Public Disclosure Authorized

Project Information Document (PID)

Concept Stage | Date Prepared/Updated: 26-Jun-2019 | Report No: PIDC27225

BASIC INFORMATION

A. Basic Project Data

Country	Project ID	Parent Project ID (if any)	Project Name
Lebanon	P170769		Lebanon Electricity Transmission Project (P170769)
Region	**Estimated Appraisal Date**	**Estimated Board Date**	**Practice Area (Lead)**
MIDDLE EAST AND NORTH AFRICA	Jan 13, 2020	Mar 31, 2020	Energy & Extractives
Financing Instrument	**Borrower(s)**	**Implementing Agency**	
Investment Project Financing	Ministry of Finance	Ministry of Energy and Water	

Proposed Development Objective(s)

To strengthen the provision of electricity transmission and dispatch services in Lebanon

PROJECT FINANCING DATA (US$, Millions)

SUMMARY

Total Project Cost	200.00
Total Financing	200.00
of which IBRD/IDA	200.00
Financing Gap	0.00

DETAILS

World Bank Group Financing

International Bank for Reconstruction and Development (IBRD)	200.00

Environmental and Social Risk Classification	Concept Review Decision
Substantial	Track II-The review did authorize the preparation to continue

Other Decision (as needed)

B. Introduction and Context

Country Context

1. **Lebanon is a small, densely populated upper middle-income country.** Lebanon is an east-Mediterranean country, with surface area of 10,452 square kilometers, bordering with Syria in the north and east and with Israel in the south. It had a population of 6.1 million people in 2018 and its GDP was US$56.6 million. With a GNI per capita of US$8,310 in 2017, it is considered an upper middle-income country.

2. **Lebanon has experienced significant political, financial, and social crises.** GDP growth plummeted from an average of 8 percent before 2011 to just 0.2 percent in 2018. The economy remains heavily based on services and oriented towards the region, rendering it vulnerable to volatility and sizable macroeconomic imbalances. The business environment has worsened, with Lebanon's Doing Business rank dropping from 103 in 2010 to 142 in 2019.[1] Growth has been sustained by foreign inflow and consumption rather than productive sectors. As a result, public debt reached 155 percent of GDP by the end of 2018, one of the highest globally, and could rise to 180 percent by 2023 without adjustment. Debt service reaches around 10 percent of GDP annually, consuming approximately half of domestic revenues. The fiscal deficit in 2018 was 11.5 percent of GDP. Externally, a large trade deficit drives a sizable structural current account deficit, which has averaged over 21 percent of GDP over the past 5 years. This is under the context of a fixed exchange rate regime that has been in effect for a couple of decades and which has become a central pillar of the Lebanese economy. Poverty rates are relatively high, at 27.4 percent based on the latest household survey of 2011/12, and are estimated to have increased to 32 percent in 2017. Furthermore, a notable share of youth is employed in a growing informal sector which provides limited social protection and growth. For example, informality affects six in 10 young workers in Lebanon with young women more likely to be affected than men.[2]

3. **The economy is highly dependent on external financing, which undermines its ability to invest in infrastructure.** Funding the economy's substantial financing needs is highly dependent on foreign inflows, mainly from donor aid and remittances, that are intermediated via a banking sector whose balance sheet is over three times of GDP. Banque du Liban (BdL), the country's central bank, ensures that banks keep attracting foreign deposits to fund gross financing needs of the public and private sectors, thereby financing the sizable twin (fiscal and current account) deficits. To attract foreign deposits, BdL offers certificate of deposits and various subsidized refinancing schemes. Lebanon's currency peg is sustained in good part by these foreign currency inflows. To meet Government needs, BdL is the residual buyer of Government debt in the primary and secondary markets. The result is a banking-sovereign feedback loop with amplification effects that generate systemic macro-financial risks. The ensuing high interest rates reflect the risk premia that need to be paid in such a context to maintain the attractiveness of Lebanese assets and generate capital inflows.

[1] This indicator is ranked out of 183 countries in 2010 and 190 in 2019.

[2] ILO: Towards Decent Work in Lebanon: Issues and Challenges in Light of the Syrian Crisis, 2015; ILO Work for Youth Country Brief: Lebanon, 2016.

