



# LEBANON

## SELECTED ISSUES

October 2019

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August 21, 2019

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# THE ELECTRICITY SECTOR IN LEBANON: A NEW PLAN TO ADDRESS LONG-STANDING INEFFICIENCIES<sup>1</sup>

**1. The electricity sector is highly inefficient in Lebanon and is imposing a significant economic and social cost.** Electricité du Liban (EdL), the state-owned company mandated with the responsibility of generation, transmission, and distribution of electricity, is faced with three main challenges: (i) production capacity is well below consumers' demand; (ii) losses (technical, non-technical and non-collection) are very high, estimated at 43 percent of production—i.e. only 57 percent of electricity produced is actually transmitted, billed, and collected; and (iii) electricity tariffs are well below cost recovery, and EdL's large financial losses impose a heavy burden on the government budget.

**2. While there is a broad agreement on the need to reform the electricity sector, implementing a reform has proven difficult.** Several reform plans have been produced in the past years but were never implemented—the most recent ones are the Policy Paper for the Energy Sector in 2010 and the Energy Sector Salvation Plan in 2017. Since the formation of the new government in February 2019, the authorities have worked on an update of the 2010 Policy Paper, which was approved by the Cabinet and Parliament in April 2019.

**3. This note studies the inefficiencies related to the electricity sector and assesses the potential impact of the 2019 reform plan.** After giving an overview of the electricity sector in section A, section B focuses on its impact on business competitiveness while section C studies its effect on household inequalities. Section D concludes by assessing the potential impact of the 2019 reform plan on the budget and proposes further options for reforms.

## A. Background

**4. EdL's generation capacity is well below consumers' demand.** The installed generating capacity of 3,017 MW<sup>2</sup> is estimated to fall short of demand by about 1,500 MW (even excluding some large energy-intensive companies that rely on their own generators). Although consumers rely on pricy private generators to fill this gap, significant electricity outages are a daily experience. Moreover, demand for electricity is estimated to grow by 500 MW every five years, which is likely to worsen the capacity gap in the absence of reform. While ongoing projects—e.g. the Bisri dam in collaboration with the WB—are expected to increase capacity, power barges used for temporary power generation since 2012 are scheduled to exit the market in 2021.

**5. EdL currently applies an outdated tariff structure, unchanged since the 1990s.** It is

<sup>1</sup> Prepared by Constance de Soyres and Najla Nakhle.

<sup>2</sup> According to EdL's website, thermal power plants have a capacity of 2,764 MW while hydroelectric power plants have a capacity of 252.6 MW.

composed of different brackets for low, medium and high-voltage users (Table 1). The rates have been unchanged since 1996, and are well below the cost from alternative sources. For example, consumers currently pay an average of 9.6 cents/kWh to EdL while private generators charge 22 cents/kWh on average.

#### 6. In addition, EdL faces important losses and unpaid bills.

Losses represent 43 percent of the production—of which 17 percent are technical losses, 21 percent are non-technical losses (meter tampering, misbilling and theft), and 5 percent are billed but non-collected losses. Technical losses could be reduced by an investment in transmission, which could bring them closer to international standards at 10 percent. Non-technical losses are currently difficult to track but could be improved through the use of smart meters.<sup>3</sup> Non-collection losses have built up over the years and the current stock of payment arrears from private consumers is estimated at USD 0.4 billion (0.7 percent of GDP). Total unpaid dues—including central government, municipalities, public institutions—are estimated at USD 2 billion (3.6 percent of GDP).

