AMERICAN UNIVERSITY OF BEIRUT

A CASE STUDY OF PUBLIC-PRIVATE PARTNERSHIPS IN LEBANON'S POWER SECTOR: DO THEY DELIVER?

by
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A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Arts
to the Department of Political Studies and Public Administration
of the Faculty of Arts and Sciences
at the American University of Beirut

Beirut, Lebanon
January 2025

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ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my advisor, Dr. Tariq Tell. From the early stages of shaping my research topic to the minute details, Dr. Tell has been a constant source of guidance. His thoughtful feedback has pushed me to think critically and go beyond my thesis work. My immense gratitude also goes to the committee members, Dr. Charbel Nahas, whose mentorship, one-on-one support, and inspiring words have profoundly influenced this thesis and shaped my perspective on what matters. I am equally grateful to Dr. Hilal Khashan for his insightful feedback, which has been instrumental in refining my work, and his uplifting words of encouragement during tough times. Their collective mentorship throughout my undergraduate and graduate years has been transformative, and I am deeply honored to have learned from each of them.

Additionally, I would like to extend my warmest thanks to those who graciously agreed to discuss my thesis topic and who have shaped its course in profound ways: Mr. Marc Ayoub, Ms. Christina Abi Haidar, Dr. Hassan Harajli, Mr. Michel Abu Jawde, Mr. Salah Tabbara, and Mr. Rabih Medawar.

Lastly, I would like to express my heartfelt gratitude to my family and especially my parents, who have invested their lives to ensure a healthy and promising future for me and my brothers—and to my friends, for being there throughout this journey. Their words of encouragement, feedback, and constant motivation, checking on me during late nights and tough moments, helped me push through and finish this thesis. Without them, this achievement would not have been possible.

ABSTRACT
OF THE THESIS OF

Jamal Wajdi Daou for Master of Arts
Major: Public Policy and International Affairs

Title: A Case Study of Public-Private Partnerships in Lebanon's Power Sector: Do They Deliver?

This paper explores Lebanon's ongoing electricity crisis, exacerbated by the country's severe economic crisis over the past five years. The electricity sector, which is central to any recovery plan, has long relied on public-private partnerships (PPPs) for both generation and distribution. Historically, PPPs have played a crucial role in bridging supply gaps, managing assets, and rehabilitating infrastructure. Despite this, Lebanon's national utility, Électricité du Liban (EDL), struggles to meet demand, providing only 2-4 hours of power daily. PPPs, such as independent power producers (IPPs) and distribution service companies (DISCOs), are recommended to address the chronic supply shortage and inefficiencies in the grid. These partnerships offer the potential to leverage private expertise, enhance service delivery, and reduce reliance on Lebanon's inefficient and polluting fossil fuel generation.

However, the success of PPPs in Lebanon has been mixed, with concerns over unmet targets, subpar services and questionable performances. The research looks at different PPP contract types and projects, including concession contracts (e.g., Électricité de Zahlé), BOT contracts (e.g., Sustainable Akkar Wind Farm), PPA contracts (e.g., Karadeniz power barges), and O&M contracts (e.g., BUTEC Utility Services). In a country where political, regulatory and economic risks are high, the challenges of financing high-capital infrastructure projects amidst Lebanon's defaults and weak sovereign guarantees further complicate efforts. Despite these hurdles, PPPs remain emphasized as a key policy option for addressing Lebanon's electricity supply challenges and to foster economic recovery. This study critically examines this recommendation, its implications for Lebanon's energy landscape, and its contribution to an equitable, sustainable and efficient energy future.

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ABBREVIATIONS

AMI – Advanced Metering Infrastructure

AES – Autonomous Energy System

BDL – Banque Du Liban

BOT – Build, Operate and Transfer

BUS – Butec Utility Services

BALADI – Building Alliance for Local Advancement, Development and Investment Program

CEDRO – Country Entrepreneurship for Distributed Renewables Opportunities

CAPEX – Capital Expenditure

CoMs – Council of Ministers

CDR – Council of Development and Reconstruction

DRE – Distributed Renewable Energy

DISCOs – Distribution Service Companies

DBFO – Design, Build, Finance and Operate

DOM – Design, Operate and Maintain

DSPs – Distribution Service Providers

DFIs – Development Finance Institutions

EoI – Expression of Interest

EDL – Électricité du Liban

EDZ – Électricité de Zahlé

EBRD – European Bank for Reconstruction and Development

FX – Foreign Exchange Reserves

GDP – Gross Domestic Product

GSM – Global System for Mobile Communication

IRENA – International Renewable Energy Agency

ICT – Information and Communication Technology

IPPs – Independent Power Producers

IMF – International Monetary Fund

JV – Joint Venture

kVA – Kilo-volt-amperes

kWp – Kilowatt peak

kWh – Kilowatt hour

KPIs – Key Performance Indicators

LV – Low Voltage

LBP – Lebanese Pound

LCEC – Lebanese Center for Energy Conservation

MDBs – Multilateral Development Banks

MoEW – Ministry of Energy and Water

MoF – Ministry of Finance

MPT – Ministry of Post and Telecommunications

MIGA – Multilateral Investment Guarantee Agency

MV – Medium voltage

MW – Megawatt

MENA – Middle East and North Africa

NEUC – National Electricity Utility Company

NERA – National Electricity Regulatory Authority

OPEX – Operating Expenditure

O&M – Operation and Maintenance

PPP – Public-Private Partnership

PPA – Power Purchase Agreement

PV – Photovoltaic

SDGs – Sustainable Development Goals

SCADA – Supervisory Control and Data Acquisition

T&D – Transmission and Distribution

USD – United States Dollar

UNDP – United Nations Development Program

USAID – United States Agency for International Development

WB – World Bank

CHAPTER 1

INTRODUCTION

Over the past five years since 2020, Lebanon's economic crisis has been characterized by mounting hyperinflation, rapid currency depreciation, and serious economic contraction. The crisis has profoundly altered the country's socioeconomic landscape, exacerbating inequality and creating formidable challenges to stability and development. Addressing the multifaceted crisis facing the country hinges on securing a reliable electricity supply, which is a cornerstone for any viable economic recovery plan.

Traditionally, in Lebanon, public-private partnerships (PPPs) have been the norm when it comes to private sector involvement in electricity provision. In generation: concessionaires, operators, and independent power producers (IPPs), both thermal and hydroelectric, were contracted and widely used to address the supply gap, operate assets and bypass budget constraints. In distribution: distribution service providers (DSPs) and concessionaires were contracted to operate and maintain (O&M) the grid, collect bills, and upgrade infrastructure.

PPPs are medium- or long-term agreements between private entities and public authorities at the local or central level, which are often backed by some form of sovereign guarantee. Depending on the extent of private sector involvement, the contracted party may design, build, finance, operate (DBFO), maintain and upgrade infrastructure or deliver services traditionally provisioned by the state while sharing risks (Iossa & Martimort, 2015; Eurodad, 2017; Fabre & Straub, 2023).

Commonly used in economic/hard infrastructure (tourism, utilities, ICT, roads, water, and sewerage) and social/soft infrastructure (healthcare, education, prisons, and housing), PPP arrangements promise improved service delivery and relief on public finances (Chong and Poole, 2013; Walker, 2017; Eurodad, 2022). Additionally, they are viewed as a means to leverage private expertise, facilitate knowledge exchange between sectors, and are considered a viable policy solution to address investment gaps (Barth-Coullaré, 2022; Mohammed et al., 2023; Nyirinkindi, 2023). While these theoretical benefits of efficiency and cost-effectiveness are often praised by governments and policy-makers, their performance on the ground has raised serious concerns.

Public-private partnerships (PPPs) are increasingly regarded as a promising mechanism to tackle Lebanon's electricity crisis, considering that the national utility is currently providing only 2 to 4 hours a day of power. Contracting IPPs such as the Karadeniz Power Barges, Akkar Wind Farms, and Solar Farms across Lebanon, has been a key strategy to address the chronic supply gap that has persisted since the Civil War (1975–1990). Today, renewable energy partnerships offer a unique opportunity to diversify energy sources, reducing reliance on inefficient and polluting diesel & gas oil.

However, financing such high-capital, long-term projects remains a challenge in a country that has defaulted on its debts, with investor confidence undermined by the government's inability to provide reliable sovereign guarantees. On the other hand, in distribution, past PPP initiatives, including the DSP project and notable regional concessions, sought to modernize the grid, improve collection rates, and reduce losses. However, they either fell short of contracted targets or exploited historical contexts, resulting in questionable outcomes.

Despite limited and/or controversial success, contracting IPPs and distribution service companies (DISCOs) continue to be argued as a critical approach to addressing Lebanon's electricity challenges in collection, losses, and generation capacity. However, PPPs are often criticized for their incomplete contracts, increased future uncertainty, and long-term nature. In Lebanon's political economy context, uncertainty—stemming from Lebanon's fluctuating economic conditions, security risks, and patronage system—necessitates periodic adjustments in PPP relations to maintain operations and avoid setbacks. While results have been mixed in Lebanon, PPPs in the form of IPPs and DISCOs remain portrayed as a pathway to revitalize productive sectors, support economic recovery, and pave the way for a more sustainable and efficient energy future.

CHAPTER 2

LITERATURE REVIEW

With approximately 675 million people lacking electricity, nearly 2 billion without safe drinking water, and 2.7 billion unconnected to the Internet (Nyirinkindi, 2023), multilateral development banks (MDBs) have championed PPPs as crucial to achieving sustainable development goals (SDGs) (Romero, 2015), developing resilient infrastructure, meeting climate targets, and extending services to underserved communities (Barth-Coullaré, 2022; Nyirinkindi, 2023). As an alternative to public works, they promise improved service delivery, better financial returns, and relief on public finances (Walker, 2017). Furthermore, PPPs are viewed as a means to leverage private finance and expertise, foster knowledge exchange, and tackle investment gaps in large infrastructure projects (Minow, 2003; Mohammad et al., 2023; Nyirinkindi, 2023).

In electricity provision, they aim to enhance quality, reliability, and access of electricity services, especially in underserved areas, while stimulating economic growth through private participation (Nyirinkindi, 2023). Governments are increasingly looking to PPPs, believing these partnerships can be cost-effective and efficient in resource allocation, especially during fiscal constraints (Walker, 2017; Mohammad et al., 2023).

Institutions like the World Bank Group have developed frameworks for PPP contracts and established offices to support countries in executing PPP projects (Eurodad, 2022). This advocacy has contributed to the growth of PPPs in the developing world, leading to the enactment of PPP laws, establishment of PPP units, and adjustments in regulatory environments (Eurodad, 2022).

In a typical PPP, the private partner receives renumeration over several years, either by charging users, state payments, or a combination of both (Walker, 2017). PPPs also involve shared risk, where up-front costs borne by the private entity are offset by guaranteed profits over the project's lifetime. This setup positions PPP contracts as attractive business opportunities, providing a steady income stream, often over extended periods, and backed by the government as the primary risk bearer (Walker, 2017).

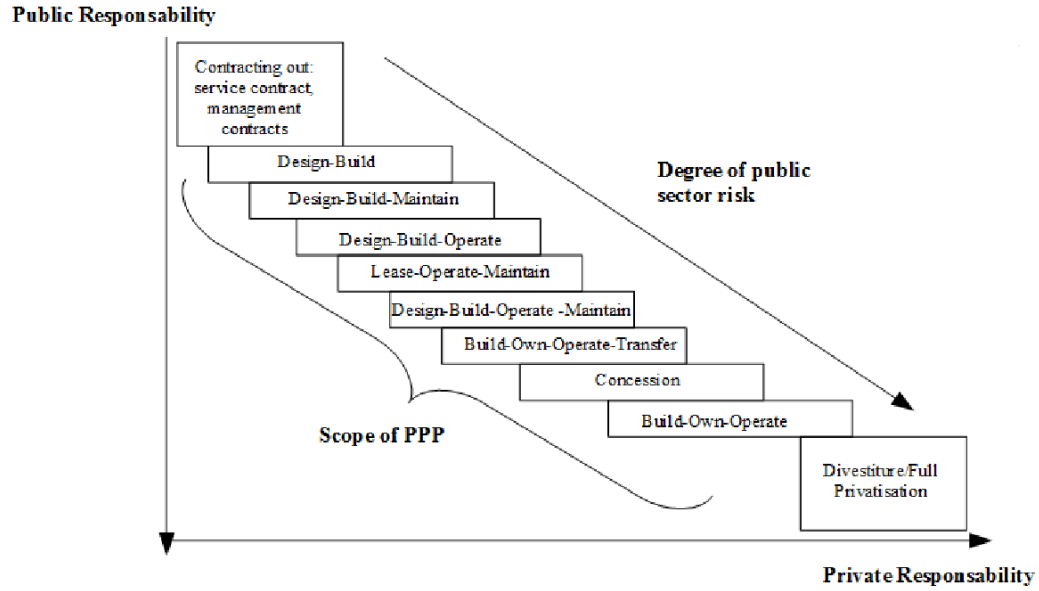

Figure 1: Types of PPPs in Order of Risk Allocation
Source. From Roehrich et al. (2014).

Patrinos et al. (2009) outline four advantages of PPPs in public service provision. First, they can foster competition between providers, creating 'choice' and enhancing service quality through incentives for improvement (Minow, 2003). Second, PPPs tend to be more flexible than the public sector, and have autonomy to cut costs and integrate innovative ideas in PPP design (Patrinos et al., 2009; Mohammad et al., 2023; Nyirinkindi, 2023). Third, governments can select providers through competitive tendering, optimizing cost and quality in bids. These contracts typically include

measurable clauses (KPIs) to meet specific quality and performance targets. Fourth, PPPs allow for greater risk-sharing between the public and private sector, with the government acting as a regulator closely monitoring service delivery, while the private sector manages financing, implementation, and operational risks (Patrinos et al., 2009; Mohammad et al., 2023; Nyirinkindi, 2023).

On the contrary, the actual benefits depend on the PPP's design, the regulatory framework, and state capacity to enforce compliance (Patrinos et al., 2009; Mohammad et al., 2023). If adequately designed and implemented, PPPs can create value by delivering services on time and within budget. Additionally, the World Bank highlights that a solid legal framework is but one of many critical factors for a successful PPP, and emphasizes the importance of building strong institutions and PPP units (Barth-Coullaré, 2022; Mohammad et al., 2023).

The PPP: Global Campaign Manifesto, endorsed by 152 civil society organizations from 45 nations, underscores the experience of PPPs as overwhelmingly negative, noting that only a minority have delivered results and served public interest. Eurodad (2017) highlights that PPPs often result in higher long-term costs than traditional public financing and expose governments to hidden financial liabilities (Lethbridge & Gallop, 2020; Eurodad, 2022). In many cases, PPPs are the riskiest and costliest financing method (Romero, 2015; Eurodad, 2022), with documented cases of cost overruns (Barth-Coullaré, 2022). Still, they are appealing for their off-balance-sheet accounting, which conceals their impact on budgets and debt figures, creating a false sense of financial freedom (Eurodad, 2017). By being co-financed, they bypass legislated budgetary constraints and keep project liabilities off government budgets (Walker, 2017).

While policymakers often advocate for PPPs, evidence of their value for money, efficiency gains, and on-time/on-budget delivery is mixed or lacking (Walker, 2017; Eurodad, 2022; Lethbridge & Gallop, 2020). Proposed efficiency gains and innovation in PPP design can result in undesirable corner-cutting by private partners to cut costs as much as possible (Lethbridge & Gallop, 2020; Eurodad, 2022). Weak regulatory environments can result in non-compliance to standards of transparency, quality, accountability of providers, compromising state capacities to address inequality (Skelcher, 2009; Walker, 2017). Furthermore, information may not be publicly disclosed to maintain a competitive advantage, further undermining transparency (Skelcher, 2009). Consequently, outsourcing service provision to non-government actors is often perceived as an *abdication of responsibility* by the public sector (Barth-Coullaré, 2022).

Despite the premise of risk-sharing, the government ultimately is the guarantor, bearing the financial burden if projects fail—evidently burdening taxpayers and creating political and social risks (Skelcher, 2009; Walker, 2017). This guarantee reduces market-driven incentives for PPPs, highlighting the need for effective regulatory oversight to protect public fiscal interests. Furthermore, contracting PPPs can limit legislative supervision, as they often report to executive ministries, not representatives (Skelcher, 2009). PPPs can increase risks of corruption due to complex negotiations and opaque contracting, often shrouded by commercial confidentiality (Romero, 2015; Walker, 2017; Eurodad, 2022).

PPP contracts also tend to favor international arbitration over local courts for their unaccountability and delays, sidelining national democratic processes (Eurodad, 2017). In the absence of an independent regulator, conflicts of interest can arise, as

governments act as both partners and regulators (Minow, 2003; Skelcher, 2009; Walker, 2017). PPPs risk enriching invested stakeholders while depleting public resources. The inflated costs and increased payments associated with PPPs often result in budget cuts to essential services such as universal social protection, healthcare, and compromises in quality (Eurodad, 2017). Furthermore, PPPs often come with added fees and tariff hikes for users, where providers may prioritize better off areas and neglect marginalized areas (Eurodad, 2017; Eurodad 2022).

PPPs have become a favored funding method for large-scale infrastructure projects, such as dams, highways, and pipelines. However, these projects often lead to significant environmental damage, including habitat and natural resource destruction (Eurodad, 2017; Eurodad 2022). They have also been linked to forced displacement, human rights abuses, and repression of protestors and indigenous communities (Eurodad, 2017). Additionally, the rise of energy PPPs in oil, gas, coal, and waste-to-energy burning, drastically intensifies climate change, as social and environmental regulations are debilitated to foster favorable business environments for investors (Eurodad, 2017).

Eurodad (2022) *acutely* notes that the rationale for PPPs and private sector finance is presented in tandem with recurrent allegations on government limitations to provide adequate public services and develop infrastructure. This narrative is backed by the claim that the private sector is *inherently* more cost-effective and efficient in high-quality and quantity service delivery (Minow, 2003; Lethbridge & Gallop, 2020). However, this account overlooks decades of austerity policies and structural adjustment programs that have crippled public services and left infrastructure underfunded (Nahas, 2020; Eurodad, 2022). Skelcher (2009) concludes that the inherent tensions within PPP

arrangements is particularly in balancing public accountability with commercial objectives. PPP critics have long argued that private focus on profit-maximization is incompatible with efforts to protect the environment and guarantee universal access to quality services (Barth-Coullaré, 2022).

Recent research by Fabre & Straub (2023) reviews the effectiveness of PPPs in infrastructure, health, and education and evaluates the development and operation of PPPs overtime. The study compares PPPs from multiple continents and investigates the trade-off in using PPPs over public service provision. Most notably, the study draws conclusions on overlapping issues that negatively impact PPP performance including renegotiations, contract design, institutional problems, and poor regulation. Fabre & Straub (2023) found the cost of PPP renegotiations to be large in countries with weak governance environments like Lebanon, which is burdened with rent-seeking partisan politics and high levels of corruption.