Deposit inflows have decelerated sharply since 2011, and annual foreign direct investment (FDI) decreased by an average of US$1 billion, increasing uncertainty on the economy's ability to meet its financing needs. The limited financing did not go into productive areas, resulting in sub-par infrastructure which is not conducive to job creation and productivity, further perpetuating the cycle of low growth. Lebanon's quality in overall infrastructure ranks 130 out of 137 countries.[3]

4. **Lebanon is a fragile country, with challenges further exacerbated by a large influx of refugees.** In addition to being a proxy for many international influences, the country also suffers from frequent internal sectarian tensions which in the past have led to extended episodes of violence and conflicts along confessional lines. The security concern in the region has affected the tourism industry on which the economy depends. Government institutions are captured by political parties, with informal power sharing that often results in frequent coalitions, parliamentary blocs, and national unity government. The social contract is undermined by poor infrastructure and service delivery, particularly electricity supply. On the other hand, Lebanon enjoys a high level of human capital as the quality of (private) education and health facilities is high. Most of Lebanon's resilience has come from a strong private sector despite a challenging political environment. Since the Syrian crisis in 2011, Lebanon has been hosting displaced Syrians with the number estimated at 1-1.5 million by 2015, which represents the largest concentration of refugees per capita in the world, in addition to the existing 300,000 Palestinian refugees. The country, with large international aid, has managed to provide the refugees with basic services, but this no doubt adds a tremendous pressure on the already weak public service system, especially as the refugees tend to concentrate in already densely populated and impoverished areas. Despite improvements in economic vulnerability, 69 percent of refugee households remained below the poverty line.[4]

5. **The Government presented the Vision for Stabilization, Growth and Employment, which aims to increase economic growth and create productive jobs as well as alleviate the burden of reforms on both host communities and refugees.** The Vision includes four complementary pillars. The *first pillar* is a large capital investment program (CIP) which includes a list of more than 280 infrastructure projects at an estimated cost of US$16 billion (32 percent of GDP) over the 2018-2025 period. The *second pillar* is fiscal reform in which the Government committed to an annual 1 percentage point reduction in the fiscal deficit ratio over the next five years. The *third pillar* is structural reforms to ensure good governance, fight corruption, and modernize the public sector. The *fourth pillar* is development of productive sectors as well as enabling sectors including infrastructure and electricity. The Vision was presented at the Conference Économique pour le Développement, par Les Réformes et avec les Enterprises (CEDRE), which took place on April 6, 2018, in Paris, France, as part of the fundraising effort for the CIP. If implemented, the plan has significant potential to provide a sustained boost to the economy, attract much needed capital inflows, and catalyze job creation for women and men. The new Government, formed on January 31, 2019, promised to contain public spending and implement needed reforms that could unlock pledged aid and loans. Since the new government was formed, domestic bank deposits are forecast to grow by US$7-8 billion in 2019 compared with US$5.6 billion in 2018. The Council of Ministers (COM) submitted to the Parliament the draft 2019 budget that

[3] World Economic Forum, Global Competitiveness Index 2017-2018.

[4] Vulnerability Assessment for Syrian Refugees in Lebanon (VASyR-2018) by the United Nations Children's Fund (UNICEF), United Nations High Commissioner for Refugees (UNHCR) and the United Nations World Food Programme (WFP).

seeks to reduce the budget deficit to 7.6 percent of GDP, which shows the first sign of Government following through on its commitment to reform. Growth is projected to increase to 1.7 percent in 2019.

6. **Investments in the electricity sector are key priorities of the CIP**. Almost a quarter of the investments are reserved for the energy sector, addressing a huge gap in infrastructure – Lebanon's quality of electricity supply ranks 134 out of 137 countries[5]. The sector is not only one of the main building blocks for a growing economy and functioning society but also an absolute must to attract the private investment in broader economy and promote economic growth and social welfare.