#### 7. EdL receives transfers from the government to finance its expenses.

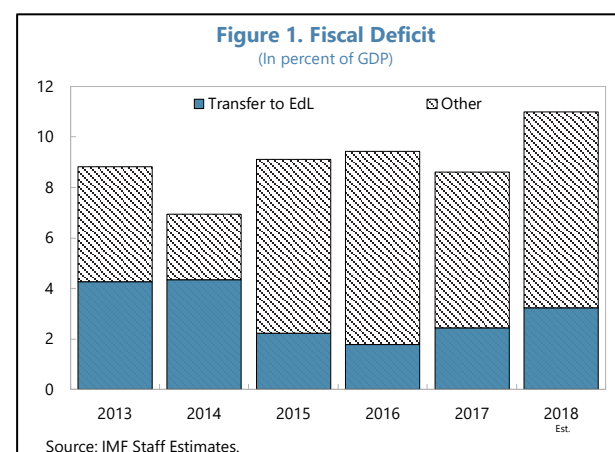
Transfers amounted to an estimated USD 1.8 billion in 2018 (3.1 percent of GDP, Figure 1), putting a significant burden on public finances.

#### 8. For the EdL to break even, consumer tariffs need to increase significantly.

Under the current system, to cover both production and distribution costs—which include technical and non-technical losses—the break-even tariff is estimated at 23 cents/kWh. Including capital expenditures would increase the break-even tariff further to 28 cents/kWh.

Voltage	Category	Type of Consumption	Price US\$ cents/kWh
Low Voltage	Households and Commercials	0-100 kWh	2.32
		100-300 kWh	3.65
		300-400 kWh	5.31
		400-500 kWh	7.96
		>500 kWh	13.27
	Public Administration		9.29
	Handcraft and Agriculture		7.63
Medium Voltage	Lighting	Day Peak	21.23
		Day Off-Peak	7.43
		Night	5.31
	Concessions		4.98
	Concession Zahle		3.32
High Voltage	Industry		7.63
	Kadisha		4.98
	Cement Sibling		4.98

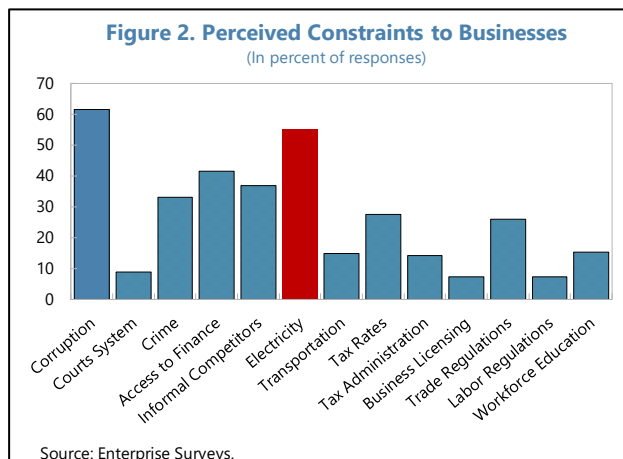
Source: EdL.



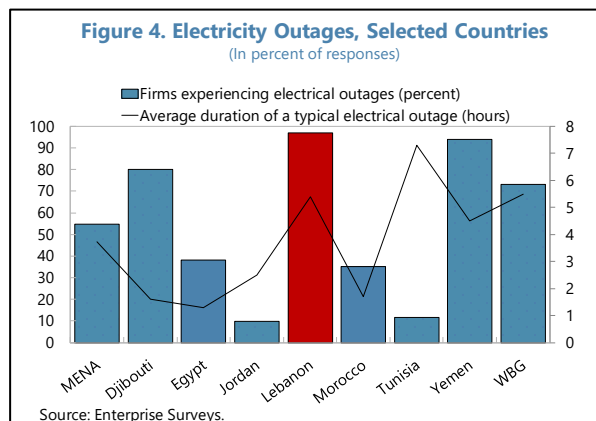
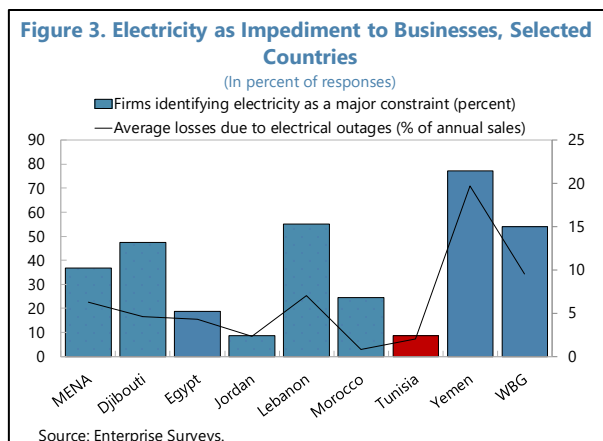
<sup>3</sup> A smart meter is an electronic device that records electricity consumption and communicates the information to the electricity supplier for monitoring and billing. Using smart meters would contribute to reducing the non-technical losses which stem from meter tampering and electricity theft.