CHAPTER 3

RESEARCH PROBLEM & METHODOLOGY

3.1. Research Problem

Lebanon's political economy is characterized by rampant rent-seeking[1], captured institutions, and fragmented organizational power. Failure in the power sector stems from these deep-rooted political economy challenges (Ahmad, 2020). Many PPP projects launched by the government have come under criticism for failing to achieve financial closure, contracted targets, and provide adequate services to citizens. The Wind and Solar Farm IPPs, for instance, failed to achieve financial closure with the onset of the economic crisis that crippled any chances of bankability. Furthermore, the government has not enacted the necessary reforms outlined by the IMF to increase its creditworthiness and investor confidence.

Similarly, the DSP project, had a clear contracted target of commissioning, installing, and maintaining an advanced metering infrastructure (AMI), which would include the installation of 1.2 million smart meters, effectively modernizing the grid to track consumption nationwide. However, full deployment was prevented due to community resistance and a lack of effective government enforcement. Additionally, persistent political instability and the absence of a clear regulatory framework further hampered the execution of these initiatives, leaving the country with delayed or

[1] Rents are income flows created by policies or institutions, with varying impacts on development (Khan et al., 2019). Some rents support markets and growth (e.g., subsidies), while others hinder progress (e.g., monopolies). Rent-seeking involves efforts to influence policies for rent distribution, and corruption represents the illegal subset of these activities (Khan et al., 2019). Effective anti-corruption strategies aim to align rent creation and allocation with social welfare and development goals.

incomplete infrastructure projects that have not met the expectations of improved energy services.

For decades, Électricité du Liban (EDL) struggled under an austerity policy that limited state transfers for fuel procurement, along with a political decision to keep end-user tariffs low (Nahas, 2020; Ayoub et al., 2021). This combination led to chronic underpricing, electricity rationing, and underinvestment in infrastructure, leaving EDL in a persistent fiscal and supply deficit. Unusual technical and non-technical losses, poor collection practices, and overstaffing—driven by Lebanon's patronage system—further exacerbated EDL's deficit amid rising electricity demand. Mismanagement and corruption intensified these issues, driving the underperformance of the power sector and cascading into a consistent drain on public finances (Ahmad et al., 2022). Consequently, EDL was perpetually reliant on annual state transfers to remain operational, widening Lebanon's structural twin deficit (current account and fiscal) and increasing public debt over time (Ersoy et al., 2021).

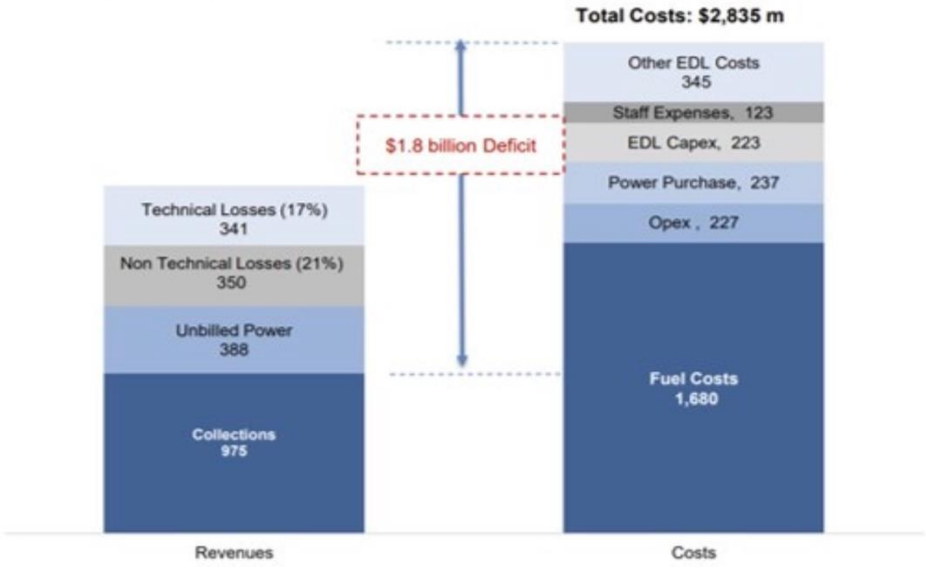

Figure 2: EDL's Revenues and Expenditure in 2018.
Note. EDL's 2018 Financials in USD millions at a low tariff of USD 9.3c/kWh, high operating costs and network losses resulting in a USD 1.8 billion deficit from Ayoub et al. (2021).

Ratified in 2002, Law No. 462 was to organize the electricity sector, unbundle its activities, and establish the National Electricity Regulatory Authority (NERA), a public entity that would enjoy administrative, financial, and technical autonomy to issue 50-year licenses through transparent public tenders (Abi Haidar, 2019). Instead, the Council of Ministers (CoMs), through direct amendments, have temporarily issued licenses to IPPs and extended contracts to service providers, based on proposals from the Ministry of Energy & Water (MoEW). As with many laws in Lebanon, Law No. 462/2002 remains ratified but disregarded due to the country's confessional spoils system, which requires consensus across all political spheres (Adwan, 2004; Ayoub & Moawad, 2022). Thus, when a law is not enforced on one party, it is not enforced on any, allowing the political elite to evade implementing laws, including those promoting anti-corruption.

Appointing an independent Electricity Regulatory Authority (ERA) is a key reform for Lebanon to secure international financial assistance. Some argue for an "independent" authority to develop effective PPPs, deploy distributed renewable energy (DRE), and unbundle the sector's activities (EBRD, 2019a; Ayoub et al., 2021). Ahmad et al. (2021b), warn of the risk of establishing an ERA too quickly to please the international community. Hidden elite-level agreements will undermine its independence and result in a "political economy trap" (Ahmad et al., 2021b), where the ERA would be held hostage by the same mechanisms of rent distribution that have sabotaged the performance of many PPPs and regulatory authorities in Lebanon.

Lebanon's power sector is marked by weak governance, lack of transparency, and bureaucratic bottlenecks, fostering conditions conducive to subpar PPP outcomes and exploitations. Some argue that the relative performance of concession models and

decentralized systems of service provision, highlight the potential benefits of expanding the extent of private sector involvement in generation and distribution (Ahmad et al., 2022; Boukather, 2023).

This thesis seeks to explore the following research question: *How has private sector participation, including public-private partnerships (PPPs), influenced outcomes in Lebanon's power sector, and what are the implications for equity, accountability, and sustainability?* This study will assess whether the theoretical benefits of PPPs are achieved in practice through a case study and explore whether they are viable in Lebanon's energy landscape, or whether they deepen systemic challenges, such as exacerbating socio-economic disparities, weakening accountability and transparency, and compromising fiscal sustainability.

This thesis examines private sector models—including Independent Power Producers (IPPs), Distribution Service Providers (DSPs), concessions, and mini-grids—to explore increased private participation in Lebanon's power sector. Although many PPPs have struggled due to bureaucratic delays and uncertain conditions, models with higher private sector risk have been argued to demonstrate relatively better performance. The study will examine this claim and its implications for the future of Lebanon's energy landscape. Furthermore, the research looks at different PPP contract types, including concession contracts (e.g., Électricité de Zahlé), BOT contracts (e.g., Sustainable Akkar Wind Farm), PPA contracts (e.g., Karadeniz power barges), and O&M contracts (e.g., BUTEC Utility Services), and identifies key performance barriers and bottlenecks while charting Lebanon's overall experience with PPPs.

3.2. Research Methodology

Based on the existing literature (Skelcher, 2009; Romero, 2015; Walker, 2017; Lethbridge & Gallop, 2020; Eurodad, 2022), this thesis frames Lebanon's PPP outcomes within global criticisms of PPPs, highlighting common issues such as high costs, unbalanced risk-sharing, mixed efficiency gains, opaque contracting, and underperformance due to weak regulatory oversight. Several studies reveal PPP inefficiencies and stress that they pose unforeseen liabilities on governments (Romero, 2015; Romero, 2015; Walker, 2017; Lethbridge & Gallop, 2020; Eurodad, 2022). These concerns guide this thesis's goal to examine whether private participation and decentralization can truly support a sustainable, accessible, and affordable energy future for Lebanon.

This thesis conducts a case-study of various PPP models in Lebanon's power sector, focusing on emblematic examples that illustrate both the underperformance of some PPPs and the relatively better outcomes of others. Due to the lack of performance data, the analysis focuses on the publicly available sources that explore PPP dynamics in Lebanon. By drawing from the literature and secondary data, it examines the outcomes of various PPP contract types with differing levels of private sector involvement. It focuses on their risk-sharing arrangements, degrees of autonomy, and operational bottlenecks, analyzing how these factors impact overall performance.

While some models may appear more efficient, the research argues that increased private sector involvement risks fostering grid fragmentation and transforming the universal right to public services for all citizens into a pay-for-service model based on individuals' capacity to pay. The objective is to critique the assertion that increased private participation, flexible PPP arrangements, and enhanced risk-

sharing yield better results and are appropriate for Lebanon's socio-political context. By exploring overarching issues such as EDL's deficit, hybrid mini-grids, distributed renewable energy (DRE), and the diesel generator supply chain, this study provides an overview of public and private sector dynamics in Lebanon's power sector. Ultimately, the study aims to add to the literature on energy dynamics in Lebanon, and inform future decision-making and investment strategies while identifying avenues for future research.

CHAPTER 4

LEBANON'S POWER SECTOR

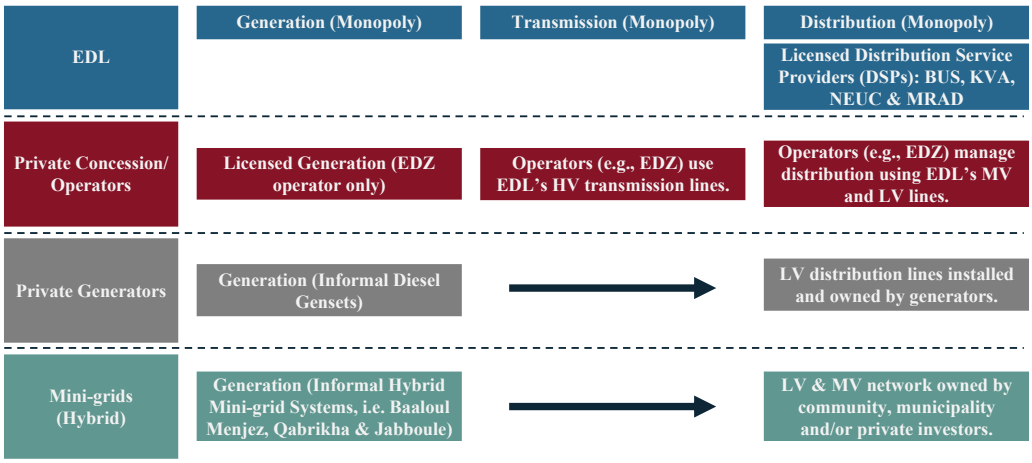

Figure 3: Current Structure of Lebanon's Power Sector – Generation, Transmission & Distribution.
Source. Adapted from Ahmad et al. (2020).

4.1. Power and Lebanon's economic crisis

Many date the start of Lebanon's economic collapse to October 2019, when popular uprisings erupted in the country. This crisis was compounded by Lebanon's default on its USD 31.3 billion sovereign Eurobonds in March 2020 (Halabi & Noe, 2022). The depletion of foreign exchange reserves (FX) severely limited government spending, including critical transfers to Électricité du Liban (EdL) for heavy fuel oil procurement, causing a significant reduction in power generation. As a result, Lebanon has been forced to shut down several power plants, and the country is currently only able to generate 2 to 4 hours of electricity per day.

Currently, the country's gross public debt is USD 120 billion or 740% of GDP, while GDP has plummeted to USD 16 billion in 2023—a 71% contraction from USD 55 billion in 2018 (Hausmann et al., 2023). In fact, the collapse of the power sector is

one of the main reasons for Lebanon's unprecedented fall in GDP. By early 2020, Lebanon faced a triple crisis: a sovereign default, a banking crisis triggered by a bank run, and a currency crisis, with the Lebanese pound (LBP) depreciating by 98% (Hausmann et al., 2023).

Between 1992 and 2019, Lebanon averaged a current account deficit[2] of 20-25% of GDP, accumulating to USD 250 billion (Nahas, 2020). Post-Civil War reconstruction and decades of expansionary policies put Lebanon under a twin deficit (fiscal and current account), leading to a heavy reliance on public debt to plug imbalances and shoulder foreign exchange reserves (FX). By 2023, Banque du Liban (BdL) faced an USD 80 billion currency mismatch, or 465% of GDP (Hausmann et al., 2023).

Lebanon's fiscal deficit[3] (expenditure exceed revenue), averaging 14% of GDP from 1990 to 2020, was driven by limited revenues, high personnel costs, interest payments, and electricity subsidies (Hausmann et al., 2023). From 1992 to 1997, reconstruction efforts increased the fiscal deficit to 20.7% of GDP, with debt soaring from USD 2.9 billion to USD 16.5 billion, fueled by high interest rates (averaging 18.6%)(Hausmann et al., 2023). To manage outflows, an austerity policy was instituted in 1997 to address depleting foreign currency reserves, rising interest rates, and growing debt.

This 1997 policy limited BDL financing to state salaries, debt servicing, and limited fuel purchases for intermittent electricity production (Nahas, 2020). From then on, reserves were channeled to maintain the artificial peg of 1992, cover the structural

[2] An account deficit occurs when a country's net imports of goods, services, and investments exceed its exports, leading to a net outflow of foreign currency.

[3] A fiscal deficit represents the shortfall between a government's revenues (taxes and other income) and its expenditures, indicating a reliance on borrowing funds to sustain operations or investments.

deficit, and support policies that attracted capital inflows, perpetuating the cycle of growing debt and deficits (Nahas, 2020). The economic crisis arose from an inability to finance the high debt-to-GDP ratio through foreign deposits and Eurobonds, leaving Lebanon vulnerable to shifts in the interest-growth differential[4] (Hausmann et al., 2023). This cycle of increasing debt and economic instability contributed to Lebanon's financial collapse. In the end, exorbitant spending, slowed growth, and dwindling reserves led to unsustainable interest rates and an unmanageable debt burden.

From 1994 till 2020, Électricité du Liban (EDL) depended on annual budget transfers of USD 1 to 2 billion to cover its deficit and procure costly heavy fuel and diesel oil for its inefficient power plants (Ministry of Finance, 2010; Ersoy et al., 2021; Ayoub & Moawad, 2022). In the below figure from Bramley et al. (2020), Tyr and Baalbek power plants stand out as the costliest of EDL's facilities to run with an average cost of USD 16.7c/kWh. This is primarily due to operational and fuel costs, as gas oil must be transported via trucks, which has led to EDL limiting their output to reduce expenses. The two reciprocating plants of Zouk and Jieh are EDL's cheapest source of power at an average of USD 8.5c/kWh (Bramley et al., 2020). Lastly, the Karadeniz power-ships had fuel costs comparable to the recips, however, their operational expenses, including IPP charges and rental fees, made the barges among the most expensive of EDL's sources (Bramley et al., 2020).

[4] The interest-growth differential refers to the gap between the interest rate on debt and the rate at which the economy is growing. When the interest rate exceeds the economic growth rate, the country struggles to generate enough income to cover its debt, forcing it to borrow more just to pay interest payments.

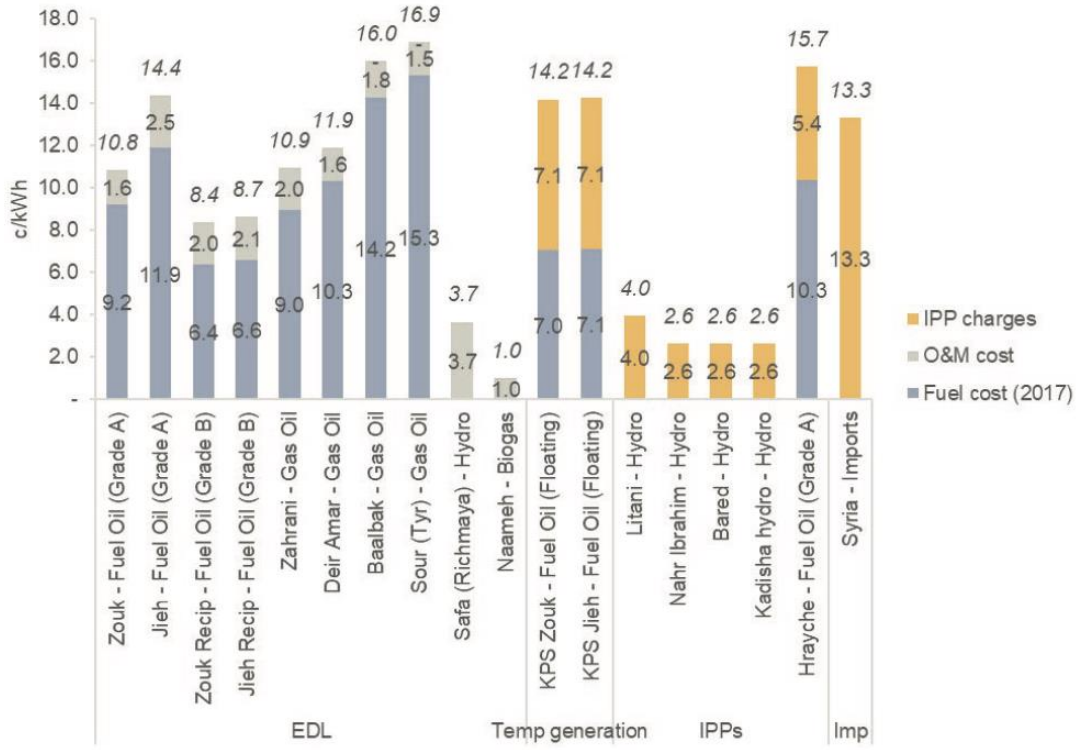

Figure 4: Breakdown of Fuel, O&M, and IPP Costs by Power Plant in 2017 (at USD 54 per Barrel).
Source. Bramley et al. (2020).

The power sector's quasi-fiscal deficit, driven by underpricing, transmission and distribution (T&D) losses, poor collection, and overstaffing, ranked highest among 14 MENA countries at 9% of GDP (Camos et al., 2017). Depending on the region of Lebanon, EDL averaged 3 to 12 hours of daily blackouts, with the supply gap reaching 37% of demand in 2018, filled by costly, polluting diesel generators (Ahmad, 2020; Majzoub, 2023). In short, EDL was unable to meet demand and was perpetually reliant on state transfers to operate.