Sectoral and Institutional Context

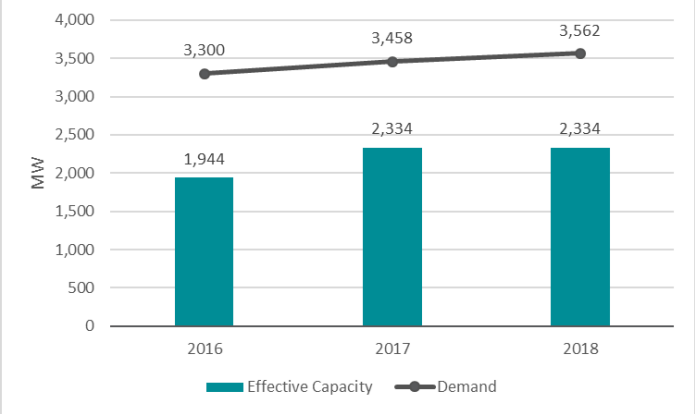
7. **The electricity sector is dominated by a vertically integrated national utility, Electricité du Liban (EDL)**. Established in 1964, EDL has near exclusivity over generation (except for long-standing hydropower private sector concessions), transmission, and distribution, with some of the distribution and retail supply functions outsourced in 2012 for a 10-year period to three Distribution Service Providers (DSPs). Access is practically universal, and there are around 1.15 million customers across the country. EDL operates under the administrative oversight of the Ministry of Energy and Water (MEW), which is responsible for policy formulation of the electricity, fuel and water sectors. However, the overall responsibility for the sector and its reforms rests with the COM, which, in turn, will rely on a newly formed COM sub-Committee, which is chaired by the Prime Minister and includes the Ministry of Finance (MOF), MEW, and other Ministries that represent the major political parties in the country. The Lebanese Oil Installations (LOI) Directorate and the Lebanese Petroleum Administration are also involved in the electricity sector reforms, but the absence of coherent planning and insufficient collaboration often delay important actions. The sector does not have a regulatory authority to undertake independent oversight and economic regulation.

8. **The electricity sector has a significant impact on Lebanon's fiscal and current account positions**. The loss-making electricity sector imparts a staggering burden on Lebanon's public finances as the revenues in the sector are significantly below the costs, with the difference covered by the Government. EDL's revenues in 2017 were about US$457 million (down from US$700 million in 2016). EDL made an operating loss of US$1.4 billion in 2017 (US$0.66 billion in 2016). Sector subsidies averaged 3.8 percent of GDP during 2008-2017, aggregating over the years to account for close to half of Lebanon's overall external debt. Transfers to the sector reached US$1.8 billion in 2018 (3.5 percent of GDP or 30 percent of annual fiscal deficit). EDL's average tariff, which has not changed since 1996, is approximately US$0.095/kWh, covering only 37 percent of average operating costs in 2018. EDL's losses in 2018 exceeded 36 percent in total (as per electricity billed), with 4 percent loss of energy in the transmission network and 34 percent in the distribution system (of which technical losses were estimated at 13 percent and non-technical at 21 percent). The sector is dependent on liquid fuel imports which feed most of electricity generation. EDL's fixed tariff precludes the recouping of much of the fuel costs due to the fact that the tariff is based on 1996 fuel costs of US$23 per barrel of oil. With the overall fiscal balance in deficit since 1992, this government subsidy has been effectively paid through borrowing. The fuel imports also add to the country's current account deficit and the sector's vulnerability to international oil price. Energy imports have averaged close to US$5 billion annually over the 2010-2017 period, constituting close to a quarter of the total bill for merchandize imports.

[5] World Economic Forum, Global Competitiveness Index 2017-2018.

9. **Despite the large subsidies, electricity supply is insufficient to meet growing demand.** Even with likely underestimated peak electricity demand of about 3,562 MW, the utility supplied only 47 percent of this demand in 2018 (about 1670 MW) from its 2,334 MW of available (installed and rented) generation capacity (Figure 1). The shortfall is also partly caused by generation curtailment to reduce the fuel bill. Rolling blackouts are 3-17 hours per day, with the lowest level in Beirut and South Lebanon, up to 11 hours in Mount Lebanon, and 17 hours in Bekaa Valley. Daily hours of supply at feeder level is on average only about 16 hours in the Beirut area and 12 hours in the rest of the country. Recent World Bank Enterprise Survey indicated that lack of reliable electricity is the second biggest obstacle to private sector growth, after political instability. Over 97 percent of firms experience regular electricity outages, incurring large losses as a result (estimated at 6 percent of sales). The balance of demand was satisfied by diesel-fired private generators that are (illegally) connected to the low-voltage distribution network. About 85 percent of households rely on these private generators with very high prices of around US$0.25/kWh and low wattage.