## B. Electricity Provision and Business Competitiveness

**9. Electricity shortages are the second constraint to competitiveness reported by businesses in Lebanon, based on the Enterprise Survey conducted by the World Bank.<sup>4</sup>** While corruption is considered as a constraint by 61 percent of the businesses surveyed, electricity is reported as an impediment by 55 percent of them (Figure 2). It is well above other categories such as access to finance, informal sector competitors or criminality.

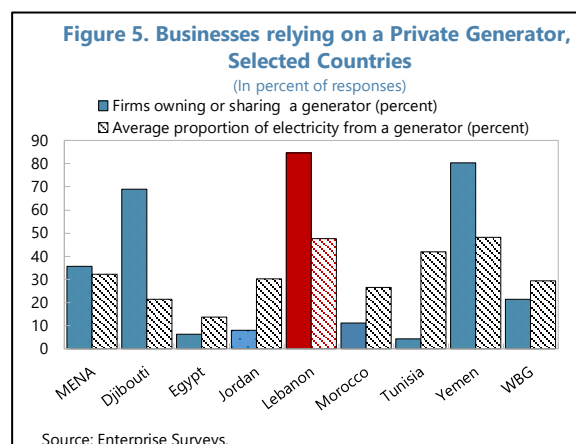


**10. Lebanon’s electricity sector performance is worse than other similar countries in the region.** The share of businesses reporting electricity as a constraint is well above the MENA average of 37 percent (Figure 3), and 97 percent of the businesses report experiencing an electrical outage, compared to an average of 55 percent in the MENA region (Figure 4). The average duration of daily shortages is 5.4 hours compared to an average of 3.7 hours in the MENA region.



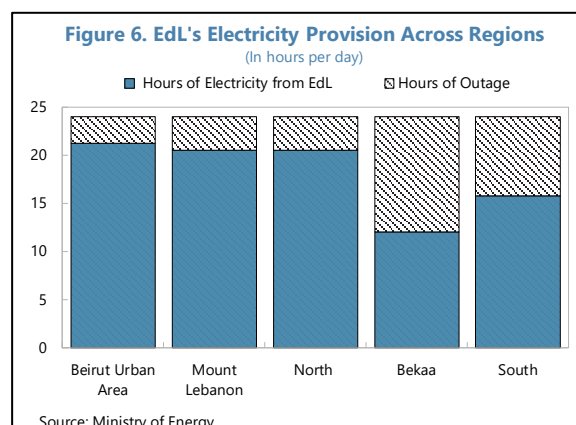
<sup>4</sup> The World Bank conducted an Enterprise Survey in Lebanon in 2013. Most other countries in the region (Djibouti, Jordan, Morocco, Tunisia, Yemen, and West Bank and Gaza) were surveyed in 2013, except for Egypt in 2016. The number for MENA in Figures 3–5 is computed by averaging over the subset of countries shown in the charts.

**11. Many businesses have to rely on costly private generators.** 84 percent of the surveyed businesses report using private generators, which supply almost half of their electricity (Figure 5). This is well above the MENA average where 36 percent of businesses surveyed report using a private generator for 32 percent of the supply. Given that private generators cost on average 22 cents/kWh—as opposed to an average of 9.6 cents/kWh for EdL’s electricity tariffs—they represent an important share of businesses’ electricity expenses.

