. Companies can now understand that Lebanon can go green. One of the stated goals of the project was indeed raising awareness about the feasibility of renewable energy projects in Lebanon.

Proposed Solution

For reasons explained above, Lebanon is in dire need of a reliable and competent energy sector. The following proposal aims to amend the chaotic status-quo: switching to a Deregulated Energy Market.

The energy generation, transmission and distribution sector will be open to the market, allowing for new players alongside EDL to join the scene and compete for the acquisition of the consumers' business, resulting in a more efficient competitive market where all participants must perform at their prime if they would like to remain in the market.

Secondly, The commission that will be created according chapter 2 of law 462 – National electricity regulatory authority (NERA) will act as a regional transmission organization wherein it will be responsible for acting as quality control and maintaining the entirety of the electric grid and overseeing the interconnection and the

wellbeing of the transmission and distribution lines at all times as well as the proper and efficient functioning of the power plants, forecasting loads, coordinating the balance between supply and demand of electricity, and responding to emergencies.

Thirdly, energy retailers would then be allowed to purchase energy from a variety of generation and transmission companies to then directly sell their energy packages ornamented with diverse types of energy sources (i.e. hydro, wind, coal) to the consumers by utilizing the local utilities' distribution lines (EDL's).

Lastly, consumers would be allowed their choice of energy providers through the retailers, choosing the packages they find the most suitable for their needs. For example, if an industrial company prides itself on its environmentally friendly tendencies, they would pay the added value and acquire the package from the retailer that includes mostly renewable energy. As a note, consumers would still have the option to choose the local utility as a provider if desired.

This approach mitigates the availability and reliability problem as companies strive to provide best service possible for the consumer to purchase through the retailers. In order to provide the best service, companies will continuously guarantee that their power plants operate at maximum efficiency thus ensuring that their machinery is never outdated, and no power is spilled, hence reducing pollution. Furthermore, as Lebanon has a 12% renewable energy production obligation, companies will strive to satisfy that need. Ultimately, by removing the expenses on the government budget and eliminating the need for small scale inefficient and high-priced private power generators, citizens will be relieved from the costly electricity bill.

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