Figure 1: Generation capacity and estimated demand for electricity



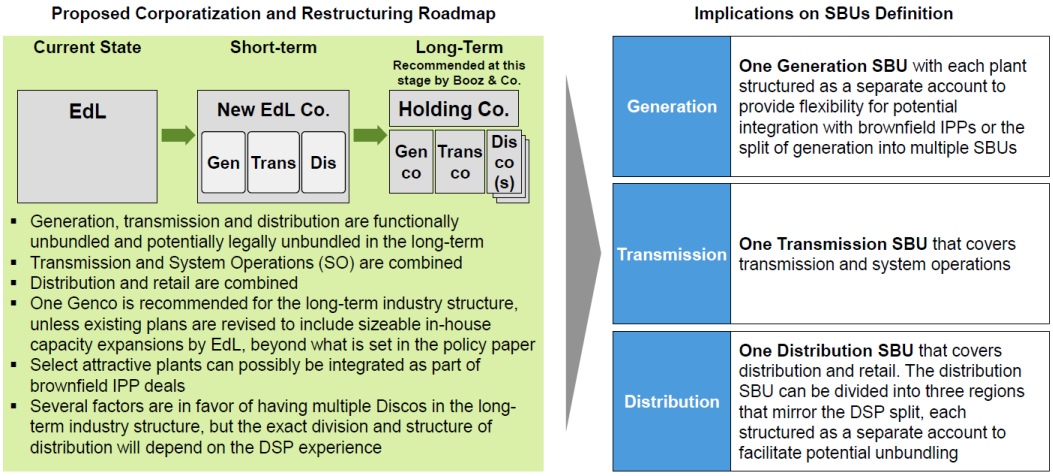
Source: Ministry of Energy and Water, 2019. Updated Policy Paper for the Electricity Sector.

10. **The transmission system is outdated and will need significant upgrade.** Historically, the bulk of the transmission system in Lebanon was developed in the 1970s, with some upgrades in the 1990s, as a 66-kV network which over time has gained country-wide coverage. As power demand grew, there was a need to introduce higher voltage transmission, which resulted in construction of a 150-kV network in the central coastal area around Beirut. Subsequently, the more standard 220-kV network was introduced, which now stretches from north to south in coastal area and loops through the northern Bekaa valley toward Beirut area (see the map in Annex 1). EDL's long-term technical strategy is to transition away from the 150-kV voltage and base the transmission system on 66-kV and 220-kV equipment as standard. Significant further expansion of 220-kV network is envisaged as the existing 66-kV network is not able to withstand the increasing demand, especially in urbanized areas. There is also the potential for increased regional trade beyond the existing trading arrangements with Syria, particularly given excess generation capacity existing in Jordan and Egypt, and the existing regional transmission infrastructure that connects Egypt, Jordan, and Syria with Lebanon.

11. **The sector structure has largely remained unchanged for the past several decades.** Law 462, which was promulgated in 2002, called for the physical unbundling of the transmission and the distribution functions of EDL into separate companies and the creation of an independent regulator to oversee largely privatized sector operations. EDL would then transition into a Transmission System

Operator (TSO) providing transmission service to support transactions for the sale and purchase of energy between otherwise private generation and distribution companies. An extensive Bank-supported study of the potential restructuring of the sector was undertaken in 2012 that recommended a phased approach to implementing Law 462's prescriptions (see Figure 2).