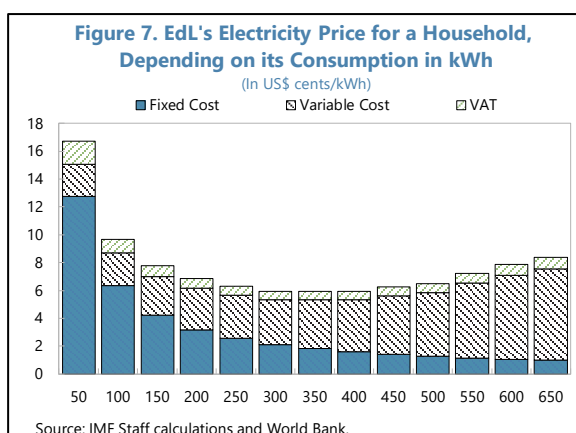


### C. Electricity Provision and Household Income Disparities

**12. EdL’s electricity provision is highly unequal across regions.** While Beirut urban area receives 21.2 hours of electricity per day, the Bekaa region receives only 12 hours of electricity per day (Figure 6). Given that hours of outage are covered with expensive privately generated electricity, the average cost of having 24/7 electricity varies significantly across regions to the detriment of those with the lowest supply from EdL—e.g. the average cost of electricity is lower in Beirut urban area where hours of outage are comparatively lower while residents have the second highest average monthly income.



**13. Inequalities are further exacerbated by EdL’s tariff structure.** While tariffs—which correspond to variable costs—are designed in a progressive manner to subsidize lower tranches (Table 1), the overall cost of electricity is actually regressive because of the presence of high fixed costs. Fixed costs—including stamp, rehabilitation and a subscription to Amps—amount to USD 6.40 monthly.<sup>5</sup> They represent between 40 and 76 percent of EdL’s electricity bill for the smallest

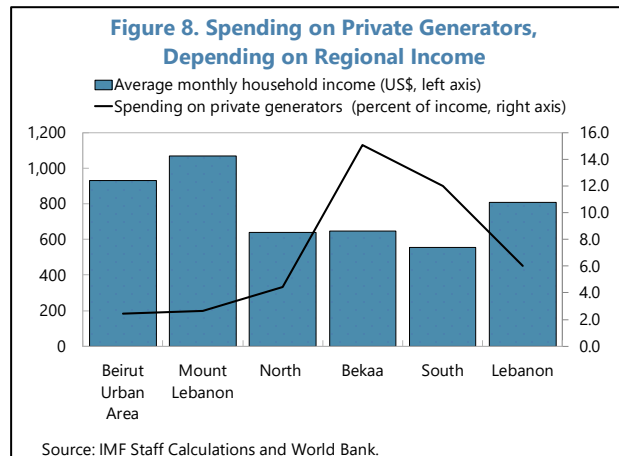


<sup>5</sup> While the stamp fee amounts to USD 0.70 and the rehabilitation fee to USD 3.30, the subscription to Amps depends on the amount chosen. Most households subscribe to 15 Amps, which cost USD 2.40. Fixed costs therefore amount to USD 6.40 a month for most households.

consumers—consuming less than 300 kWh per month (Figure 7).

#### 14. Income inequalities are exacerbated by both the geographical disparities in EdL's electricity provision and its tariff structure.

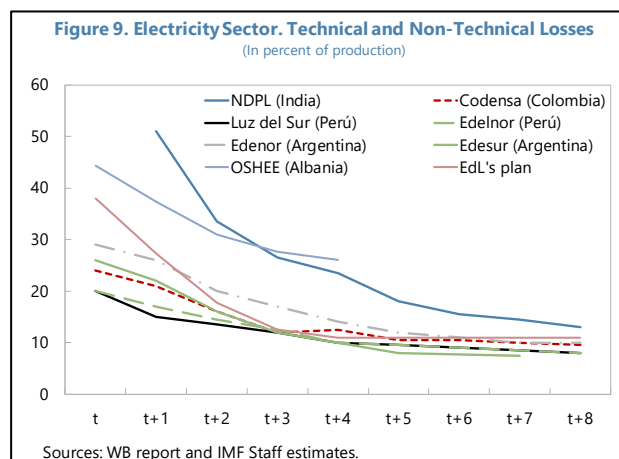
The most vulnerable households are the small consumers located in regions with little electricity provision from EdL. They devote the highest share of their income to pay for private generators. For example, households in the poorest region in Lebanon—the South with a household average monthly income equivalent to 69 percent of the national average—devote 12 percent of their income to pay for private generators. Households in the richest region of Lebanon—Mount Lebanon with a household average monthly income equivalent to 1.3 times the national average—pay 2 percent of their income to private generators (Figure 8).<sup>6</sup>