Table 1: EDL's Performance in 2018

Performance parameter	Value
Total capacity (owned and purchased) (MW)	2512
Generation capacity (% of peak demand capacity)	72.7
Total generation delivered (terawatt hours, TWh)	14
Total generation (% of total demand)	63
Average load factor (%)	75
Technical losses (%)	14
Non-technical losses (%)	20
Average tariff (US cents per kilo-watt hour, kWh)	9
Average tariff (% of cost-recovery tariff)	27
Collection ratio (%)	66 (2017)

Source. From Ahmad et al. (2022)

Lebanon maintained an end-user electricity tariff of USD 9c/kWh from 1994 to 2022, while EDL's generation costs ranged between USD 16c-22c/kWh contingent on the price of barrel of oil (BOE) (Ahmad, 2020; Ayoub et al., 2021). The tariff, fixed at an oil price of USD 26 per barrel, did not adjust for market fluctuations, even with oil prices peaking at USD 140 per barrel in 2008 (IRENA, 2020; Ayoub et al., 2021). That year transfers to cover EDL's deficit were USD 1.6 billion (Ministry of Finance, 2010; Ersoy et al., 2021). During periods of high oil prices, electricity subsidies represented 4.5% of GDP and were, at times, the second or third largest expenditure item in Lebanon's budget, alongside interest payments and government personnel costs (Ministry of Finance, 2010; Hausmann et al., 2023).

By political decision, EDL was barred from raising its tariff, despite its legal and financial independence under Decree 16878/1964 (Ayoub et al., 2021). In 2022, after fuel subsidies were lifted, EDL's tariff increased to USD 0.27 per kWh, while diesel generator tariffs rose to USD 0.50 per kWh, leading to a 52% drop in average electricity consumption (Boukather, 2023).

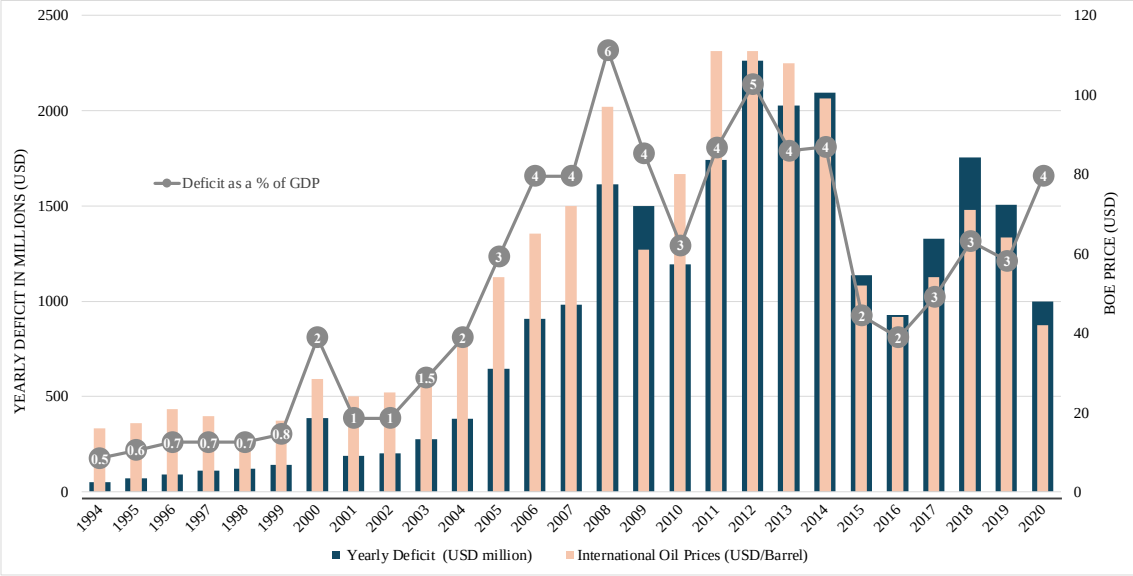

Figure 5: EDL's Yearly Deficit and State Transfers as a percentage of GDP and International Oil Prices (USD/BOE).
Source. Adapted from Ersoy et al. (2021), Ministry of Finance (2010), Statista (2025) and Statista (2024).

In 2021, EDL experienced total network losses of 40% due to grid faults, meter tampering, and illegal connections, wasting over a third of generated electricity (Ministry of Energy & Water, 2022; IRENA, 2020). Collection losses added another 12%, with unpaid bills from public institutions and refugee camps totaling USD 1.820 billion and USD 444 million respectively (IRENA, 2020). Furthermore, according to a study undertaken by UNDP and the MoEW, the Syrian refugee crisis has reduced power availability by approximately 500 MW, or about five hours of electricity daily (IRENA, 2020), due to both direct and indirect additional power consumption in municipalities and public schools hosting displaced Syrians (AEMS, 2017). As of 2022, EDL's net distributed power is 1,089 MW, while average demand stands at 2,067 MW (Boukather, 2023). Today, EDL is generating less than 200 MW or 1 to 2 hours of electricity due to liquidity shortages for fuel (Boukather, 2023; Nhede, 2021). Stabilizing Lebanon's

electricity network is estimated to require an annual investment of USD 1.6 billion (Nhede, 2021).

Table 2: EDL's Current Generation Capacity

Existing EdL power plants	Year Commissioned	Fuel	Technology	Installed Capacity (MW)	Derated capacity (MW)	Capacity factor (%)	Net Power (MW)
Zouk	1984-1987	Heavy Fuel Oil (Grade A)	Steam Turbine	607	300	65%	195
Jieh	1970-1981	Heavy Fuel Oil (Grade A)	Steam Turbine	343	140	68%	95.2
Zouk Recip	2017	Heavy Fuel Oil (Grade B)	ICE	194	194	88%	170.7
Jieh Recip	2017	Heavy Fuel Oil (Grade B)	ICE	78	78	87%	67.9
Zahrani	1998-2001	Gas Oil	CCGT	469	395	89%	351.6
Deir Ammar	1998-2002	Gas Oil	CCGT	464	430	73%	313.9
Baalbek	1996	Gas Oil	OCGT	64	60	36%	21.6
Tyr	1996	Gas Oil	OCGT	72	60	44%	26.4
Richmaya-safa	1931-1956	Hydro	Hydro	13	12	9%	1.1
Naameh Landfill	1997-2016	Biogas	Biogas	7	7	105%	7.4
Existing IPPs							
Litani	1961-1967	Hydro	Hydro	199	47	45%	21.2
Nahr Ibrahim	1951-1961	Hydro	Hydro	32	17	44%	7.5
Nahr Al Bared	1936	Hydro	Hydro	17	6	56%	3.4
Kadisha	1924-1961	Hydro	Hydro	21	15	45%	6.8
Hrayche	1975	Heavy Fuel Oil (Grade A)	Steam Turbine	75	45	51%	23
Total Generation Capacity				2,655	1,806		**1,312**
Technical Losses					-17%		-17%
Net Distributed Power					1,499		**1,089**
Installed Distributed PV					688	21%	144
Peak Demand (2022)							2,500
Missing Generation							**1,411**

Note. The derating of most of these power plants is essentially a result of their age and maintenance. Adapted from Boukather (2023), Bramley et al. (2020), and UNDP (2016).

The collapse of EDL has fueled a surge in distributed solar photovoltaic (PV) applications, despite limited regulatory support. By 2022, Lebanon had installed 900 MW of solar PV, with 663 MW added that year alone (Tsagas, 2023). PV capacity rose from 0.33 MWp in 2010 to 90 MWp by 2020, achieving 90% of the National Renewable Energy Action Plan's target (LCEC, 2022). However, with an annual capacity factor of 21%, the installed solar PV capacity in 2022 translates to approximately 144 MW of available power. Investments accumulated to USD 135 million, while emission offsets grew from 377 tCO2e in 2010 to 20,458 tCO2e in 2019 (LCEC, 2022). The recent Distributed Renewable Energy Law (No. 318/2023) regulates

net metering[5] in all its forms, and permits private sale of renewable electricity through power purchase agreements (PPAs) and equipment leasing[6].

Distributed renewable energy (DRE) generation is proposed as an alternative to large-scale projects by generating electricity near its point of use, cutting T&D losses, capital costs, and minimizing environmental externalities. Despite EDL approving net metering arrangements in 2011, technical and administrative barriers have hindered its widespread adoption, including grid limitations and delays in meter installations (Tsagas, 2023). Following the collapse of EDL, net metering is nonexistent, with most PV systems operating as off-grid battery systems for self-consumption, leading to wasted electricity once consumer needs are met and batteries are fully charged (Tsagas, 2023).

4.2. An "Independent" Regulatory Authority

Appointing an independent regulator or Electricity Regulatory Authority (ERA) in the power sector is among the primary conditional reforms for Lebanon to receive assistance from international finance institutions (IFIs). Generally, the rationale behind it, highlights a country's long-term commitment to promoting a sustainable and competitive electricity market. As an independent public body, the ERA would ensure balance to concerned stakeholders, by protecting consumers against overpricing and uneven market power, while shielding investors from arbitrary government actions.

[5] Net metering allows prosumers (producers and consumers) with a two-way connection to the grid to be compensated for surplus electricity based on a rate set by the regulatory authority (EBRD, 2019b; LCEC, 2023).

[6] Renewable energy leasing enables consumers to lease a renewable energy system from a third party for a monthly fee, typically over a contract period of 10-20 years (EBRD, 2019a).

In addition to mitigating tensions, the ERA would provide technical oversight, oversee tenders, and grant licenses for PPP projects contracted in electricity production and distribution. Furthermore, all on-grid distributed renewable energy configurations would be governed by the ERA, regulating fair pricing, power wheeling arrangements, and net metering schemes (Ahmad et al., 2021a). Ahmad et al. (2021b), warn of the risk of establishing an ERA too quickly to please the international community. Illicit elite-level arrangements can undermine its independence as an impartial regulator and result in a "political economy trap" (Ahmad et al., 2021b). The ERA would be held hostage by the same mechanisms of rent generation and distribution that have sabotaged the performance of the power sector and other regulatory authorities. In this way, the ERA would trap citizens and the international community in what would be a continuation of the clientelist status quo, but in a more familiar institutional arrangement.

Why then is establishing an independent regulator given such high importance? Establishing the ERA would limit the ministry's influence on awarding contracts and distributing benefits (Ahmad et al., 2021b). A redistribution among a broader group of stakeholders, reduces the discretion of the political party controlling the ministry and disrupts present clientelist relations between political and business elites. Furthermore, resistance against privatization indicates that elites perceive such changes as a genuine threat (Ahmad et al., 2021b). As a result, the formation of a new regulatory body ultimately falls prey to elite capture like many other state institutions. This closely aligns with the development literature, which warns of "regulatory capture" in states with weak governance (Ahmad et al., 2021b).

Lebanon's regulatory bodies, from banking to telecom, have failed to protect public interests, with board members appointed based on sectarian lines. This defeats

the purpose of regulatory bodies, and as a consequence, has steered the country to the worst financial crisis seen anywhere since the 19th century, with telecom suffering from the highest mismatch between services and tariffs in the world (Ahmad et al., 2021b). According to the World Population Review (2024)'s Internet Cost by Country metric, Lebanon ranks as the most expensive globally, costing approximately USD 7 per month per megabyte per second despite poor internet speeds.

Furthermore, the Council of Development and Reconstruction (CDR), a public administration responsible for planning and executing infrastructure projects, has been criticized for favoritism toward politically connected firms, disadvantaging others in contract applications (Ahmad et al., 2021b). This bias stems from the very process of appointing CDR board members, which often serves as a political exercise where elites nominate close affiliates. Recent evidence shows that these politically connected board members enable favored firms to secure significantly larger contracts, limiting opportunities for unconnected firms to compete equally (Ahmad et al., 2021b). Such institutions are formed to tackle issues of resource distribution and nepotism. Given this context, Lebanon's elite are unlikely to leave the composition of the ERA to chance or technical expertise.

4.3. Law 462 & Transparency in Lebanon

Failures in the power sector originate from deep-rooted political economy challenges (Ahmad, 2020). Many PPP projects launched by the government have come under criticism for not reaching financial closure, achieving contracted targets, rehabilitating infrastructure, and providing adequate services to citizens. Failure in this regard is attributed to two things: the lack of a standardized contract design for project

preparation and inadequate tender processes conducted under sector-specific laws (Abi Haidar, 2019).

Ratified in 2002, Law No. 462 was to organize the electricity sector, unbundle its activities, and establish the National Electricity Regulatory Authority (NERA), a public entity that would enjoy administrative, financial, and technical autonomy to issue 50-year licenses through public tenders and offerings (Ayoub & Moawad, 2022)(Abi Haidar, 2019). If implemented, Law No. 462 promised to create a more transparent and competitive market for public service delivery (Ayoub et al., 2021). Law No. 462, often regarded as the singular solution to the sector's challenges, promotes the formation of three publicly owned companies to manage the value chain and unbundle generation & distribution, where up to 40% of shares will be under the private sector (Ayoub et al., 2021)(Abi Haidar, 2019).

To date, Law No. 462 remains unimplemented, with the NERA yet to be established and no progress realized in unbundling the power sector. There is an on-going official stance to by-pass the framework through amendments, such as Law No. 75/2006, and subsequent extensions, including Law No. 288/2014, Law No. 54/2015, and Law No. 129/2019 (Ayoub et al., 2021)(Abi Haidar, 2019). These amendments specifically targeted Article 7 of Law No. 462, which grants the framework its legal personality and made it not subject to Decree 4517/1972; the public order governing all public institutions (Ayoub et al., 2021). The CoMs, in this way, would temporarily issue licenses for electricity generation to IPPs and extend contracts to operators and service providers, based on proposals from the MoEW. As a result, like many laws in Lebanon, Law No. 462/2002 remains ratified and disregarded under political deadlock.

Laws often go unimplemented in Lebanon due to the country's confessional system, which necessitates consensus across all political and public spheres (Ayoub & Moawad, 2022). Confessionalism is at the forefront when agreeing to the implementation of laws, and grants equal power to all political actors, making it challenging to enforce laws when one party or actor opposes them (Adwan, 2004). In 2019, there were 52 laws ratified but unimplemented, effectively rendering the legislature as useless in its law-making function (Ayoub & Moawad, 2022). The judiciary branch also faces challenges as it is not autonomous and prone to political interference. As a result, the political elite get away with not implementing laws, including those promoting transparency.

There is widespread lack of checks and balances in Lebanese public institutions, leading to an absence of public accountability and transparency. This is particularly evident in the power sector, where mismanagement has resulted in highly inefficient, insufficient, inequitable, and polluting electricity provision despite substantial government subsidies (Ayoub & Moawad, 2022). Lebanon's power sector has been particularly prone to corruption and dysfunction, and is a platform to maintain a clientelist system of rent distribution (Ahmad et al., 2022). Through service contracts, subcontracting companies, and nepotistic job selection, the sector has generated politically-oriented profits that were accompanied with non-transparent processes (Ayoub & Moawad, 2022).

A review of sector activities over the past few decades, reveal evidence of rampant corruption along the electricity value chain (Ayoub & Moawad, 2022). Corruption in the power sector is exceedingly costly and is an immense barrier to economic development in the country. Transparency laws are not implemented, they are

resisted (Ayoub & Moawad, 2022). The lack of law implementation and accountability is fundamentally linked to the consensus based political system that emerged after the Civil War. The Ta'if Agreement of 1989, which birthed the confessional system, also gave the CoMs unrestricted authority over their respective ministries; as bottlenecks of all sector decisions, becoming the make-or-break entity in applying laws and decrees (Ayoub & Moawad, 2022). While consensus was essential in ending the war, the agreement reshaped the power-sharing formula in a way that hindered effective governance. By concentrating decision-making authority, distributing among sects and undermining the separation of powers and rule of law, it crippled the state's ability to provide essential public goods and services.

4.4. Mismanagement and the power sector

Corruption in the power sector has been a significant impediment to economic growth in many developing countries. The literature distinguishes between various types of corruption in the power sector, ranging from petty corruption and theft (such as bribing meter readers or illegal connections that tap into the national grid) to corrupt management practices (such as overpayment of fuel suppliers or rigging procurement processes), and grand corruption (as seen in the scandals associated with emergency power purchases in Tanzania or the privatization of distribution companies in Nigeria) (Ahmad et al., 2020). Corruption significantly reduces the efficiency of utilities and undermines the overall performance of the sector, particularly in terms of technical efficiency, access rates, and economic margins.

It also damages the reliability of services. Utilizing data from 118 countries, Pless & Fell (2017) discovered that the tendency to engage in bribery for connections is

directly linked to an average increase of 14 power outages per month and a 22% rise in annual sales lost due to outages. Corruption also greatly diminishes labor productivity, raises transmission and distribution losses, and hampers efforts to enhance access to electricity services (Wren-Lewis, 2015; Dal Bó, 2006; Estache et al., 2009). Paradoxically, the limited access resulting in part from corruption encourages bribery and further corruption to gain access. Cummins and Gillanders (2020) demonstrate that areas where individuals report paying bribes to access services are more likely to have electricity, indicating a relationship between the amount of bribes paid and access rates.

Lebanon's electricity sector has long been plagued by mismanagement, a reflection of the broader systemic issues that have persisted since the Civil War (Ahmad et al., 2020). Over the decades, this dysfunction has worsened EDL's performance and contributed to a serious drain on public finances (Ahmad et al., 2020). Despite rising generation costs, the government kept electricity tariffs artificially low, pegged at USD 9c/kWh from 1994 to 2022, while failing to adjust for market fluctuations. This resulted in a persistent supply gap and fiscal deficit for EDL, which was covered by government transfers, diverting public funds that could have otherwise been allocated to social services. Political interference prevented necessary tariff adjustments, leaving EDL unable to operate sustainably. As a result, the utility became dependent on limited cash injections due to austerity policies, struggling to operate its inefficient and costly power plants while failing to provide adequate electricity supply to citizens.

One outcome of the demand-supply gap was the proliferation of the de facto diesel generator market. The diesel supply chain, specifically its generator owners, are frequently labeled as the "generator mafias," while the major diesel importers and distributors are referred to as the "oil cartel" (Ahmad et al., 2020)(Ayoub, 2020). Both

entities are deeply entrenched in and contribute to Lebanon's spoils system, as well as substantially benefiting from EDL's underperformance.

Ahmad (2020) estimated the diesel market's worth, including fuel imports, distribution, generator sales, and maintenance, at USD 2 billion. Additionally, Ahmad (2020) calculated the cost of fuel required to address EDL's 37% supply gap in 2018 at USD 1.78 billion in diesel expenses for 8.1-8.6 TWh of power. Similar to other informal sectors in Lebanon, the informal diesel generator market does not pay *taxes*. Given its prolonged unregulated existence, significant losses in tax revenue for the treasury are expected (Ahmad, 2020). In 2018, diesel gensets emitted about 3,400 Gg of CO2 equivalent, representing 40% of the country's total electricity emissions and 11.4% of total CO2 emissions (Ahmad, 2020).