Figure 2 – Proposed Sector Transition to implement requirements of Law 462



12. However, this vision has not yet been implemented, ostensibly because of the institutional challenges at EDL and the inability to proceed with even functional unbundling of the utility's generation, transmission, and distribution, lack of political consensus on the future structure of the sector, and long-overdue tariff reforms to ensure the sector's financial sustainability. Thus far, the only private participation has been the DSPs contracted by EDL to oversee operations and maintenance of the distribution system (including distribution investment, meter reading, bill collection, and customer service). On the generation side, there are only small private sector independent power producers (IPPs), mainly hydropower, and private temporary generation (rental power). Nevertheless, the Government plans to add significant generation capacity through IPPs (see below) and some form of private sector participation in distribution is expected to continue for the foreseeable future. Therefore, there is an opportunity to advance on implementing Law 462's structural prescriptions and build political momentum for creating a TSO, once institutional challenges at EDL are addressed and there is progress in establishing a regulatory authority that would oversee the sector's operations and potential sector restructuring.

Government Reform Program

13. **The Government has shown strong commitment to turn around the electricity sector as a critical element for the revival of the Lebanese economy**. Political consensus has gathered around the urgency of reforms as the economy faces looming crises from the electricity sector: (i) the growing fiscal deficit and macro imbalances have weakened the ability to borrow and finance the sector shortfall, which, in turn, deterred private investment that is needed to expand and maintain the generation and transmission capacity; (ii) the growing power supply deficit has aggravated social mistrust; and (iii) the sector inefficiencies, arising from EDL's inefficient business practices and system losses, have undermined any effort to increase generation and added to the already unaffordable sector subsidies.

14. **The COM unanimously approved in April 2019 an update to the Electricity Sector Policy Paper adopted in June 2010 to be part of the Prime Minister's Vision for the CEDRE to resolve the country's crises**. The Parliament subsequently tacitly approved the updated Policy Paper by adopting an extension to the COM authority to grant licenses for the envisaged generation plants and fuel supply projects (based on floating storage and regasification units (FSRUs), which is key to implementing the updated Policy Paper. The main objective of the Policy Paper and its update (henceforth referred to as the "Electricity Sector Policy Paper" or the "ESPP") is to reform the sector, guaranteeing 24-hour electricity supply coupled with advanced services, and ending the sector financial deficits, using a four-pronged approach: (i) strengthening security of supply; (ii) improving operational performance; (iii) achieving cost recovery; (iv) improving governance of the sector.

15. **The ESPP envisages significant investments in generation and transmission.** Electricity demand is growing at an approximate pace of a 600 MW power plant every five years. The ESPP laid out the short- and long-term strategy to improve the electricity supply through fast track public and transparent tenders in partnership with the private sector at competitive prices with minimal environmental impact. This strategy envisions the combination of a temporary solution, based on 1450 MW of rented power plants deployed for a period ranging between 3 to 5 years, to reach available capacity of about 4000 MW in 2020, sufficient to ensure 24-hr supply to the country. Commissioning of 180 MW PV solar and 220 MW wind power is also expected in 2020. Simultaneously, the Government will launch an investment program for construction of a number of gas-based power plants through the private sector in several locations, primarily in Salaata, Zahrani, and Deir Ammar, where FSRUs are expected to be installed by 2021[6]. Overall, the generation plan calls for construction of a total of about 3,100 MW of thermal power plants in seven locations (in Salaata, Zahrani, Deir Ammar, Zouk, Jiyeh, Hrayche, and Tyre), to replace the rental plants, compensate for retirement of old plants at Zouk, Jiyeh and Hrayche, and ensure meeting the incremental demand. In addition, renewable energy (RE) – also to be developed by the private sector – will play a major role in the coming period as more than 840 MW of solar PV plants and 600 MW of wind power plants are planned for construction. Up to 2000 MW of new RE capacity (wind, solar, hydropower) is envisaged to be developed by 2030.

16. **Transmission grid reinforcements are needed across the country to accommodate planned additional generation and ensure reliable supply to the demand centers.** These investments are outlined in the ESPP, which lists about 40 transmission projects for a total of about 700 billion Lebanese pounds (about US$470 million). The list is based on transmission studies conducted by Électricité de France (EdF) in 2013 and 2017.[7] The transmission projects are to ensure reliable supply to the main load centers (of which Beirut is by far the largest), evacuation of power from the generation plants, and meet the (N-1) supply security requirement.[8] The COM has agreed on taking multiple measures to facilitate the above mentioned grid improvements, including requesting financing for transmission investments from international financing institutions (IFIs), allocating budget funding

[6] There are also discussions of possible resumption of natural gas imports from Egypt through the Arab gas pipeline that passes through Jordan and Syria.