### D. A New Reform Proposal

15. A new electricity plan was approved by Cabinet on April 9, 2019 and ratified by Parliament on April 17, 2019. It has four components:

- Reduce losses.** There are two projects to reduce losses: (i) improve the Distribution Service Provider (DSP) framework and the distribution grid to reduce technical losses; and (ii) install smart meters to reduce non-technical losses. Since the approval of the plan, technical losses have been reduced by 1 percentage point through the installation and electrification of a high voltage line in Mansourieh. Other lines are expected to be installed in three other cities by the end of the year. To reduce non-technical losses, the subscription price has been reduced by 75 percent temporarily, which has substantially increased the number of new subscriptions. The smart meters' installation cost of USD 200 million is expected to be supported by a WB loan Program for Results (PforR), which is disbursed only when the implementation is successful (according to an indicator of losses). A test phase, which aims at installing around 30,000 smart meters by end August 2019, has



<sup>6</sup> The percentages of income paid on private generators are estimated based on the 2012 indicative tariffs for private generators and hours of electricity outages.

already been initiated with support from the National Electric Utility Company (NEUC). The goal is to reduce technical and non-technical losses from 34 percent to 12 percent by 2023. Based on cross-country experience, staff estimates suggest that a reduction to 20 percent is more realistic in the medium-term (Figure 9).<sup>7</sup>

- Increase capacity.** Given that building new power plants takes at least two years, the authorities are planning to implement a temporary solution—e.g. modular power plants, power barges—in parallel to reach a 24/7 supply in 2020. As a temporary solution is likely to be more expensive than a permanent one, combining the two in a Power Purchasing Agreement (PPA) would make it possible to backload the cost of the temporary solution. EdL would pay a fixed price per kWh for electricity consumption over the duration of the project, while the private contractor would be responsible for any costs related to the project—e.g. investment costs. While the production cost of a temporary solution could stand at around 14 cents/kWh in the case of power barges, the production cost of new power plants is expected to range between 8–9 cents/kWh. Therefore, the fixed price including both solutions as well as fiscal risks taken by the private contractor could be in-between. Staff estimates that the increase in capacity could start by end 2020 and that the fixed price negotiated under the PPA could be around 10 cents/kWh.
- Reduce production costs.** Using gas as input to electricity production rather than the fuel currently used could bring substantial fiscal savings. The authorities are planning to negotiate a PPA to import LNG by ship, build three Floating Storage Regasification Units (FSRUs) and an underwater pipeline from ship to shore. While the bidding process is completed, the contract needs to be signed by the end of the year to fulfill the objective to supply all existing power plants by 2021. Given the possibility of delays in the process, staff assesses that gas could be used as input starting in 2022.
- Increase tariffs.** The authorities plan to raise tariffs to 14.4 cents/kWh after the increase in capacity is implemented (i.e. only after electricity provision is sufficient to cover demand on a 24/7 basis) and to adopt an automatic fuel indexation mechanism thereafter. According to the authorities, this is the price at which the EdL's operating deficit (excluding capital expenditures) will be closed once all the components of the reform have been implemented. However, staff estimates suggest that a higher increase in tariffs to about USD 16.2 cents would be necessary to close EdL's deficit after the implementation of the plan,<sup>8</sup> accounting for both (i) projected capital expenditures; and (ii) a more realistic reduction in technical and non-technical losses.