Given the adverse impacts of mismanagement on the sector, there have been a number of attempts to reform. Reform plans developed by the Ministry (such as the 2010 policy paper, the 2019 updated policy paper, and the 2022 policy statement) and ratified laws (such as Law No. 462/2002, Law No. 48/2017, and Law No. 244/2021) promote improved operations, the establishment of a NERA, and transparency over EDL accounts, tenders, and procurement procedures (Ahmad et al., 2020). However, none of these appeals have led to meaningful reform.

Recent research by Khan et al. (2019) on the nature of corruption practices clarify why traditional reform efforts fail as anti-corruption strategies (Ahmad et al., 2022). They argue that developed economies benefit from robust support by powerful organizations who guarantee widespread law enforcement. On the contrary, poorer states are more susceptible to corruption, where influential actors can shape regulations informally, reducing the impact of general law enforcement (Khan et al., 2019; Ahmad

et al., 2022). Additionally, the majority of the population, who would gain from comprehensive law enforcement, lack the power to check adherence to the rule of law.

In countries like Lebanon, where informal networks and patronage systems dominate, sectarian elites routinely bypass formal regulations. Traditional sector reforms fail because those benefiting from the current status quo wield significant power to resist meaningful change. Thus, in the power sector, reforms proposed by the Ministry or the IMF remain unimplemented. These efforts assume a *functional* state *capable* of enforcing nation-wide policies and ensuring accountability, but entrenched sectarian groups and rent-distribution systems create substantial barriers-to-reform.

Khan et al. (2019) emphasize that in such contexts, traditional anti-corruption strategies are unlikely to succeed. Effective reforms must not only yield development benefits but also align with the *interests* of powerful groups. Understanding the nature of rents, corruption types, and political settlements[7] is crucial to designing context-specific anti-corruption policies (Khan et al., 2019). Such tailored approaches can improve development outcomes while working *with* existing constraints and dynamics of organizational power in a given sector, society, or country. Khan et al. (2010) also examine how political economy factors shape the way institutions function, connecting institutional development to their political environments/settlements. This perspective is important for designing effective governance reforms, as it helps determine which institutions can best support growth in a given context or whether changes to the broader environment are needed to overcome barriers to progress.

[7]A political settlement refers to the balance between power and institutions that ensures mutual compatibility and sustainability. It is maintained when powerful groups receive acceptable benefits from the institutional structure and when those institutions achieve the minimum economic performance and political stability needed to sustain society (Khan et al., 2010).

Moreover, the importance of understanding configurations of power extends beyond anti-corruption strategies. As Levy (2014) highlights in the concept of 'working with the grain,' where the feasibility of reforms in any country is closely tied to the nature of its political settlement (Khan et al., 2010; Ahmad et al., 2022). Roll (2014) argues that supporting 'pockets of effectiveness' may yield better outcomes than imposing top-down governance reforms, which often fail to bring about substantial change (Khan et al., 2019; Ahmad et al., 2022). This aligns with evidence showing that applying 'best-practice' governance models from other contexts has a poor track record in achieving meaningful progress (Levy, 2014; Khan et al., 2019; Ahmad et al., 2022). Similarly, Andrews (2015) emphasizes the value of learning from 'positive deviance,' or unexpected instances of success in challenging environments, as these examples can offer insights into achieving impact in politically feasible ways (Ahmad et al., 2022).

Ahmad et al. (2022) provide a documented example of Électricité de Zahlé (EDZ), illustrating what the literature terms as a 'pocket of effectiveness' (Roll, 2014), 'working with the grain' (Levy, 2014), and 'positive deviance' (Andrews, 2015). Drawing on Khan et al. (2019)'s conceptual framework, Ahmad et al. (2022) analyze how EDZ navigated Lebanon's challenging political economy to establish a functioning electricity provision mechanism. Khan et al. (2019) highlight the potential of such approaches that align with existing settlements and dynamics to achieve progress in sectors marked by inefficiencies and corruption.

Khan et al. (2019)'s framework provides a way to understand why traditional top-down reform strategies have failed in Lebanon's electricity sector and points to the need for a more nuanced approach that *aligns* with the interests of powerful Lebanese players. By analyzing the issue of political settlement in Lebanon and detailing the

incentives at play, one can design reforms that are both politically feasible and effective in improving the sector's performance. The case study of EDZ will be explored in greater detail in the following chapter.

CHAPTER 5

BRIEF OVERVIEW OF PUBLIC-PRIVATE PARTNERSHIPS IN LEBANON

Lebanon's political economy is best captured as the struggle to impose and maintain a liberal, laissez-faire (*al-siyasa al-yad al-marfu'a*) economic model, championed by a 'commercial-financial bourgeoisie', under minimal state intervention (Leenders, 2004; Kardahji, 2015). This model was explicitly referenced in the 1989 Ta'if Accord and the amended postwar Constitution (Leenders, 2004). Unlike many neighboring countries, Lebanon has long stood as an exception to the state *dirigisme* of the region and the developing world. The model meant affixing the economy to regional powers, particularly Gulf oil-producing states, to promote the country's historical role as a financial *entrepôt* for the Middle East (Leenders, 2004; Kardahji, 2015). The ruling elite struggled to maintain the existing status quo and economic model, designing a rigid political system that resisted even moderate reforms in order to preserve it.

However, rigidity, regional attachment and stark emphasis on trade, finance and trade sectors, proved to be highly unstable for the country (Kardahji, 2015). Critics argue that the minimalist state fostered wide socioeconomic disparities and neglected the country's productive sectors (Leenders, 2004). Despite this, international organizations viewed the country as progressive, praising Lebanon's thriving private sector and liberal economic policies (Leenders, 2004). Postwar reconstruction plans, under the leadership of Prime Minister Rafiq al-Hariri, further championed laissez-faire as key to economic recovery, advocating for private-led growth through partnerships and privatization. Kardahji (2015) concludes the key characteristics of the Lebanese system, down to its instability, inequality and political inflexibility, and argues that

‘Lebanese exceptionalism’ is rooted not in Lebanon’s sectarian divides but in its risky laissez-faire economic model.

Following the end of the Civil War (1975-1990), Lebanon faced significant challenges in reconstruction and the provision of adequate public services. This shortfall created opportunities for the private sector and civil society organizations to contribute through service delivery, although informally (Abi Haidar, 2019). In the 1990s, the Lebanese government committed to privatization and PPPs as a strategy to address the growing public debt and to rehabilitate infrastructure (Straub, 2019). However, minimal efforts were made to establish a regulatory framework to govern such agreements and support infrastructure projects effectively. Prior to the ratification of PPP Law No. 48/2017, PPPs lacked the necessary investor guarantees to mitigate commercial risks and ensure transparency—key conditions for IFIs to consider PPPs as bankable (Abi Haidar, 2019). Despite the absence of a comprehensive framework, Lebanon implemented several PPP projects using management contracts, BOT agreements, and concession contracts.

Table 3: PPP initiatives implemented in Lebanon.

Sukleen handling solid waste collection and treatment
SOLIDERE planning and redeveloping Beirut Central District
Ondea awarded management contract for Tripoli Water Authority
Concessions awarded to expand Beirut International Airport
LibanPost operating postal sector
Beirut Duty Free operated by Phoenicia – Aer Rianta Company (PAC)
MAPAS operating Jeïta Grotto tourist attraction
Mobile phone network awarded to France Telecom, Mobile Liban and LibanCell
Karadeniz Holding deploys power barges
IBC Waste Treatment Facility
Akkar Wind Farms
Solar Farms
Concessions (Zahle, Jbeil, Aley and Bhamdoun)
Distribution Service Providers (DSP) Project

Source. Adapted from Abi Haidar (2019).

The past portfolio of PPPs in Lebanon spans a wide array of sectors, including electricity, waste management, tourism, postal services, and telecom (Straub, 2019). However, due to the controversy associated with privatization and PPPs, the debate over these partnerships has been contentious in Lebanon. Privatization in the country has often been perceived as serving the commercial and political interests of ruling elites (Straub, 2019). Sectarian dominance and *Muhasasa*, where political and sectarian leaders distribute public sector positions to their cronies, have both hindered the

privatization process and blocked efforts to reform public sector institutions and state-owned enterprises in all sectors (Leenders, 2004; Straub, 2019). Moreover, many of the privatization and PPP initiatives have been criticized for clear violations of enacted laws, including Privatization Law No. 228/2000, Electricity Sector Law No. 462/2002, and PPP Law No. 48/2017 (Straub, 2019).

A look at Lebanon's history with PPPs reveals an uneven performance and mixed results, reflecting both questionable successes and notable failures, similar to the experiences of other developing economies (Straub, 2019). Many projects have encountered significant governance and political challenges, resulting in inefficiencies, unmet targets, subpar services, cost overruns, and frequent renegotiations (Straub, 2019; Ayoub et al., 2021). This has raised concerns about the feasibility of PPPs as a viable policy solution within the current Lebanese context. Straub (2019) examines several PPP initiatives in Lebanon, analyzing the reasons behind PPP limited success and offering policy recommendations aimed at reducing inefficiencies and conflicts in the PPP process.

5.1. Public-Private Partnerships in Lebanon: Beyond Energy

In a case study on PPP projects in telecom, tourism, waste management, and postal services in Lebanon, Straub (2019) observed that all four projects endured serious setbacks arising from *tensions* between the public and private sector. These tensions led to renegotiations in some cases, and all projects had to navigate a complex regulatory environment. Straub (2019) observed that while some PPP projects achieved short-lived or questionable success, others failed entirely, prompting the question of what factors drive the varying performance of PPPs in Lebanon?

Straub (2019) attributes the relative success of the postal service PPP to its simplicity, well-defined scope, innovation, and flexibility. In contrast, other PPP projects—such as those in waste management, tourism and telecom—suffered from opportunistic behavior, political interference, complexity, rigidity, lack of expertise & independence, short-sightedness, incoordination, and stakeholder disputes (Straub, 2019).

In 1994, two BOT agreements were awarded to private operators: one to Cellis (currently Alfa), a JV with France Telecom and local investors (Mikati Group), and the other to Libancell (currently Touch), a partnership where Telecom Finland and local stakeholders (Dalloul Group)(Straub, 2019; SMEX, 2024). The initiatives aimed to DBFO Lebanon's mobile infrastructure for a period of 10-12 years before transferring the network back to the state (SMEX, 2024). It included an escalating revenue-sharing scheme from voice calls, starting with 20% for the first eight years, increasing to 40% for the subsequent two years, and reaching 50% thereafter (Straub, 2019). By June 2001, the private companies had a combined subscriber base of 759,300, with the network covering more than 80% of Lebanese territory while offering one of the lowest service rates in the world at USD 8c/min (Jamali, 2004).

The affordability of mobile services in Lebanon drove up usage, averaging 750 minutes per subscriber per month, however, the rapid uptake of GSM subscription levels led the government to cap subscriptions at 125,000 per operator (Jamali, 2004; Straub, 2019). Operators Cellis and Libancell contested the subscriber cap, arguing it undermined Lebanon's significant growth, breached obligations to fulfill market demand, and was counterintuitive by reducing government revenue (Jamali, 2004). Tensions grew when the MPT raised mobile call taxes by USD 4c/min. in 1999 (Jamali,

2004). Furthermore, the State Audit Department produced a report accusing the operators of exceeding the subscriber limit, evading/delaying government fees and taxes, and providing inadequate network coverage, imposing over USD 1 billion in penalties (Jamali, 2004). An international legal arbitration led to the premature termination of the contracts in 2001 due to alleged violations, with the companies ultimately receiving USD 286 million in compensation (Straub, 2019).

In the absence of a defined regulatory framework and oversight bodies, Lebanon's PPP experiment in Telecom was short-lived (SMEX, 2024). The contract suffered from being overly complete, complex, and ambiguous in definitions and terms, lacking the necessary foresight and adaptability (Straub, 2019). This, coupled with a lack of regulatory expertise and independence, and expectations of significant public sector *rents* from the potential sale of licenses for elites, paved the way for contract violations and opportunistic behavior (Straub, 2019). Operators delayed settling dues, while disputes arose over capacity and quality constraints. In the end, the operators were accused of exceeding the subscriber limit, with allegations of high-profile public officials being involved in their operations.

Additionally, the state exploited the Telecom sector as an indirect taxation tool, charging citizens double the actual cost of services (SMEX, 2024). As a result, the treasury was accumulating an increasing share of revenues from the operators, alongside an additional tax on mobile services in *USD*; contrary to Lebanese law (SMEX, 2024). By 2010, the government increased the per-minute call rate from USD 5c to USD 11c, and funneled over USD 1.5 billion annually in taxes (SMEX, 2024). These funds primarily *subsidized* the struggling EDL and secured fuel for its operations

(SMEX, 2024). Ultimately, the PPP initiative collapsed, and the government continues to monopolize the telecom sector today.

Lebanon's waste management PPP in Saida exemplifies many of the same challenges faced by PPPs in Lebanon. In 2002, a 20-year BOT contract was signed between the Saida Municipality and IBC s.a.l for a waste treatment facility capable of processing 250 tons of solid waste daily (Straub, 2019). Under this agreement, IBC was tasked to DBFO and maintain the facility, while also being granted the right to sort and sell recyclable materials. The project was exceedingly complex both technically and administratively, involving multiple public entities, which made coordination challenging.

In the PPP, the Saida municipality was responsible for solid waste collection, while IBC s.a.l. operated the waste treatment facility for anaerobic digestion, producing methane gas for electricity and organic fertilizer as a by-product (Straub, 2019). However, the waste delivery chain did not meet the plant's technological requirements. The municipality's insistence on keeping garbage cans outside of houses made the treatment process impossible, as chemical decomposition would have already begun, compromising the process of anaerobic digestion due to untimely collection (Straub, 2019). This caused multiple interruptions and delays, ultimately leading to the process never being implemented as originally designed.

Operations were halted for three years, followed by a contract renegotiation in which the separation and anaerobic treatment of waste were replaced with an arrangement that provided free transport and a fixed fee of USD 95/ton for simple treatment (Straub, 2019). The arrangement, designed for a population of 300,000, was overwhelmed by the waste from 550,000 residents, in addition to 150 tons shipped daily

from Beirut (Straub, 2019). As a result, a new mountain of waste emerged in the vicinity. Furthermore, the project lacked a wastewater treatment facility that could have supplied sludge to the digester, resulting in wastewater being discharged into the sea. The plant's inability to process and store all waste led to improper disposal of by-products, which accumulated and were often dumped into the sea, creating a serious ecological hazard to surrounding areas (Abu Alfa, 2020).

The PPP's complexity required a complete reorganization of the sector, something that was hardly possible given the lack of regulatory expertise and the inability of authorities to curb the opportunistic behavior of other operators (Straub, 2019). Despite these challenges, the city built a seawall and seaside landfill to contain the waste, a solution that came with significant costs. A central point of controversy in the waste management PPP was the *usage* of the land reclaimed from the sea. Additionally, filling the marine basin to accommodate the treatment plant and landfill raised pressing concerns about hazards to marine ecosystems and long-term risks to public health of nearby residents due to the degrading waste (Abu Alfa, 2020).

Likewise, the Tourism sector PPP faced a similar complex institutional environment, negotiating with several uncoordinated public partners. In 1993, the Ministry of Tourism awarded Mapas Co. a 30-year BOT contract for the rehabilitation and operation of Jeïta Grotto's natural limestone caves (Straub, 2019). The Jeïta Grotto PPP was the first public-private partnership following the Civil War (1975-1990). Between 1996-2017, the Jeïta Grotto averaged approximately 260,000 visitors annually (Straub, 2019). However, the site experienced a sharp decline in visitors during three key events: the assassination of Prime Minister Rafic Hariri in 2005, the 2006 Israel War, and the onset of the 2011 Syrian War (Straub, 2019). Visitor numbers to Jeïta

Grotto peaked in 2010 and 2011 but fell below 1995 levels in the following years. Nationwide, tourism revenues peaked at USD 8 billion in 2010 and dropped to USD 7 billion between 2011-2015 as a result of the Syrian conflict and regional turmoil (Hausmann et al., 2023).

Tensions emerged between the parties as a result of frequent changes to the Minister of Tourism, interference in employee hiring, and disagreements between public partners: the Jeïta Municipality and the Ministry (Straub, 2019). A major point of contention was the changes to visitor tariffs. While inflation and rate adjustments were stipulated in the contract, successive ministers *opposed* them on no clear grounds. The decline in visitors, coupled with inflation and absence of income guarantees, severely undermined the site's long-term viability, as over 40% of its income had to be transferred to the state while relying heavily on imported materials for cave maintenance (Straub, 2019). Subsequently, the concessionaire pursued legal action, eventually being granted a tariff increase after 8 years of litigation (Straub, 2019).

Straub (2019) presents Lebanon's postal service PPP as a relative success due to its robustness, despite the absence of a regulatory framework, and its adaptability, which permitted several adjustments over the contract's period. Following the Civil War, the CDR aimed to rehabilitate Lebanon's postal services through private sector involvement. In 1998, a 12-year BOT contract was awarded to Canada Post Systems Management Limited (CPSML) and ProFac Management Group (Straub 2019; Megaphone 2023). Initial targets of the private operator were to invest USD 70 million to restore postal services (stamp and mail carriage) following the war. The agreement included an increasing revenue-sharing model with the government of between 5% and 40%, and depending on annual revenues (Straub 2019; Megaphone 2023).

By 2001, the Canadian operators had sold their stake in LibanPost to Lebanese private investors due to the government's failure to fulfill its promises of support (Monson & Di Serracapriola, 2024). These included assurances to assist with delivering municipality, telephone and electricity bills—promises that were ultimately not met (Sioufi, 2013). Bank Audi, through its subsidiaries under Lebanon Invest, took control of the postal service PPP, alongside a consortium of Lebanese investors, including the Mikati family, and extended the BOT contract to 15 years, delaying the transfer back to the state until 2016 (Sioufi, 2013; Monson & Di Serracapriola, 2024).

Unlike other PPPs, LibanPost expanded its offerings by introducing services beyond those outlined in the initial contract. The government granted exclusive rights to LibanPost to provide a wide range of services and charge commissions on transactions between the general public and the state, including payments for official documentation, permits, bills, registrations, and other services (Monson & Di Serracapriola, 2024). Mobile and internet recharging services were later included, along with post and parcel services between government offices that generated over USD 27 million in fees over two decades (Monson & Di Serracapriola, 2024). Most notably, the government did not benefit from these income streams, as the new PPP agreement (under Bank Audi) allocated the state 5% from LibanPost's postal delivery services, excluding non-postal services (Megaphone, 2023; Monson & Di Serracapriola, 2024).