[7] "Republique du Liban, Electricity du Liban (EDL): Etude du Schéma Directeur Transport du Secteur Electrique au Liban, Plan d'Investissement", EdF, Août 2013, Version Finale
"Republique du Liban, Electricity du Liban (EDL): Update of the Transmission Master Plan", EdF, Final Report, May 2017.

[8] (N-1) security criterion for transmission network means that the system should be able to continue supplying the load in case of outage of any single element (transmission line, substation).

for land acquisition or transferring the land from other government agencies, requesting the internal security forces and the Lebanese army for convoying the EDL teams in performing their missions; etc.

17. **The Government program envisages the sector achieving financial self-sustainability within a five-year period.** Table 1 below summarizes the expected trajectory of the sector performance and the resulting financial performance. Generation is expected to meet demand starting in 2021 once (temporary and permanent) capacity is added; and the expected decrease of losses makes significant contribution to the reduction of the cost of supply, as does the fuel switching in generation expected to kick-in in 2022.

Table 1: Sector performance trajectory

	2017	2018	2019	2020	2021	2022	2023
Energy produced (GWh)	15.0	15.1	15.4	15.5	22.9	21.8	21.7
Technical losses (% energy sent out)	13.5%	13.4%	10.7%	8.8%	8.3%	7.0%	7.0%
Non-technical losses (% energy sent out)	20.4%	22.6%	21.6%	19.6%	16.6%	12.6%	7.6%
Collection loss (% energy sent out)	22.3%	3.2%	3.4%	2.9%	3.0%	3.2%	3.4%
Cost of supply (US$) per kWh collected	0.36	0.27	0.25	0.24	0.20	0.18	0.16
Tariff (US$/kWh)	0.09	0.09	0.09	0.09	0.11	0.13	0.16
Cost recovery	27%	35%	37%	40%	53%	75%	100%
Subsidy requirement (US$ million)	1,716	1,643	1,593	1,531	1,595	742	0

Source: ECA (2019). Lebanon cost of service and tariff design study

Relationship to CPF

18. **The Country Partnership Framework (CPF) (FY17-FY22) aims at mitigating the immediate, and potentially long-lasting impact of the Syrian crisis on Lebanon**, while strengthening state institutions, addressing existing vulnerabilities, and bolstering efforts on longer term development challenges, all through interventions that foster inclusion and shared prosperity. Specifically, the project would support two focus areas of the CPF to renew the social contract between the state and the citizens: (i) expand access to and quality of service delivery; and (ii) expand economic opportunities and increase human capital. The proposed Project will contribute to advancing CPF (FY17-FY22) objectives. Poor delivery of electricity supply was identified in the Systematic Country Diagnostic (2015) as a binding constraint to Lebanon's economic development. Inefficiencies in the electricity sector have ripple effects on the lives of Lebanese citizens, not just because they increase the cost of living as people cope with deficiencies in the quality of electricity services, but they can also have deleterious impacts on job opportunities, education, and healthcare services. For women, limited access to reliable electricity can increase the time they conduct specific household chores. It can also negatively impact their ability to engage in entrepreneurial activities, both inside and outside of the home.[9] Moreover, studies have demonstrated that improved infrastructure has strong positive impacts not only on long-run economic growth, but also on income equality.

19. **The Project also contributes to the updated Middle East and North Africa (MNA) Regional Strategy[10] and is aligned with the Maximizing Finance for Development (MFD) approach** The

[9] World Bank EEX Gender Follow Up Note, 2017.
[10] Middle East and North Africa Regional Update 2019 - *#OpenforBusiness,* The World Bank Group

proposed Project enables the power sector to deploy the MFD approach to improve electricity services in the country, an objective that cuts across the strategic aims of the MNA regional strategy -- promoting sustainable and inclusive growth, building human capital, and strengthening resilience to refugee and climate change shocks. Starting from limited private sector participation in generation, the Government is planning for a series of IPPs for both thermal and RE capacity addition. The enforcement of the transmission network is critical to facilitate these much needed private investments and support the establishment of a more efficient generation market. This is of critical strategic importance for the sector and support by the Bank can help build the enabling conditions.