<sup>7</sup> Cross-country evidence shows that technical losses stand at 10 percent of production on average in well-performing utilities, while non-technical losses could be reduced to 5 percent of production in the best of circumstances in Lebanon. Given that losses were reduced by roughly 4 percentage points on average annually in similar cases, staff estimates suggest that a reduction of losses to 20 percent of production could be reached in the medium-term while a reduction to 15 percent of production could be attained in the longer-term.

<sup>8</sup> After the implementation of the plan, losses are expected to be reduced from 43 to 20 percent of production by 2025, capacity to be increased to achieve zero outage by end-2020 and production costs to be reduced through the use of gas as input by 2023. Staff estimates suggest that an increase in tariffs to USD 16.2 cents would then be necessary to close EdL's primary deficit.



**16. If fully implemented, the plan could start reducing EdL's deficit by 0.1 percent of GDP in 2020 and 0.9 percent of GDP in 2021 (Table 2).** Then, annual savings would increase gradually as losses are reduced and amount to 1.9 percent of GDP in 2025. EdL's deficit would still be positive at around 0.4 percent of GDP in 2025. The main contributor to the deficit reduction is the use of gas as input to production which could save 0.7 percent of GDP in 2025, followed by the increase in tariffs which could save 0.6 percent of GDP. Once losses are reduced to 20 percent of production in 2025, it could reduce the deficit by 0.5 percent of GDP. The four components of the reform give rise to significant interactions, which explains why the sum of individual savings is not equal to the overall gains of the reform plan.

**Table 2. Projected Savings Under the Electricity Plan**  
(In percent of GDP)

	2019	2020	2021	2022	2023	2024	2025
1. Reduction of losses from 43 to 20 percent by 2025 1/	0.0	0.1	0.2	0.3	0.4	0.5	0.5
2. Increase capacity to achieve zero outage by end 2020 2/	0.0	-0.1	-0.8	-0.8	-0.9	-0.9	-0.8
3. Use of gas as input starting in 2022 3/	0.0	0.0	0.0	0.7	0.7	0.7	0.7
4. Increase tariff from 9.6 to 14.4 cents/kWh in 2021	0.0	0.0	0.7	0.7	0.7	0.7	0.6
<b>Electricity Plan - Total Savings 4/</b>	<b>0.0</b>	<b>0.1</b>	<b>0.9</b>	<b>1.6</b>	<b>1.7</b>	<b>1.9</b>	<b>1.9</b>
<i>Memorandum items.</i>							
EdL's primary deficit under unchanged policies 5/	2.7	2.5	2.4	2.4	2.4	2.3	2.3
EdL's primary deficit under the plan	2.7	2.4	1.5	0.8	0.6	0.5	0.4
Source: IMF Staff estimates.							
1/ Non-technical losses are reduced from 21 to 10 percent, technical losses from 17 to 10 percent and non-collection losses from 5 to zero percent. These assumptions follow cross-country experience and represent a lower reduction than in the authorities' plan in the medium-term.							
2/ Capacity is expected to be increased gradually to reach zero outage by end-2020. It is increased through a temporary solution (barges) over 2020-2022, while the permanent solution (new power plants) is expected to start producing electricity in 2023.							
3/ Gas is used as an input to power plants in 2022.							
4/ Savings of the four components of the plan do not sum to total savings because of significant interactions between the components.							
5/ The primary deficit excludes interest payments.							

**17. While it is critical that the plan is decisively implemented, it is also important that it is enhanced further to fully restore EdL's viability.** Regarding the tariff increase, users should pay electricity tariffs that are sufficient for EdL's finances to be balanced. Including capital expenditures, this implies tariffs of at least 16.2 cents/kWh, after taking into account the impact of the reforms. The tariff increase should take place as soon as possible to start relieving the strain on public finances, possibly targeting the largest consumers (industrials) first. In addition, it is essential to simplify the tariff structure to improve fairness and design it to incentivize consumers to reduce their consumption while supporting the most vulnerable. In this regard, introducing well-targeted measures, such as cash transfers, would help protect the most vulnerable households from the tariff increase. As planned in the reform package, consumer tariffs should be indexed on the evolution of input prices to guarantee that it will not be negatively impacted by future developments in fuel or gas prices.

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