LibanPost's leadership described the PPP contract as resilient, despite a lack of conflict resolution mechanisms. Straub (2019) connects the PPP's performance to the contract's 'incompleteness', and the *leeway* granted to LibanPost to expand into new services and facilitate transactions between the general public and the government. On the contrary, local news outlet Megaphone alleges that LibanPost leveraged its

connections with public administrations to become the largest intermediary for transactions in Lebanon, generating massive profits without contributing to state revenues (Megaphone, 2023). Furthermore, about 65% of LibanPost's revenues come from non-postal services, making the operator highly profitable (Straub, 2019). This entails that the majority of LibanPost's revenues were not shared with the state and fell outside the scope of the PPP agreement.

In fact, available evidence indicates that even this seemingly successful PPP scheme resulted in a drain on public resources, or more accurately, a reduction in potential state revenues. Prior to the PPP, postal revenues contributed over LBP 12.4 billion to the public treasury between 1997 and 1998, with state institutions benefiting from free postal services (Megaphone, 2023). However, under LibanPost's tenure from 1999 and 2019, state institutions paid LBP 40.8 billion for postal services, while net treasury revenue remained below LBP 5.13 billion (Megaphone, 2023). In short, the PPP would have never continued without elite-level political backing.

PPPs are criticized for their incomplete contracts, increased future uncertainty, and long-term nature. In the case of Lebanon, the uncertainty emerging from its fluctuating economic condition and patronage system, requires periodic adjustments in PPP relations to maintain operations. This itself, Straub (2019) notes, is a bias for "optimal incompleteness," where weak governance environments *need* PPP contracts that are adaptable. However, awarding such incomplete and adjustable contracts makes room for serious contract errors that are potentially more damaging to PPP performance and public interests.

For PPPs in Lebanon, Straub (2019) suggests open-ended, flexible PPP contracts with two additional components to be more resilient. The first is the need for an

independent regulator to facilitate negotiations and mitigate tensions between sectors. Straub (2019) notes that independent local mediation may prove more useful than imposing arbitration procedures, because verdicts may not be respected, given the poor contract enforcement documented in Lebanon. The World Bank gave Lebanon a 50/100 score on total enforcement of contracts and the longest time span among MENA countries to resolve contract disputes at 725 days (Straub, 2019).

Secondly, in situations where authorities have weak incentives to abide by long-term contracts, revenue-sharing agreements can be made adjustable over time to be more resilient; as fixed revenue clauses lead to unexpected renegotiations (Straub, 2019). For instance, worsening economic conditions can place unforeseen pressures on private sector revenues, and improved economic conditions can result in unpredicted windfalls for the private sector.

In contrast to Straub (2019)'s first recommendation, Ahmad et al. (2021b) *caution* against the haste establishment of an "independent" regulatory authority just to appease IFIs. In the power sector, the authors *warn* that such an approach would neither produce effective short-term measures nor ensure long-term sustainability of the sector. Elite-level arrangements could quickly undermine its independence, viewing it as a threat to existing clientelist systems and transforming it into yet another tool for rent distribution (Ahmad et al., 2021b). Thus, a newly appointed authority, risks falling prey to the same elite capture that plagues many other institutions. Given this risk, along with the documented ineffectiveness of existing regulatory bodies such the Telecom and Petroleum authorities, the prospect of an *independent* authority in Lebanon appears questionable.

In the Lebanese context, Fabre & Straub (2023) concluded that not all governance failures can be fixed in the short term; hence, PPPs will need to strike enough compromises to reduce the potential costs of disruptive renegotiations in the future. This means finding the right balance of contract 'incompleteness' and tailoring the institutional processes to mitigate the risk of capture by vested interests or distortions in project implementation. The benefits of rigid contract commitment appear in strong governance environments; however, a more pragmatic approach of flexible agreements maybe necessary in the Lebanese context.

CHAPTER 6

PUBLIC-PRIVATE PARTNERSHIPS IN LEBANON'S POWER SECTOR

Without the implementation of Law No. 462 and the formation of an independent electricity regulatory authority (ERA), Lebanon's generation and distribution of electricity will remain monopolized under EDL (Ayoub et al., 2021). Authors *stress* that unbundling the sector and setting up the ERA would be the solution for project transparency, management, competition, and mediation among PPPs, and ensure efficiency while reducing risks (Abi Haidar, 2019; Straub, 2019; Ayoub et al., 2021; Boukather, 2023). Even Ahmad et al. (2021b), who caution against the ERA and falling into the "political economy trap," assert: "there can be no doubt that Lebanon needs an independent electricity regulatory if it ever wants sustainable electricity provision at competitive costs."

Despite failures to enforce Law No. 462 in the power sector, many attempts were made to outsource generation and distribution to the private sector between 2012 and 2018 (Abi Haidar, 2019). These included: the 2012 Distribution Service Provider (DSP) project that awarded three firms to operate the distribution network, the 2013 Karadeniz floating power stations contracted to generate electricity, and the 2018 Akkar wind farms project that awarded three firms to develop and generate for EDL under a 20-year power purchase agreement (PPA[8])(Abi Haidar, 2019).

Meanwhile, in 2017, the MoEW launched an expression of interest (EOI) for solar PV farms totaling 180 MW. In 2022, when negotiations and tariffs were

[8] A PPA is a contract between a consumer and renewable energy producer for the purchase of electricity for a specified period of time at a predetermined tariff (LCEC, 2023).

concluded, 11 licenses were issued for 11 solar farms across Lebanon with a total capacity of 165 MW (LCEC, n.d.). Like the Akkar wind farms, which never launched, the solar PV farms have not reached financial closure due to the ensuing economic crisis in the country and lack of any investor guarantees following Lebanon's sovereign default. However, as long as Law No. 462 is not applied, there is no legal framework to regulate and monitor PPP development and operations, nor will there be generation or distribution entities outside EDL and not licensed by the CoMs.

6.1 Distribution Service Providers

Over the years, EDL would outsource distribution responsibilities to concessions and distribution service providers (DSPs) contracted to O&M the grid, collect bills, and upgrade infrastructure. In June 2010, the Ministry of Energy & Water (MoEW) approved a policy paper for the power sector, which included a PPP initiative to improve electricity distribution through Distribution Service Provider (DSP) project (IRENA, 2020). The scope of the project would be to upgrade, operate, and maintain the network along with customer and billing services (Électricité du Liban., n.d.).

Additionally, the DSP project would be one of the few PPPs in Lebanon with a clear objective of rehabilitating and upgrading the distribution network through investments and implementation of a smart grid (Saghir et al., 2020). The financial crisis and the collapse of the Lebanese currency have significantly impacted the project as the DSPs depend on USD-denominated payments. However, since 2023, EDL has lifted its unsustainable tariff and denominated bills in USD, a change that will improve EDL's financial stability for the first time in three decades and ensure consistent payments.

Prior to outsourcing distribution, the sector was exclusively managed by EDL that employed contractors and staff responsible for operations, maintenance, and bill collection (Ayoub et al., 2021). However, EDL was struggling with significant financial losses, reporting annual losses of USD 300 to 400 million (Multilateral Investment Guarantee Agency, n.d.)(BUS, n.d. -a). These losses were attributed to non-technical losses; mainly due to theft, reaching 25%, and technical losses at 15%, caused by outdated cables and equipment (BUS, n.d. -a). Meter reading was also a major challenge due to the different types of meters that were susceptible to interference. Recognizing the pressing need to address distribution losses, EDL and the ministry launched the DSP project to "ensure proper investment planning, effective execution of network extension, network O&M, metering and billing activities with full correlation of energy distributed, billed, and collected to minimize and eliminate losses", as stipulated by the contract (Électricité du Liban., n.d.).

In April 2012, the MoEW awarded four-year DSP contracts to three private firms: Butec Utility Services (BUS), KVA s.a.l. (a joint venture between the Arabian Construction Company and Khatib & Alami), and NEUC (part of Debbas Group) (Ayoub et al., 2021). One of KVA's primary goals was to create a digital platform for EDL of all physical assets owned, balancing costs, and monitoring distributed energy, to achieve the overall strategic objectives of EDL (KVA, n.d.). The total cost of the initial four-year period until August 2016 amounted to USD 800 million (Ayoub et al., 2021). The main objective of the DSP project aimed to enhance distribution services and contribute to the modernization of Lebanon's distribution infrastructure.

In May 2018, the Ministry appointed the private company MRAD utility services as the fourth service provider for the southern governorate without any *tender*

or competitive process (Ayoub et al., 2021). The other contracts were extended till 2018 and again till December 2021, in order to reach initial targets and implement the *advanced metering infrastructure* (AMI): commissioning, installing, and maintaining of 1.2 million smart meters with all necessary accessories at customer, MV feeders, and MV/LV transformers (Yehia, 2014). Other objectives included: completing a comprehensive network survey assessing the condition of assets, a network map, an investment plan to upgrade assets, construction/rehabilitation of facilities, network expansion, O&M, metering reading, meter inspection, violation removal, bill collection, and supervising & monitoring of all DSP activities by contracted project managers (Électricité du Liban., n.d.).

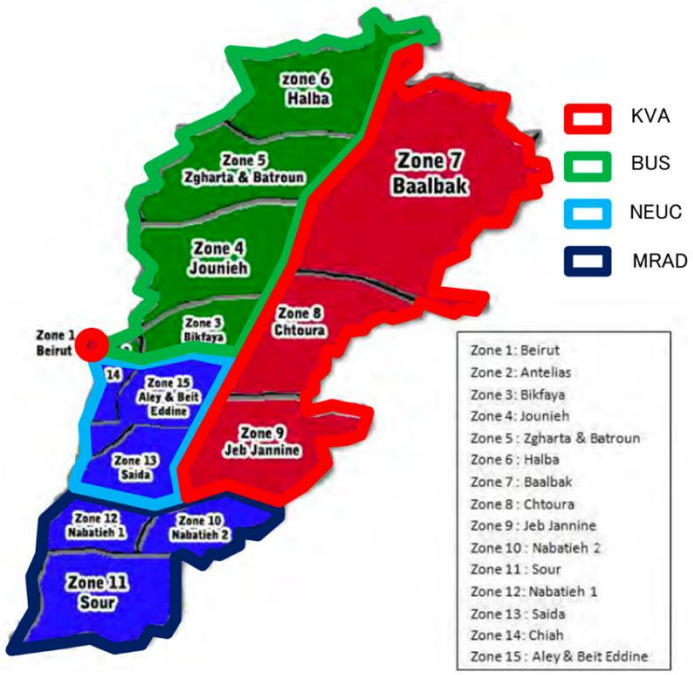

Figure 6: Geographic Distribution of Zones Among the DSPs.
Source. From Japan International Cooperation Agency, NEWJEC Inc., & Kansai Transmission and Distribution, Inc. (2023).

For the DSPs to effectively manage and efficiently track network losses, particularly the abnormally high non-technical losses (illegal connections and theft), EDL and the DSPs must first be able to locate them. The launch of the AMI system

aimed to address this challenge. The installation of smart meters at the levels of M1 (generation plant busbar), M2 (HV/MV substations), M3 (MV feeders), and private M4 (MV/LV transformers) had already been completed by the DSPs in their respective regions (World Bank Group, 2020)(Ayoub et al., 2021). What hindered the *full* deployment of the AMI system was installing the remaining *majority* target of meters at the public M4[9] (MV/LV transformers) and all M5[10] (LV customers) public and private customers, as well as the data concentrator units (DCUs) (World Bank Group, 2020). Full deployment was not seen to be possible due to security concerns in some areas and resistance from a number of customers on installation (World Bank Group, 2020). Furthermore, the lack of a clear government decision backed up by internal security forces and the army made the target unattainable.

The DSP project was initially supervised by NEEDS (Near East Engineering & Development Services) and was followed by Decon International and later by Électricité de France (EDF) (Ayoub et al., 2021). While the DSPs were tasked with bill collection on behalf of EDL, the function of issuing bills remained with EDL. This arrangement left EDL liable to delays and risks associated with untimely collection. One major bottleneck in the project was the late billing cycle that was 1 to 2 years behind, which meant collectors were collecting revenues from the previous year, and whose value in USD equivalent had diminished as a consequence of the rapid currency depreciation after 2019 (Boukather, 2023). Additionally, it is interesting to note that

[9] Refers to the Medium Voltage/Low Voltage (MV/LV) transformers located in public areas, which play a crucial role in managing electricity distribution, typically serving public infrastructure and facilities.

[10] Refers to Low Voltage (LV) customers, both public and private, who are the end users connected to the low-voltage distribution network.

collectors always collected bills exclusively in LBP, and that EDL is now issuing and collecting bills in USD as a consequence of the dollarization of everyday transactions.

As of December 31, 2021, the DSP contracts have expired. Several criticisms were raised about the *added* value, efficiency, and legality of the DSPs, such as the continuous renewal of the same providers without any improvements in collection revenues and few smart meters being installed (Saghir et al., 2020). Moreover, it was not clear how MRAD was awarded the DSP contract without any competitive procurement (Saghir et al., 2020). In addition, although key performance indicators (KPIs) that monitor supply interruptions, loads, maintenance completed, customer services, losses, investments, and overall efficiency, were recorded, they were rarely incorporated into decision-making (Ayoub et al., 2021). Performance targets were imbalanced, often favoring the private sector, whose infrastructure and operational services—such as bill collection and grid maintenance—were most urgently needed by the state (Ayoub & Moawad, 2022). Impressions from both private and public sector parties is that the project could not yield the desired results with subscribers feeling an underperformance in distribution services (Seif Edine, 2017; Ayoub et al., 2021).

For EDL, 2015, was the last fiscal year with an almost full collection rate (98%), which dropped significantly in 2016 (74%) and 2017 (66%) (Bramley et al., 2020; Ayoub et al., 2021). According to Bramley et al. (2020), this sharp decline was caused by the DSPs pausing their activities during parts of 2016 and 2017, with one operator, covering about 40% of EDL customers, not collecting any bills. In 2016, billing was disrupted by strikes from EDL staff, and in 2017, one operator halted meter reading and bill collection services due to an expired contract (World Bank Group, 2020). Although the contract was eventually extended in 2018, the delays caused significant setbacks.

By 2018, efforts were underway to recover unpaid bills from 2016 and 2017, yet billing in some areas still lag behind, reflecting the long-term impact of these disruptions. While the 2018 collection rate reached nearly 95%, this figure excluded unpaid revenues from public institutions (e.g., water utilities), political figures refusing to settle their bills, and refugee camps, all of which have historically had low collection rates (Ahmad et al., 2020; World Bank Group, 2020). Despite the introduction of the DSP project to address these challenges, uncollected bills, and technical and non-technical losses continue to contribute to EDL's fiscal deficit.

Although some progress and developments were made by the DSPs, major problems impacted the project's progress, mainly EDL's bureaucratic red-tape and complex procedures that did not streamline operations but caused serious delays (Ayoub et al., 2021). For instance, in Lot 1, technical improvements by BUTEC Utility Services (BUS) reduced technical and non-technical losses from 47% in 2012 to 21% in 2018 (BUS, 2020). This reduction, coupled with more efficient meter reading and bill collection, led to an average yearly income increase for EDL of over 50% compared to 2012 (BUS, 2020). Despite these achievements, systemic inefficiencies at EDL continued to undermine the broader potential of the DSP initiative.

Table 4: Shared DSP-EDL Workflow for Meter Reading, Billing, Tariff Collection, and Supply Management

Operation	Subject	Step	Work
Meter reading	DSP	1	Go to customers' premises, read meter indexes
		2	Go back to office, record meter indexes on the DSP's database
		3	Submit the compiled meter indexes to EDL by e-mail
Calcula-tion	EDL	4	Store the received meter indexes in data server of EDL
		5	Check the received meter indexes if there are any suspicions
		6	Calculate the tariffs from the meter indexes
Billing		7	Download the data and print out bill papers
Tariff collection	DSP	8	Go to EDL's office and receive the bill papers
		9	Go to customers at least twice for one bill and collect tariffs
		10	Deposit collected tariffs into EDL's bank account
Supply stop	EDL	11	Decide to stop the power supply to the outstanding customers
	DSP	12	Stop the power supply to the customers designated by EDL

Source. From Japan International Cooperation Agency, NEWJEC Inc., & Kansai Transmission and Distribution, Inc. (2023).

In meter installation, the DSPs needed around four approvals from EDL prior to installing, thereby delaying the deployment of smart meters (Ayoub et al., 2021). Inspection and removal of illegal connections required the presence of EDL employees, which further impeded efficiency. In terms of the contractual model, the DSP is an affirmation of the need to apply an advanced model of PPP suitable for the Lebanese context (Ayoub et al., 2021; Fabre & Straub, 2023).

Authors recommend the legal framework of the DSPs be replaced with provisions from Law No. 462/2002 for the *complete* privatization of the distribution sector, unbundling its services, and making the DSPs fully accountable for the grid and collection processes independently of EDL (Saghir et al., 2020; Ayoub et al., 2021; Ahmad, 2022; Boukather, 2023). This would be a decentralized distribution model, whereby EDL sells its generation to distribution service companies (*DISCOs*) who on-sell the electricity to consumers (Boukather, 2023).

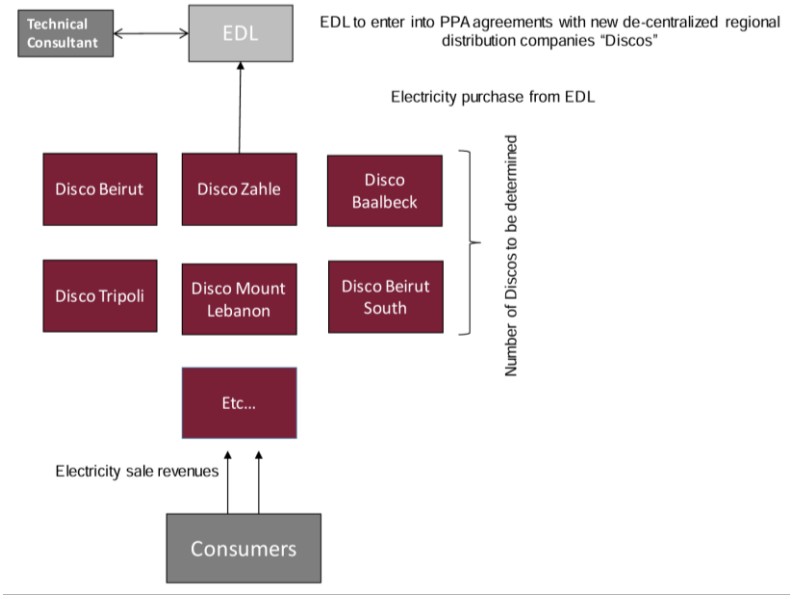

Figure 7: Fully Decentralized PPP Distribution Model.
Source. From Boukather (2023).