20. **Finally, the Project contributes to the first and second pillar of the Bank-wide Gender Strategy (FY16-23)** to improve outcomes in human development by increasing access to reliable electricity and promote access to more and better jobs by removing constraints to women's employment in the energy sector. The proposed project is also aligned with Government commitment to support women's economic empowerment, as announced with the launching of the Mashreq Gender Facility in January 2019.

C. Proposed Development Objective(s)

To strengthen the provision of electricity transmission and dispatch services in Lebanon

Key Results (From PCN)

21. The Project is expected to achieve the following results:

- Increased transmission installed capacity (MW) in selected areas
- Improved reliability of supply (frequency of outages)
- Reduced losses in the power system (percentage)
- Ringfenced transmission system operations (Yes/No).

D. Concept Description

22. **The proposed Electricity Transmission Project is part of the Bank's multiphase support to the Government's ESPP and CIP.** As described above, a key element of the Government's investment priorities involves improving the availability, efficiency, and quality of electricity supply. An adequate transmission system that has sufficient capacity, redundancy, and operates securely and reliably is fundamental to this effort. The Project aims to support institutional strengthening of transmission and dispatch functions, as well as fund priority investments in Lebanon's transmission grid and the power system control to achieve these goals. With the added lines and substations, the system will be able to respond to the increasing electricity demand and support economic growth and social services in the investment areas. The Project will help enable investments in new generation plants – expected to be financed mostly by the private sector – by removing transmission bottlenecks and enabling better access to the end-use market. The Project will also equip EDL to support technically different forms of electricity trading arrangements (including competitive, open access

arrangements), which are easier to introduce if transmission bottlenecks are removed and physical access to consumers unimpeded, and if there is an adequate system for managing dispatch and operation of the power system to ensure that it operates securely and efficiently.

23. **The proposed Project (US$200 million) will comprise of the following main components:** (i) expansion of the transmission system and strengthening transmission maintenance; (ii) upgrade of the national power system control center; and (iii) institutional support, capacity building, and project implementation.

24. **Component 1 – Expansion of the transmission system and strengthening transmission maintenance**; **(US$170 million):** The 220-kV network will need significant expansion to accommodate (a) feeding the load growth in the growing urban areas of the country; and (b) the large thermal power plants planned in the coastal areas and some larger renewable generation plants which are to be more decentralized in the inland areas. The proposed Project will include:

- Construction of a part of the 220-kV South Loop for supplying the Beirut urban area[11], Lebanon's largest load center, as the existing old 66-kV supply system has become inadequate to accommodate the load growth and future expansion and is increasingly demanding to maintain due to the age of the equipment (some elements over 50 years old). The South Loop includes a number of substations and interconnecting transmission lines (underground) and will be constructed in phases. MEW proposed the Airport – Hazmieh -- Jamhour – Choueifat – Airport section of the Southern Loop to be included in the proposed Project (as Phase 1 of the Southern Loop), with four gas insulated substations (GIS) (Airport, Hazmieh, Jamhour, Choueifat) and four underground 220-kV connecting lines with total length of about 20 km. The Jamhour-Hazmieh line will be double-circuit with carrying capacity of 1180 MW; the other three (Airport – Hazmieh, Jamhour – Choueifat, and Choueifat – Airport) will be single-circuit lines with carrying capacity of 580 MW. The cost is preliminarily estimated at about US$120 million.
- MEW also proposed to include a 220-kV, 20-km long Zahrani – Nabatieh overhead transmission line (carrying capacity of 1140 MW), from the existing 220-kV Zahrani substation (a new line bay will be needed) to a new air-insulated substation (AIS) at Nabatieh (2x70 MW). This line is the first step in constructing a future 220-kV south Bekaa loop from Zahrani to Ksara (via Nabatieh and Marjayoun substations). The cost of this investment is preliminarily estimated at about US$30 million.
- The proposed component will also support improving EDL's operations and maintenance of the transmission network. This would involve reengineering of the related processes and activities with support of state-of-the-art equipment and tools; live-line maintenance; maintenance management information system (MMS); etc.