In Lebanon's experience, both the public sector and more recently the private sector with the DSPs, have never been successful in bill collection, suffering from high technical and non-technical losses which exceeded 40% in 2021. On the other hand, a few private firms like Électricité de Zahlé, Électricité de Jbeil, and even illegal private generators, are documented as relatively "successful" examples of electricity distribution in Lebanon, despite major concerns surrounding their operations.

6.2 Électricité de Zahlé

Despite the overall poor condition of the sector, there is one notable exception in Lebanon where a private utility, Électricité de Zahlé (EDZ), has provided reliable and high-quality electricity provision. EDZ serves the city of Zahle and 16 surrounding villages in the governorate (Ahmad et al., 2020). The EDZ concession was among the oldest in the country and operated as both a generation and distribution concession. EDZ's technical losses stood only at 5% and issued & collected 100% of its bills, while

being affordable and profitable in comparison to the tariff offered by diesel gensets and EDL (Ahmad et al., 2020).

Ahmad et al. (2022) explore how it was possible for EDZ to establish *functional* service provision in a complex political environment. The authors use Khan et al. (2019)'s framework to understand rent-seeking behavior and how EDZ adapted to the nature of Lebanon's *political settlement*. By leveraging historical contexts, such as the presence of a legal concession contract, and strategically building local and national coalitions of support, Zahle successfully established a 24/7 electricity service. This achievement was facilitated through EDZ's politically connected status and extractive business model, employing rents and forging alliances with powerful actors (Ahmad et al., 2020).

The uniqueness of EDZ as a generation and distribution model comes from the historical privileges EDZ has enjoyed in its respective Qaza. In the 1920s, the EDZ concession centered on power generation from Zahle's hydropower plant on the Berdawni River (Ahmad et al., 2020). After the establishment of EDL (1964) and in the Civil War (1975-1990), EDZ ceased its hydropower operations and became a power distributor for EDL. Like other cities in Lebanon, post-war electricity outages (1990-2014) were very frequent, which led to the proliferation of diesel generator networks. Around 120 generators operated in the Zahle area at the time (Ahmad et al., 2020). In late 2014, EDZ entered an agreement with Aggreko, a UK-based company specializing in power generation leases, to install a 35 MW diesel-powered plant and take over the market (Ahmad et al., 2020). The plant, owned and operated by Aggreko, would supply EDZ during EDL outage hours. In this arrangement, EDZ would function as an "off

taker" or DISCO, acting as both a distributor of EDL and Aggreko generated power. By September 2020, the total installed capacity was 60 MW (Ahmad et al., 2020).

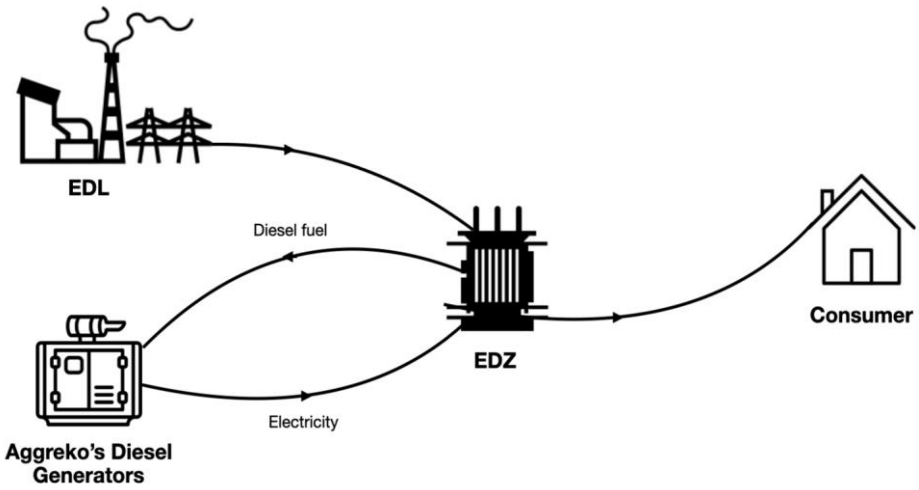

Figure 8: EDZ-EDL-Aggreko Concession Model.
Source. From Ahmad et al. (2020).

EDL could not *challenge* the EDZ-Aggreko model and the status quo of small-scale diesel generators from expanding, due to its inability to provide sufficient supply and in essence made their presence de facto. Moreover, the EDZ-Aggreko model has some notable advantages over dispersed diesel gensets. First, the model benefits from economies of scale and operates in an optimal load range, lowering operating and maintenance costs (Ahmad et al., 2020). Second, unlike neighborhood generators that are connected to low-quality illegal LV grids constructed in parallel to EDL's grid, the Aggreko plant is connected to EDL's MV grid, reducing technical losses in the process. In this way, EDZ reduced its *technical losses* to 5% in contrast to EDL's technical losses at 16.5% and diesel genset losses at 15% (Ahmad et al., 2020). Finally, from the end-user's perspective, the switch between EDL and Aggreko generated electricity was seamless due to the common grid use, eliminating losses in power quality.

In interviews conducted by Ahmad et al (2020) with EDZ subscribers, respondents highlighted that they no longer experience power outages, and that EDZ provided an integrated bill with higher quality services at an overall lower cost. The addition of power generation to EDZ's operations brought down the monthly electricity bill for residents in Zahle, in contrast to the extremely high tariffs from diesel generators in the area (Ahmad et al., 2020). Moreover, EDZ's effectiveness in lowering *non-technical losses* (theft and illegal connections) is another notable component. Total network losses for EDL were 40% in 2021, while EDZ's total grid losses was 5% (Ahmad et al., 2020). This means EDZ was extremely efficient in dealing with technical and non-technical losses combined. Another reason why EDZ is considered a "success" story is its near 100% bill collection. On the other hand, in 2017, EDL witnessed one of the lowest collection rates in recent years at 66% from its DSPs (Ahmad et al., 2020).

Concessions like EDZ are, in theory, regulated by the state utility. However, EDZ was given autonomy to operate its concession. In contrast to the DSPs, EDZ did not only issue bills but by-passed EDL's crippling protocols. It did not need approvals from EDL to install meters and more importantly, to check for meter tampering and remove illegal connections. Furthermore, EDZ was not set back by EDL's delayed bill issuance, and issued the integrated bills (EDL and Aggreko sourced) itself.

In addition, looking at the underperformance of the DSPs suggests that many KPIs were not taken seriously, despite being periodically monitored by project managers (Ayoub et al., 2021). In contrast, when the same KPIs are applied to EDZ, such as customer satisfaction levels, losses reduction, and bill collection rates, EDZ's success is clear in comparison. Many argue for the EDZ model because of its nature as a decentralized model of electricity provision, operating with little interference from the

state utility (Abi Haidar, 2019; Ayoub et al., 2021; Boukather, 2023). Furthermore, it is important to note that the EDZ model of decentralized generation contradicts the 2010 policy paper for the sector by the Ministry of Energy & Water and its updated version of 2019.

In terms of incentives, the DSPs' incentive came directly from EDL and were based on management fees and performance-based compensation tied to achieving KPI targets in areas such as asset management, facilities construction, and customer services (DSPs, 2012). However, as Ayoub et al. (2021) observed through Key Informant Interviews with DSP representatives, the KPIs were rarely considered and did not address critical issues in distribution. As a result, they failed to incentivize the DSPs to focus on improvements that were most needed. In contrast, EDZ, as an independent monopoly, had the incentive to extract rents and optimize electricity provision.

In contrast, EDZ, as an independent monopoly, had the incentive to extract rents and optimize electricity provision relative to its marginal costs (Ahmad et al., 2020). This financial and administrative autonomy motivated EDZ to improve its service quality across key areas such as generation, distribution, operation & maintenance (O&M), customer services, and bill collection. Unlike EDZ, which operated with significant autonomy, EDL, the state-run utility, functions under the tutelage of the MoEW. EDL's fiscal dependence on state transfers crippled its capacity to operate as an autonomous entity. The discrepancy between EDZ's performance, the DSP's incentives, and EDL's dependence, underscores the importance of financial and operational independence, as well as the need to align governance structures that effectively incentivize service delivery.

To succeed in its model, EDZ followed a pragmatic win-win political settlement approach at both the local and national level. EDZ management overcame the resistance from local diesel generator owners and extended its influence to secure political backing in Parliament. For instance, the 2018 heated debate on whether to extend EDZ's contract received major support from local movements and politicians. Opposition towards EDZ stemmed from the widespread acknowledgement of huge rents made over decades at the expense of EDL and the state. As one opposing MP put it, "EDZ stole from the public for 108 years, it was a coordinated theft of public capital" (Ahmad et al., 2020). For context, EDL's average selling price of electricity to customers was USD 9c/kWh, to other concessions (Jbeil, Aley and Bhamdoun) was USD 5c/kWh, and to EDZ was USD 3c/kWh, while EDL's cost-recovery was between USD 13-22c/kWh. EDZ established a highly profitable model of rent extraction, where the integrated bill was no higher than that paid by EDL customers in the rest of Lebanon and competitive in contrast to the diesel genset tariff.

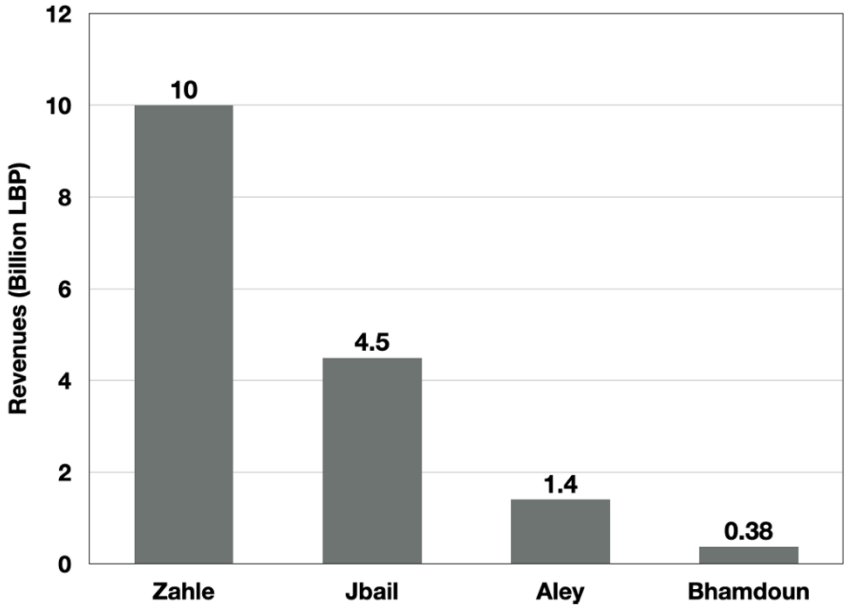

Figure 9: Revenues of Power Concessions in 2012 in Lebanon. *Source.* From Ahmad et al. (2020).

The political polarization associated with the model masks the economic factors that played an important role in the EDZ model. Two major components differentiate EDZ from other models. First, EDZ capitalized on people's eagerness to get rid of neighborhood diesel generators and utilized citizens' "willingness to pay" for reliable electricity supply (Ahmad et al., 2022). Alongside the 24/7 slogan, EDZ management advertised their electricity as cheaper than that provided by diesel generators. EDZ resourcefully positioned itself in the middle, charging a higher tariff than EDL while offering better quality and reliability, and charging a lower electricity tariff than competing diesel generators (Ahmad et al., 2022).

Secondly, and more importantly, is EDZ's due diligence in de-risking measures in a politically unstable environment (Ahmad et al., 2022). In Lebanon, political, regulatory, and socio-economic risks are abnormally high, making de-risking projects crucial for investors and to guarantee return on investments (ROIs) in infrastructure projects. This is particularly the case for investors considering funding high-capital expenditure (CAPEX) and long-term projects like generation and distribution PPPs.

By allowing Aggreko to own the power plant, EDZ avoided being locked into EDL's unsustainable tariff pricing under its concession contract. In this way, the power plant would be treated in the same way as the informal diesel gensets, with pricing risks put on the consumer (Ahmad et al., 2020). Additionally, EDZ strategically manages diesel oil procurement for Aggreko, reducing supply risks by negotiating settlements with fuel suppliers to ensure operational stability and continuous supply (Ahmad et al., 2022). These derisking measures not only enhanced EDZ's profitability but demonstrated a model that reduces risks for key stakeholders in a country where political, market and regulatory risks are high.

6.3 Independent Power Producers

6.3.1. Karadeniz Power Barges

In September 2013, EDL entered into a contract with the Turkish firm Karadeniz Holding to provide temporary electricity using their floating power stations and meet increasing demand (Abi Haidar, 2019). The rented Zouk and Jiyeh power barges had a combined capacity of 388 MW, and supplied 11% of Lebanon's peak electricity demand in 2018 (Ahmad, 2020; Ayoub et al., 2021). An analysis by L'Orient-Le Jour revealed that until the end of the contract in 2021, the power barges cost the government USD 1.5 billion and generated enormous profits to the Turkish company Karadeniz, totaling USD 750 million during its 8 years of service (Atallah, 2021a). These costs exclude the fuel procured by EDL to run the barges. For a slightly larger investment, EDL could have built three new power plants (Atallah, 2021a). Furthermore, it would have been more cost-effective to purchase the barges outright rather than have them rented (Atallah, 2021a). Instead of acquiring their own barges, the Ministry chose to extend the contract twice, first in 2016 and then again in 2018. In addition to alleged commissions, the contract was opaque and raised concerns on the negotiation practices and tendering process that took place.

The barges are considered in many ways a "symbol of the electricity sector's dysfunction" that includes untransparent procurement procedures and weak planning seemingly tailored to benefit private partners (Atallah, 2021a). It is noteworthy to mention that resorting to such temporary generation is practical in the short-term as it saves on leasing expenses and land expropriation. However, the barges lost their cost-saving benefits when used long-term because there was no transfer of facilities to EDL at maturity (Atallah, 2021a). The committee charged with leading the bidding process

was formed by a Swiss technical consultancy firm, a French law firm, and chaired by the Prime Minister at the time and the then Ministers of Justice, Energy, Finance, and Environment. This was the first warning sign, as according to Article 2 of the Public Tenders Law, it is EDL, as the public institution in question, that should organize tenders and procurement contracts (Atallah, 2021a). However, in response, the government cited EDL's deficit as financed by the state, thereby granting the cabinet prerogative to oversee tenders.

In the negotiation phase between the last two finalists, US firm Waller Marine and Karpowership, the committee did not wait for a final offer from Waller Marine when negotiating prices and instead selected Karpowership. On some accounts, Karadeniz's alleged affiliations with Lebanon's Future Movement and the Free Patriotic Movement, which heads the Ministry of Energy and Water, may have facilitated the selection process (Atallah, 2021a). In addition, although the Ministry celebrated negotiating a price drop of USD 0.10 per kWh with Karpowership, a hidden compromise was achieved. An advanced payment was offered by the state, which increased from 10%; as stated in the tender, to 22% under the new contract signed. Here, experts argue, any modification to the tender process should have been communicated with all parties, ensuring transparency and competition between candidates who may offer better prices in relation to new terms (Atallah, 2021a). However, this did not happen and Karpowership won the bid by offering its services at the lowest price.

In April 2013, just a few weeks after operations began, one of the barges experienced a breakdown due to a fuel quality issue (Atallah, 2021a). Since 2005, the Lebanese Government has been receiving heavy fuel oil from a subsidiary of Algeria's

state energy firm, Sonatrach. In 2020, a corruption case was opened on the importation of tainted fuel to EDL's power plants, severely impacting their operation. The scandal is known as the Sonatrach Fuel Scandal (Fairbanks, 2020). The details of the 2005 contract remain undisclosed to the public, despite costing the state billions (Ayoub & Moawad, 2022). In the end, the barges were supplied with better grade fuel in contrast to the fuel going to the EDL's outdated power plants. Investigations revealed several public sector employees received bribes from the subcontractors importing fuel (Atallah, 2021a).

The Sonatrach controversy and the power barges incident emphasize the need for transparency in all sector contracts, ensuring they are made publicly available. It showcases the need to establish transparent procurement procedures for EDL purchases and tendering, while being organized by the utility itself. Although EDL enjoys administrative and financial independence, non-compliance to existing decrees (Decree 16878/1964) have resulted in these huge costs to the sector.

Lebanon's public procurement law (Law No. 244) was recently adopted on June 30, 2021. Nonetheless, the framework is considered incomplete to the extent that identifying each entity's responsibilities is impossible (Atallah, 2021a). The procurement system falls short of international standards and is marked by considerable technology and capacity gaps, which leads to increased risk of corruption and inefficiency. These gaps include insufficient data on procurement activities, the lack of complaint mechanisms, the absence of independent institutional mechanisms to address complaints, limited private sector competition and inadequate capacity within implementing authorities (3RF, 2024).

Despite anticipation surrounding the PPP Law (Law No. 48/2017) to enhance competitiveness, accountability, and transparency in infrastructure projects, the law remains unimplemented like many others (Ayoub & Moawad, 2022). Corruption scandals, opaque tender/procurement processes, and undisclosed PPP agreements are proof of the continued influence of sectarian politics in decision-making (Ayoub & Moawad, 2022). Unjust tender conditions, opaque direct contracting, and the by-passing of tendering departments are key issues that require immediate attention.

6.3.2. Wind and Solar Farms

Lebanon aims to derive 30% of its electricity and heating from renewable energy by 2030 (Tsagas, 2023b; IRENA 2020). Recent developments in wind and solar farms represent Lebanon's first step towards large-scale renewable energy and achieving these targets. In May 2022, the Council of Ministers issued Decision No. 34, granting licenses to 11 qualified JVs to construct, generate, and sell electricity through utility-scale solar photo-voltaic (PV) farms. The 11 solar farms, totaling 165 MW, are distributed across the Bekaa Valley, Mount Lebanon, the South, and the North of Lebanon (Tsagas, 2023b; LCEC, n.d.).

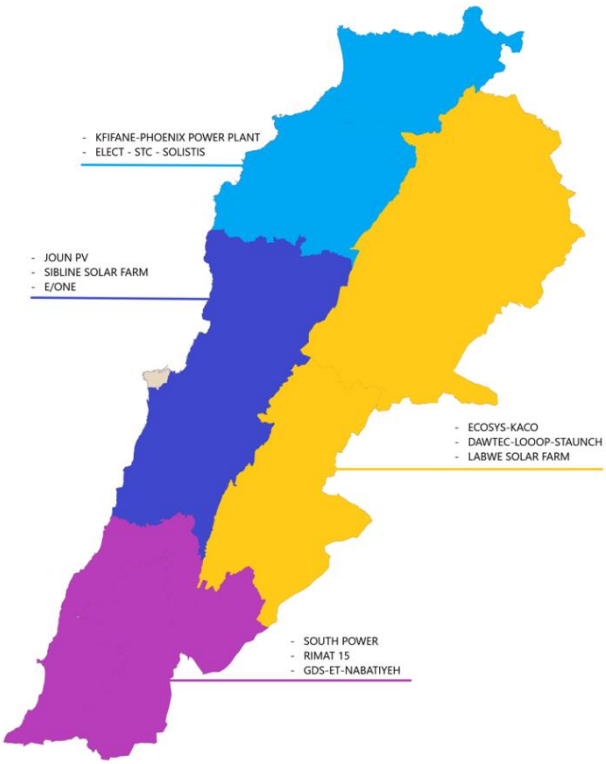

Figure 10: Map of 11 Solar Farms Distributed Across Lebanon.
Source. From LCEC. (n.d.) Solar PV Farms.

Gabriel De Lastours, the EBRD's Regional Director, remarked on the signing of the power purchase agreements (PPAs) for the 11 solar farms on May 5, 2023: "*the availability of international debt financing [for infrastructure projects] will depend on the implementation of structural reforms…we believe that the sovereign risk will remain a challenge*" (Tsagas, 2023b). As such, the solar farms must reach financial closure within one year of the PPA signing date. However, meeting this deadline hinges on implementing specific remedies and credit enhancements following Lebanon's default, which the government has not done yet.

Utility PPAs are different from corporate or direct PPAs. In this case, the national utility enters into a contract with an independent power producer, and commits to purchasing a specific amount of renewable electricity at an agreed price and for an

agreed period of time (EBRD, 2019a). The solar PPA is modelled after the first renewable energy PPA contract in Lebanon, the Akkar wind farms PPA. Notably, the wind PPA held favorable bankability clauses that aligned with various international standards mandated by Development Finance Institutions (DFIs), including well-rounded government recourse and liquidity support, dispute resolution, and foreign exchange, among other provisions. Lebanon's unprecedented economic crisis impacted many of these features, namely government recourse and liquidity support. Elements once a major advantage to the bankability of the wind farms and to Lebanon, today represent a material risk to the bankability of the solar PPA and other infrastructure projects requiring international financing (Machnouk, 2023).

As noted earlier, efforts were made to circumvent Law No. 462 through amendments like Law No. 288/2014 and extensions such as Law No. 54/2015 and Law No. 129/2019, granting temporary power to the CoM to issue licenses for IPPs and other service providers, as per proposals from the Ministry. Law No. 288/2014 ushered in the Akkar wind farms as the first renewable energy PPP in Lebanon (Abi Haidar, 2019). However, as long as Law No. 462 is unimplemented, there exists no legal regulatory framework governing PPP relations, and no licenses granted outside of EDL or Ministry proposals (Abi Haidar, 2019).

With temporary authority from Law 54/2015, the Ministry of Energy and Water awarded three licenses to three wind farm developers, Hawa Akkar, Sustainable Akkar, and Lebanon Wind Power, to build, operate, and sell electricity to EDL through utility-scale wind farms in November 2017. In February 2018, the ministry signed a power purchase agreement with the developers, which included the installation of wind power turbines in Akkar, North Lebanon, and operation for a 20-year period with a combined capacity of 226 MW (Tabbara, 2022). The budget expected for the project ranged between $340 to $490 million (LCEC, 2018) and was expected to produce over 800 million kWh of electricity per year, enough to supply 200,000 households (Tabbara, 2022). During construction, the project would create over 600 jobs, primarily local workers, and offer stable income to a number of landowners and municipalities throughout the 20-year duration (Tabbara, 2022). Furthermore, the wind farm was envisioned as an eco-tourism destination, featuring an educational center that would attract visitors to Akkar and support the local economy (Tabbara, 2022).

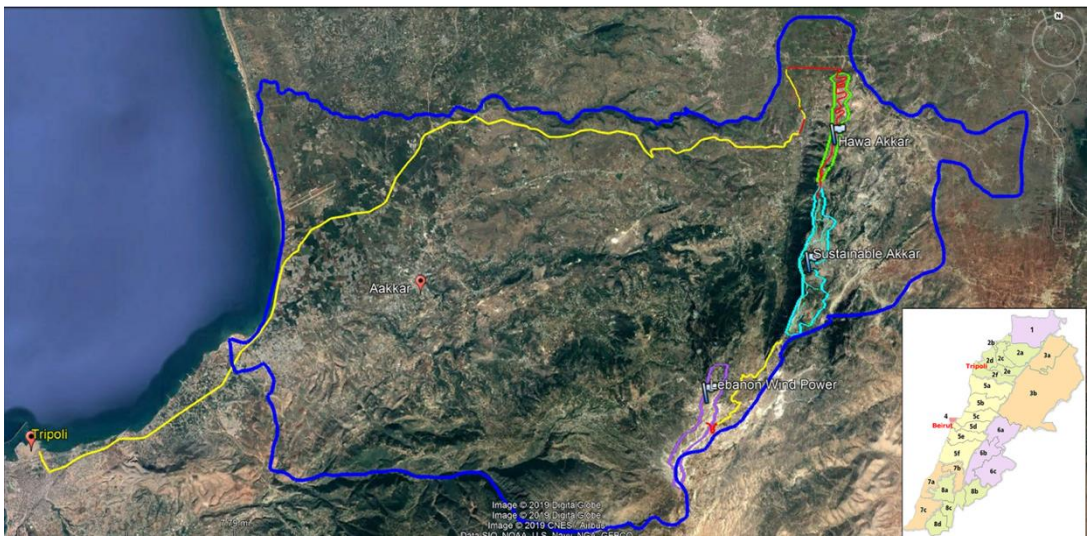

Figure 11: Map of the Akkar Wind Farms: Sustainable Akkar, Hawa Akkar and Lebanon Wind Power.
Source. From Ramboll (2019)

A major point of contention was the selling price of electricity to EDL. After prolonged negotiations, the tariff was reduced from USD 12.45 cents per kWh to USD 10.75 cents per kWh for the initial three years, and USD 9.6 cents per kWh thereafter (Obeid, 2018). According to the timeline, the original commercial operation date (COD) was in 2015, however, progress was delayed until Law 54/2015 was passed in parliament (Ayoub et al., 2021). Negotiations would take another two years until the CoMs granted final approval in 2017 and sign the PPA in 2018. Additionally, interim conditions and financial closure were not achieved before the unfolding of the economic crisis in 2019 which crippled any hopes for bankability of the wind farms.

Similarly, Lebanon's first solar farm PPP has not reached financial closure due to the government's below average creditworthiness and riskiness to financial institutions and investors (Machnouk, 2023). Nevertheless, this requires the government to strike a deal with the International Monetary Fund (IMF) and execute a recovery plan that includes structural, fiscal, and economic reforms. Conditional reforms such as instating an ERA, conducting a financial audit of EDL, improving governance and transparency in the sector to promote a conducive investor environment. Today, it is clear that DFIs will not invest in PPPs in Lebanon without an IMF deal to enact structural reforms and provide dependable sovereign guarantees on ROIs.

PPP experts *argue* that if the ERA had been established, as per Law No. 462/2002, licenses for the Akkar wind farm project would not have been issued unless the competitive portfolio tender was done (Ayoub et al., 2021). As a result, this underscores the CoMs as not the suitable authority to conduct PPP tenders, given that politicians lack legal and technical expertise. Furthermore, experts highlight issuing licenses before unbundling as ineffective, as stipulated in Article 12 of Law No. 462,

where the ERA's responsibilities would be to promote competition, oversee tariff arrangements, and guarantee market transparency (Ayoub et al., 2021).

6.3.3. Mini-grids and Distributed Renewable Energy

Lebanese citizens have resorted to diesel mini-grids since utility services began deteriorating following the 2006 Israeli war and Lebanese Civil War. Despite EDL's network covering 99% of Lebanese soil, persistent outages have prompted businesses, households, and municipalities to replace utility power with alternative sources. These include private individual generators, neighborhood generators, solar PV systems, storage solutions, urban wind turbines, and community-scale hybrid mini-grids. To cope with recent electricity shortages and interruptions, citizens have developed new models of decentralized electricity provision with unique organizational and technical characteristics. While some of these models exhibit PPP characteristics through partnerships with local municipalities, others have adopted a fully private approach.

When it comes to private power generation, Article 26 of Law 462/2002 allows for the installation of generation equipment for private use of power where output is less than 1.5 MW without the need for licensing, provided that environmental, public health, and safety guidelines are followed. (Law of Electricity Sector Organization, 2002). With the exception of two concessions, Électricité de Zahle (EDZ) and Électricité de Jbeil (EDJ), EDL is the only utility permitted to sell electricity to consumers and controls 90% of generation, transmission, and distribution services. However, in 2018, EDL covered only 63% of demand, which would have covered the needs of 430,000 customers (Chaplain, 2022).

Despite EDL's monopoly, the illegal and informal diesel generator network has been de facto for decades, filling the gap that EDL's has been unable to meet. This shift is a result of the Civil War and subsequent major attacks on Lebanon's generation infrastructure between 1996 and 2006, which severely crippled supply (Ahmad, 2020). As a result, distributed systems like diesel generators have emerged as the primary source of electricity, particularly now that EDL provides only 2–4 hours of power per day. In 2019, diesel gensets covered 84% of the population in rationing hours (Chaplain, 2022).

Initially conceived as a temporary solution, the informal diesel generator market has persisted long enough that stakeholders now hold micro-monopolies. Subscription rates and competition are managed by relationships between generator owners and municipalities, where they agree on neighborhood distribution and tariffs. Given the uneven distribution of load shedding in Lebanon and the fact that generator tariffs are three times higher than those from the national utility, the provision of electricity to households able to afford an additional bill through generator subscriptions has exacerbated both territorial and socioeconomic disparities (Chaplain, 2022).

For nearly a decade, the adoption of distributed renewable energy (DRE) systems has been slowly rising in Lebanon. The financial crisis, along with the collapse of EDL, and the soaring prices of generator tariffs, prompted the surge of distributed solar applications, despite the lack of a conducive regulatory and financial environment. By the end of 2022, Lebanon had installed 900 MW of solar PV, with 2022 alone witnessing the installation of 663 MW (Tsagas, 2023). Between 2010 till 2020, installed solar PV rose from 0.33 MWp to roughly 90 MWp, representing 90% of the distributed solar PV target outlined for 2020 in the NREAP 2016-2020 (LCEC, 2022).

In December 2023, Lebanon ratified the DRE Law under Law No. 318/2023 (LCEC, 2023). This law governs net metering in all its forms, and allows private-to-private sale of renewable electricity through direct PPAs and/or renewable energy equipment leasing (EBRD, 2019b). Law 318 applies to DRE systems that benefit from various net metering arrangements, and establishes the first regulatory framework for the market. These configurations include sole proprietors using two-way meters for energy exchange, owners with multiple meters on one property, users with multi-site meters, multiple subscribers such as tenants on one or different properties, and virtual or mass net metering for communities who own or lease a RE system (LCEC, 2023).

Notably, a new feature that Law 318 allows is the sale of renewable electricity without utilizing the public network, provided that the consumer's property is on the same premises or adjacent to the renewable energy system. This is significant for a number of reasons. Firstly, unlike the above net metering arrangements which include a point of connection with the public distribution network and exchange with the utility. PPAs can now avoid the irregular grid entirely in specific cases. Lebanon's current infrastructure and EDL's insufficient supply make the grid unfit for DRE trading (Tsagas, 2023). This is because net metering can only work if there is an electrified/stable grid to streamline the exchange of electricity from multiple sources.

In addition to a substandard grid, bureaucratic bottlenecks have hindered meter installation in the past and have, in turn, reduced incentives for DRE systems (Tsagas, 2023). Following the economic crisis and EDL's collapse, net metering has become virtually non-existent. Despite the ratification of the DRE Law, most rooftop PV installations operate as off-grid systems with storage, primarily used for residential and commercial self-consumption. Consequently, a significant amount of unused electricity

potential is wasted once customer needs are met and batteries are fully charged (Tsagas, 2023).

In recent years, rural municipalities have installed community-scale hybrid mini-grid systems, namely integrating solar PV with diesel gensets, to address EDL's shortcomings and meet their own energy needs. PhD researcher, Alix Chaplain, conducted a comparative study of four hybrid PV/diesel mini-grids to uncover their unique models, dynamics, and incentives to develop such a socio-technical system (Ahmad et al., 2021a). In an interview with a local official, her interviewee emphasized that the establishment of a mini-grid aims to achieve independence from the conventional grid and privately-owned diesel generators, and was driven by the desire to avoid paying bills to a corrupt government (Chaplain, 2022). The author explores how these socio-technical innovations reinforce local connections and disaggregate national solidarity. Chaplain (2022) highlights that certain community conditions and capacities (financial and political) contribute to the development of mini-grids, raising concerns about inequity, fragmentation, and potentially harming the national network and solidarity.

Renewable energy systems are inherently variable and intermittent, demanding back-up sources to maintain continuous supply, especially during low output hours and colder seasons. As a consequence, mini-grids are often hybridized with diesel gensets alongside PV panels and storage systems to mitigate the intermittency of renewable sources. In some communities, municipalities have installed mini-grids with capacities ranging from 80 kWp to 800 kWp (Chaplain, 2022). The latter can cater to the needs of 500 to 1,300 households to run basic necessities (Chaplain, 2022).

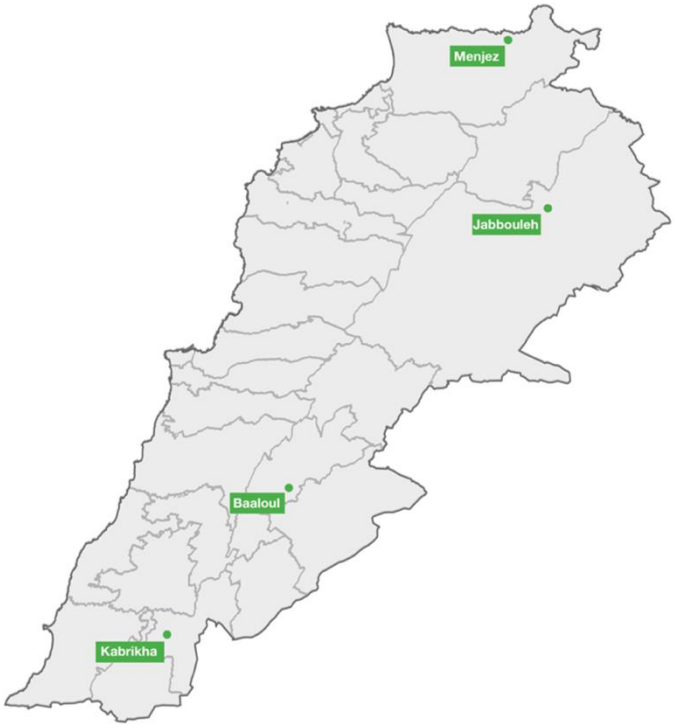

Figure 12: Location of Hybrid Mini-Grids Studied in Lebanon.
Note. Map by Alix Chaplain from Chaplain (2022).

One community-led initiative in Baaloul, West Beqaa, employs a participatory model that is locally owned and managed by the community. Funding for the mini-grid was raised through contributions from both the town's diaspora and local residents, who now hold shares in the supply system. Chaplain (2022) highlights that the development of the Baaloul grid depended on tight-knit bonds within a relatively affluent and homogeneous community. Similar to the EDZ model, in 2012, the town banded to install its own diesel mini-grid, raising USD 300,000 for two diesel gensets at 500 kVA and 650 kVA, as well as for distribution lines and meters (Chaplain, 2022).

In 2018, the community secured a grant from the USAID-BALADI project worth USD 200,000 (Chaplain, 2022; Ahmad et al., 2021a). This funding was designated to offset diesel usage by installing 80 kWp of solar PV panels and

established the Baaloul hybrid mini-grid (Chaplain, 2022). The project was implemented by CARITAS and Baaloul was chosen under the condition they would share the solar energy output with the nearby Syrian refugee camp. In reality, the camp gets little out of the project, and only receive solar power when the EDL grid is available (Chaplain, 2022).

In terms of governance, the Baaloul hybrid mini-grid is owned by its inhabitants and not the municipality, where profits are distributed amongst the Baaloul community, who are the shareholders to the mini-grid. Tariffs are set according to salaries of workers, cost of maintenance/replacements, and the price of diesel oil. Integrating solar PV in the mini-grid has boosted profitability, enabling a 50% reduction in bills, twice over, and made tariffs below that set by the ministry (Chaplain, 2022). Through community mobilization in project funding, decision-making, and profit sharing, the Baaloul mini-grid has reinforced community ties.

The second hybrid mini-grid that Chaplain (2022) explores is in Menjez, Akkar, where management of the grid is centralized in the hands of the municipality instead of the community (Ahmad et al., 2021a). The municipality of Menjez, located near Lebanon's northern border, was created in 2012 and homes 1,000 residents (Chaplain, 2022). Like other rural communities, Menjez suffered from long EDL outages reaching up to 12 hrs./day. As a result, in 2013, the municipality financed a mini-grid consisting of two diesel gensets at 300 kVa and 180 kVa, meters and distribution lines that can accommodate 300 households (Chaplain, 2022). In 2018, the municipality applied to the BALADI project and received USD 200,000 to integrate 100 kWp of solar PV panels and establish the Menjez hybrid mini-grid system (Chaplain, 2022). The Menjez mini-grid, owned and managed by the municipality, has legitimized the authority of the local

government within the local community. The town mayor chairs the mini-grid committee, implements the MoEW's diesel generator tariffs, and profits are added to Menjez's annual budget to fund other community projects (Chaplain, 2022).

While both hybrid mini-grids are technically the same, they are driven by differing sociopolitical agendas. Legally, the Baaloul and Menjez mini-grids are illicit because they include the sale of electricity by an unlicensed third-party to customers. However, EDL's stance is *unclear*. EDL has implicitly acknowledged the Baaloul mini-grid by connecting it to the utility network, implementing net metering on the town's public lighting meter and the meter of the nearby refugee camp (Chaplain, 2022). Baaloul's inhabitants do not benefit from the net metering scheme directly (in contrast to the following example of Qabrikha)(Chaplain, 2022). Moreover, despite their utility to the communities, the mini-grids are inefficient because they do not export surplus electricity when production is high, and consumption is low.

To address this inefficiency and support municipalities in Lebanon, CERDO-UNDP designed a model that promotes both community-scale solar PV systems and an exchange of surplus electricity with EDL. In 2014, the suburban village of Qabrikha, Marjeyoun, home to 3,000 residents, was chosen as UNDP's "community-led virtual net metering" pilot project (Chaplain, 2022). With a USD 300,000 grant from the EU, the Qabrikha project planned to scale net metering to a municipal level (Chaplain, 2022). While storage solutions are usually considered due to the intermittent nature of solar PV generation and high consumption during nighttime hours, net metering at a community scale enables the national grid to function effectively as a storage system. Households can draw power from EDL when solar power is unavailable, and when

systems generate surplus electricity, it can be fed back to the grid and be used elsewhere.