25. The proposed investments will be confirmed during project preparation in terms of their prioritization, costs, and exact locations of the facilities. Locations of some substations in the South Loop have been decided (Jamhour, Airport, Hazmieh). The exact routing of the underground cable lines is under study, as is routing for the Zahrani – Nabatieh line. There may be other investments in

[11] The 220-kV transmission system for the Beirut area also has a 220-kV North Loop, which will be financed by the EBRD.

transmission added during project preparation, depending on the final cost estimates and the available budget for the Project, including possible co-financing from other financing institutions[12].

26. **Component 2 – Upgrade of the national power system control center (US$20 million)**: Modern, network-based power systems require sophisticated control systems to operate them securely, reliably, safely, and efficiently. That task belongs to the computerized "System Control and Data Acquisition (SCADA)" systems, which are complemented by the Energy Management Systems (EMS) that help evaluate the security of the power system and optimize the use of its resources. Automatic Generation Control (AGC) is a particularly important function performed by modern control systems, whose task is to continually adjust power generation to maintain balance between demand and supply at the prescribed nominal frequency (50 Hz in Lebanon) and at the prescribed level of energy flows over the tie-lines with other power systems.

27. Although EDL has a SCADA system, it has become a challenge to maintain and expand it, a constraint that needs to be addressed as the power system itself expands with new generation and transmission assets that will need to be incorporated in the SCADA system. The existing national control center also has a limited functionality in terms of energy management system, and AGC function is missing. The proposed component will address the needs to upgrade the coverage, functionality, and performance of the national control center to bring it to the modern standards of power system management, including functionalities needed for different forms of market arrangements that Lebanon may consider in the future (such as more competitive, open access-based markets). The upgrade will also address the challenge of having to deal with a larger share of intermittent renewables in the power system as well as the challenges of protecting the power system against cyber-attacks.

28. **Component 3 – Institutional support, capacity building, and project implementation (US$10 million)**: This component will include the following elements:

- Support to institutional ring-fencing of transmission and dispatch services, including organizational structure, improving processes and activities, provision of training, etc.
- Studies for examining different market trading models and their institutional structure and governance, that may be considered to improve the sector's efficiency, strengthen investment environment, and increase private sector participation in at least generation and distribution;
- Provision of state-of the-art tools, training and capacity building in the areas of power system investment planning (least cost generation and transmission planning), power system control and dispatch, and in various areas of system analysis, planning, and operations;
- Development of a policy for EDL to promote employment of youth and increase participation of women in the transmission services to strengthen gender balance, including at technical and managerial positions;
- Funding to support the implementing agency (MEW) in implementing the Project by providing the necessary consulting services for procurement, project management and supervision, financial management, etc.

[12] The Islamic Development Bank has expressed interest in financing transmission investments.

Legal Operational Policies	Triggered?
Projects on International Waterways OP 7.50	No
Projects in Disputed Areas OP 7.60	No

Summary of Screening of Environmental and Social Risks and Impacts

Screening of environmental and social risks and impacts:

- The strengthening of the southern transmission loop will include expansion of existing substations, construction of new substations, laying down underground cables and erection of new transmission towers. The civil works during the construction phase will have negative impacts on the surrounding environment such as air and noise emissions, waste generation, as well as on the worker health and safety. During the operation phase, there might be community/worker health and safety concerns related to electromagnetic fields generated from the transmission lines and risks of electric shocks to maintenance workers. In addition, in case of using SF6 gas in the substations, there will be impacts on climate change. Therefore, the environmental risk is considered Substantial.
- While the social concerns may be limited in some areas to disturbances associated with construction activities, the right-of-ways need to be very carefully surveyed to investigate if there are any encroachments that could result in negative economic/livelihoods, temporary or permanent impacts. Moreover, the civil works may also be associated with labor influx which may result in potential negative social risks especially if labor camps will be installed in close proximity to residential communities. Labor influx and labor camps may result in potential gender-based violence (GBV) issues which need to be mitigated and managed through proper training of the workers and code of conduct. Finally, there is also potential for exposure of workers to electric shocks which might pose health and safety impacts. Therefore, the social risk is considered Substantial.

Note To view the Environmental and Social Risks and Impacts, please refer to the Concept Stage ESRS Document**.**

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