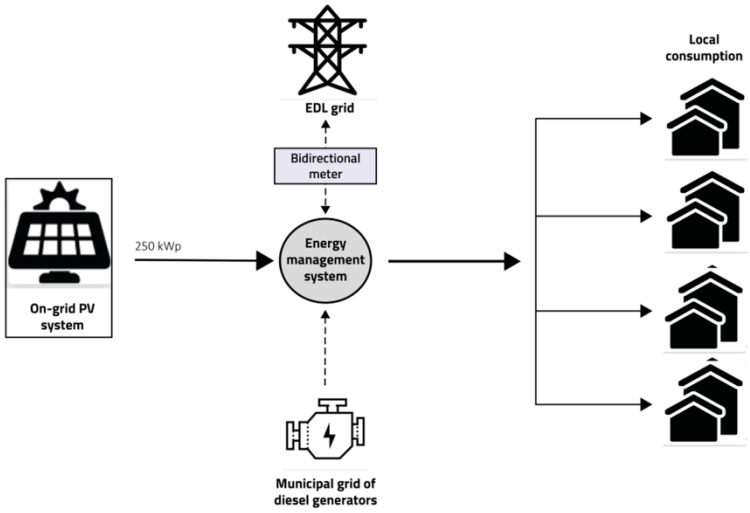

Figure 13: CEDRO-UNDP Qabrikha Model for Community-Based Virtual Net Metering. *Source.* From Chaplain (2022).

EDL introduced net metering in 2011 through Circular 32-318 (Taha & Akel, 2024) to incentivize citizens to install renewable energy systems, allowing them to become prosumers. This initiative aimed to lower electricity demand and offset consumers' bills for every kWh sent back to the grid. However, rather than focusing solely on two-way metering for individual households, CEDRO proposed expanding the net metering scheme to include a virtual net metering (VNM[11]) approach. This would involve collective electricity generation through a shared mini-grid, enabling multiple meters within a community to benefit from the credits earned, thereby maximizing the scheme's impact on energy efficiency and cost savings.

[11] VNM is a system that allows multiple participants to share the benefits of a single renewable energy generation source, such as a community solar array or mini-grid, by distributing the generated electricity credits to multiple meters or accounts.

Before the project began, the Qabrikha municipality acquired all the local generators and set up smart meters for 350 households (Chaplain, 2022). In December 2018, Qabrikha's mini-grid committee and EDL finalized a contract covering 124 homes (Chaplain, 2022). Unlike the other mini-grids, beneficiaries should witness not only a deduction in their generator bills for integrating solar PV, but also a reduction in EDL bills because of the excess power exchanged with the grid. Since Qabrikha's inhabitants enjoy 24/7 coverage thanks to the installation of a 250-kWh solar farm financed by the EU, implemented by UNDP, and operated by the municipality, which provided property for the project (Abi Haidar, 2019). During EDL outages, the hybrid system supplies power at varying intensities, based on the meter installed in each participant's home (Abi Haidar, 2019). In short, the Qabrikha model is documented to have lowered residents' electricity consumption by 30% (Abi Haidar, 2019).

The Qabrikha project was an initiative to reform Lebanon's vertically-integrated model of generation, where EDL holds a monopoly, and foster decentralized electricity exchange between communities using cost-effective renewable systems and net-metering schemes (Ahmad et al., 2021a). The model is a successful case study of how supply shortages can be optimized while lowering carbon emissions. Furthermore, other municipalities can replicate the Qabrikha model, replacing international donors, if necessary, with private partners (Abi Haidar, 2019).

However, despite a formal contract with EDL, community-scale virtual net metering has not been implemented on EDL's part in the Qabrikha project. EDL does not have the human capacity and skilled workforce to provide updated electricity bills following deductions from surplus electricity exported to the grid (Chaplain, 2022). Moreover, EDL's reluctance to promote decentralized renewable systems comes from a

reluctance to forfeit its monopoly over generation (Chaplain, 2022). This resistance has been evident in several net-metering applications since 2011, where EDL's dysfunction and negligence have hindered promising initiatives. Hence, the lack of willingness and technical proficiency from EDL, has prompted some private entrepreneurial firms to not only ignore EDL and the national grid, but to compete with it (Chaplain, 2022; Ahmad et al., 2021a). This new mini-grid arrangement seeks to offer 24/7 electricity to impoverished and remote villages through a market-driven approach, private oversight, and profitable tariff structures (Ahmad et al., 2021a).

In Lebanon, private renewable energy firms have begun marketing hybrid community-scale mini-grids and BOT (build-operate-transfer) contracts. These systems are designed to provide reliable electricity to rural villages, with residents paying monthly subscriptions for usage. The primary objective is to ensure 24/7 supply using a hybrid mini-grid with storage solutions and an autonomous energy system (AES). Through competitive tariffs and continuous supply, these companies encourage electricity consumption on the local mini-grid instead of the national grid (Chaplain, 2022). In Dier Jabboule, Baalbek, a mini-grid of this type was implemented in an area absent from any local generators and competition. The client signed a BOT contract with KEnergy, the private sector investor, and Matrix Power Network, who will operate the mini-grid for a period of 12 years, after which ownership of assets will transfer to the client (Chaplain, 2022). The project required an initial investment of USD 1.8 million and was completed in 6 months, commissioned on October 10, 2019 (Chaplain, 2022; KEnergy, 2023).

Today, the Jabboule solar farm holds a capacity of 800 kWp, and covers the energy needs of 3000 residents in three villages and their surrounding infrastructure:

schools, dormitories, municipalities, commercial stores, factories, pump stations, and workshops (Kenergy, 2023). The solar system generates 1,280 MWh per year of power and saves USD 320,000 per year in diesel and 1,030 tons per year in CO_2 equivalent emissions (Kenergy, 2023). The mini-grid includes three backup diesel gensets, 550 kVA, 330 kVA, and 165 kVA, an enclosed Lithium storage solution capable of storing 1,100 kWh and discharging 500 kW at any given moment, in addition to more than 6 km of MV transmission lines and 34 km of LV distribution network, a prepaid smart metering system, an advanced energy management system, an advanced SCADA system for energy monitoring and control, and an advanced billing and financial analysis tool to issue invoices and forecast performance (Matrix Power Network, n.d.; KEnergy, 2023). The tariff model is centered around cost optimization and profitability where depending on EDL rationing hrs., a variable tariff is introduced to make the local tariff more economical when EDL is available (Chaplain, 2022). Unlike the participatory and municipal models of Baaloul, Menjez, and Qabrikha, Jabboule's decentralized model of electricity provision implements a market-driven approach that *competes* with the national utility.

Diversity amongst the four-hybrid mini-grids emerges because of distinct community structures and relations. The mini-grids of Baaloul, Menjez, and Qabrikha were made possible by the ability of the local community to secure funding from diaspora, foundations and international entities. In cases of limited capacities, private entrepreneurial firms can take initiative and compensate for the lack of funding as was done in Jabboule. However, Chaplain (2022) notes that substituting public services for private provision, or abandoning municipalities to fend for themselves, raises concerns about national solidarity. Considering the current shortages and growth of DRE

solutions, there is uncertainty regarding how private players can leverage opportunities without exacerbating divisions in Lebanon (Ahmad et al., 2021a). Furthermore, while local infrastructure projects have been relatively effective in providing energy security for certain communities, access to such technologies is *uneven* in Lebanon and relies on locals' capacity to raise political and economic resources (Chaplain, 2022).

CHAPTER 7

CONCLUSION

Lebanon's power sector highlights the challenges of integrating private sector participation and public-private partnerships (PPPs) in a context marked by governance weaknesses and systemic inefficiencies. The collapse of EDL has necessitated the search for alternative solutions to address persistent energy shortages. This thesis explored the extent to which PPPs have improved outcomes in the sector and examined their broader implications for equity, accountability, and sustainability. While PPPs have addressed some supply and service gaps—such as through independent power producers and certain concessions—their overall performance has been mixed. This study concludes that while private participation has the potential to address gaps in electricity supply, financing and service provision, PPP success largely depends on the degree of autonomy/risk-sharing, the degree of streamlined operations, the degree of flexibility, accountability of KPIs, and transparency in tendering and contracting.

Projects like the Distribution Service Providers (DSPs) and power barges have demonstrated serious issues with transparency, accountability, efficiency gains, performance targets and high costs, raising questions about their cost-effectiveness and alignment with public interests. Non-compliance with ratified Decrees (16878/1964) have prohibited EDL's cost-recovery and made the utility perpetually reliant on annual transfers to remain operational, widening Lebanon's structural deficit and increasing debt over time. Furthermore, non-compliance with Laws, such as Law No. 462/2002, have delayed a key regulatory framework that adequately governs all market activities

through a NERA. This has hindered effective competitive tendering, the management of services and tariff arrangements, and overall market transparency.

PPP experts stress on the importance of a regulator despite risks of regulatory capture, the presence of a comprehensive framework promoting renewable energy (e.g., Law No. 318/2023), and an adaptable and flexible power sector to match Lebanon's volatile market conditions (Straub, 2019; Ayoub et al., 2021). Moreover, authors call for the prompt unbundling of EDL's structure and operations, divesting from its monopoly, to form at least three publicly owned firms to oversee generation, transmission and distribution. This would be accompanied by private sector involvement in generation (IPPs) and distribution companies (DISCOs), with the private sector owning a maximum of 40% of shares in these newly established firms (Ayoub et al., 2021). According to Article 5 of Law No. 462/2002, transmission would remain with EDL due to national border concerns, and a firm would be formed to manage the HV network (Ayoub et al., 2021).

Additionally, decentralized community models like hybrid mini-grids have provided localized energy security through innovative technical solutions, yet have introduced challenges related to equity and social and territorial fragmentation. These systems, often relying on private financing (i.e., diaspora contributions, local foundations, and development agencies), have transformed national electricity provision from a public good to a market-driven service, limiting access for communities with fewer political and economic capacities to raise resources. The uneven outcomes of these initiatives emphasize the need for careful consideration of models that can sustainably serve all Lebanese citizens.

The EDZ model, lessons from the DSP experience, and hybrid mini-grid systems like the Qabrikha community-based virtual net metering model have introduced innovative configurations that showcase the potential of decentralized models. The EDZ model highlights the potential for DISCOs to manage distribution services on a smaller scale than the DSPs, focusing on defined areas such as governorates, districts and/or cities that align with Lebanon's sectarian context and existing political settlement. This approach could minimize disputes and inefficiencies between service providers and citizens and effectively address EDL's challenges in non-technical losses (theft & illegal connections), technical losses and poor collection rates.

In this configuration, DISCOs would purchase power from EDL at a slightly reduced tariff allowing operators a profit margin to compensate for distribution services. However, it is crucial for the NERA to monitor and enforce fair operator and consumer pricing, preventing operators from unfairly transferring pricing risks onto consumers while ensuring equitable tariffs between EDL and the operators. In this decentralized model, DISCOs would be autonomous and oversee all distribution activities, including operation, maintenance, billing, and loss management, fostering efficiency and accountability.

Furthermore, the EDZ and DSP experience highlight the importance of incentives and financial and administrative autonomy. In the case of the DSP, the providers' incentives came from management fees and performance-based compensation tied to achieving KPI targets. However, as an independent monopoly, EDZ had clear incentives to optimize service provision relative to its marginal costs, driving improvements in generation, distribution, O&M, customer services, and bill collection (Ahmad et al., 2020). The same decentralized model would be applied to

DISCOs to maintain these strong incentives, ensuring they are self-sustaining and motivated to deliver quality services while operating independently of EDL's constraints.

The Qabrikha virtual community-based net metering project highlights the potential for distributed renewable energy generation and trading at the community level and, more broadly, on a national scale, potentially between DISCO jurisdictions. Circular 32-318/2011 and Law No. 318/2023 offer a regulatory framework that governs net metering in all its forms, including allowing private-to-private sale of renewable electricity through direct PPAs, permitting renewable energy equipment leasing, and allows prosumers to export excess power to EDL's grid in return for a deduction in their consumption bill. Thus, DISCOs can establish agreements with prosumers generating excess power through solar PV systems, implementing bi-directional meters to offset their consumption or implementing their own virtual community-based net metering system, as demonstrated in Qabrikha. This enables DISCOs to redirect surplus energy to other consumers in need or even to the national grid during peak demand, effectively making the grid a storage system while promoting sustainability and energy efficiency.

While decentralizing distribution offers significant benefits in loss reduction and service optimization, generation *must* remain centralized or sold to the public utility through PPAs. This ensures efficiency by leveraging economies of scale and promotes equity by addressing disparities in electricity capacities across Lebanon. EDL, despite its current limited output between 200-400 MW (i.e. 2-4 hours of daily power), must gradually expand its supply capacity to meet national energy demand, retain its market share, and prevent territorial fragmentation. This includes leveraging renewable energy

IPPs at competitive rates while reinvesting in thermal power, both cost-effective and reliable options essential for revitalizing Lebanon's productive sectors and GDP.

Moreover, policy reforms must account for Lebanon's political settlement and the de facto role of diesel generators and now hybrid mini-grids, which dominate the current market. An efficiency-focused settlement among EDL, DISCOs, diesel generators, oil importers, and communities is crucial. For the near term, diesel generators and informal sources should remain vital as stop-gap suppliers, but their operations should be organized under a regulated framework to complement EDL's power in the long-term. Prosumers with excess power from solar PV systems should also be enabled in this configuration, utilizing all available generation sources in the market for trading and growth. Importantly, this model aligns with Lebanon's complex political economy, aligning reforms with present realities and stakeholder interests.

Looking ahead, Lebanon's energy sector must balance the need for immediate solutions to address economic recovery with long-term sustainability. The future success of private participation and PPPs hinges not only on bridging funding and supply gaps but on the *clear delineation* of responsibilities between public and private actors in the sector. Strengthening the role of a regulator, as envisioned in Law No. 462, while avoiding regulatory capture, could be a critical step toward improving services, fostering competition, and ensuring accountability. Simultaneously, addressing systemic challenges while promoting models that prioritize universal access to reliable and affordable electricity is imperative. Achieving economy recovery and sector sustainability will not only require the technical and financial reforms to appease the international community, but the political will to move beyond entrenched mechanisms that have undermined the sector's performance.

APPENDIX

Table 5: Relevant Laws, Documents, Circulars and Decrees of Lebanon's Power Sector.

Decree 16878/1964	The establishment of the Electricity Authority of Lebanon (Électricité du Liban, EDL).
Law No. 20/1966	The establishment of the Ministry of Water and Electricity Resources.
Decree 5469/1966	The organization of the Ministry of Water and Electricity Resources, and the designation of its staff.
Decree 4517/1972	The general structure of public institutions.
Decree 7580/1974	The Investment Law of Electricity for Lebanon.
Law No. 247/2000	Amendment of Law No. 20/1966, replacing the Ministry of Water and Electricity Resources with the Ministry of Energy and Water.
Law No. 228/2000	Privatization Law. Regulating privatization operations and defining its terms and fields of implementation and established the High Council of Privatization & PPP (HCP) managed by the CoM. It includes the Minister of Finance, Economy & Trade, Labor and the relevant minister in charge of the project.
Law No. 462/2002	Provided the legal framework for privatization, liberalization and unbundling of the electricity sector and establishment of an Electricity Regulatory Authority.
Law No. 75/2006	Amendment of article 7 of Law No. 462 of 2002 allowing, on a temporary basis and for a maximum period of one year, the CoM to issue permits and licenses for electricity generation upon the proposal of the Minister of Energy and Water until the ERA members are appointed.
2010 Electricity Policy Paper (MoEW)	Committed to "launching, supporting, and reinforcing all public, private and individual initiatives to adopt the utilization of renewable energies to reach 12% of electric and thermal supply".
2010 Circular 236 (BDL)	Initiated NEEREA, a green financing mechanism that provided low interest

	loans for energy efficiency and renewable energy projects.
2011 Circular 32-318 (EDL)	Net-metering mechanism adopted by EDL, which allows owners of renewable energy systems to export the excess energy produced to EDL's grid, and in return benefit from an equivalent deduction in their bill.
Decision #26 (CoM)	Adoption of National Energy Efficiency Action Plan (NEEAP).
Law No. 288/2014	Amendment of article 7 of Law No. 462 of 2002 allowing, for a period of two years, the CoM to issue permits and licenses for electricity generation upon the proposal of both the Ministers of Energy and Water with the Ministry of Finance, until the ERA members are appointed.
Law No. 54/2015	Extension of Law No. 288 of 2014 for two additional years (from April 2016 until April 2018).
Document 2016 (MoEW)	NEEAP II 2016-2020: presented the national targets for RE and highlighted policies and roadmaps for implementation
Law No. 48/2017	PPP Law. Public-private partnership law was enacted during the time of the CEDRE conference. The law aimed at improving the tendering process of projects, where a committee is created to select the appropriate private partner. The law has given the authority to the HCP to evaluate the potential projects whether they are economically, financially, technically and legally feasible. The private partner should be involved in financing and administering the project and could carry at least one of these activities: designing, building, constructing, developing, restoring, equipping, maintaining, rehabilitating and operating a project).
Law No. 107/2018	Allowing EDL to enter into an agreement with EDZ as an electricity operator for a period of two years (December 2018 - December 2020).

PPA Agreement 2018 (Wind Farms)	Signing of three power production agreements for a 200-MW wind farm in the northern governorate of Akkar.
Law No. 129/2019	Extension of Law No. 288 of 2014 for three additional years (from April 2019 to April 2022).
Law No. 115/2019	Lebanon ratifies the Paris Agreement and issues its Nationally Determined Contributions (NDCs) – 30% reduction in GHG emissions by 2030.
2019 Electricity Plan (MoET)	Commits to installing 1 GW of electricity from Wind and Solar.
Law No. 198/2020	Extension of EDZ agreement for two additional years until December 2022, issued after the expiry of the concession. In November 2022, the contract's expiry date was moved to March 8, 2023, in line with the recommendation of the Legislation and Consultations Committee at the Ministry of Justice.
Law No. 244/2021	The Public Procurement Law was ratified in 2022 and replaced the outdated 1963 Public Accounting Law which governed public procurement in Lebanon.
PPA Agreement 2022 (Solar Farms)	Lebanon signs PPAs for 11 projects with 165 MW of PV capacity, and issues 11 licensees (in accordance with Law No. 129/2019) to consortia located in Bekaa, Mount Lebanon, North and South of Lebanon.
Law No. 318/2023	Distributed Renewable Energy Generation (DRE) Law governs net metering in all its forms, and allows private-to-private sale of renewable electricity through direct PPAs and/or renewable energy equipment leasing

Source. Adapted from Ayoub et al. (2021), Ahmad (2020), LCEC (n.d.) and LCEC

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