ACE SOAS Consortium
Anti-Corruption Evidence
Making Anti-Corruption Real

Briefing Paper 16

The economics and politics of integrating renewables into electricity concessions in Lebanon

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Credit: Marc Ayoub/Zahle – July 2020

Key messages

- The high dependency on fossil fuels (heavy fuel oil and diesel) for power generation in Lebanon is expensive, polluting and widens social inequalities
- The country has abundant renewable resources, notably significant solar and wind power potential
- Utility-scale solar power could unlock climate-linked international financing while dramatically reduce the cost of electricity relative to diesel based generation
- Up to 2018, a local private concession – Electricité de Zahle (EDZ) – has made important steps towards integrating small-scale renewables, but, to invest in utility-scale renewables, concessions need the certainty of long-term contracts
- Passing the Distributed Renewable Energy Law would provide a legal basis for further development of renewables in Lebanon by allowing net metering, power wheeling across networks and private-to-private sales of electricity.

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What is ACE?

The Anti-Corruption Evidence (ACE) research consortium takes an innovative approach to anti-corruption policy and practice. Working with a multi-country coalition of 12 partners over five years, ACE is responding to the serious challenges facing people and economies affected by corruption by generating evidence that makes anti-corruption real and using those findings to help policymakers, business and civil society adopt new, feasible, high-impact strategies to tackle corruption.

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The potential of renewables in Lebanon

Lebanon's electricity sector is failing, in part, because of its dependence on fossil fuel. The power sector was among the first services to reflect the collapse of the Lebanese economy and the country's ongoing financial crisis. Dwindling foreign currency reserves at the Central Bank of Lebanon have made it difficult for the state utility, Electricité du Liban (EDL), to purchase fuel – which is almost entirely imported fossil fuel – leading to prolonged power outages and reliance on private diesel generators. The large depreciation of the currency suggests that, in the short term, the challenges facing the electricity sector are expected to get worse.

Lebanon has abundant renewable resources, but the country is yet to benefit at scale. In addition to significant wind potential – particularly in Akkar and the Bekaa valley – Lebanon has considerable potential for solar power. The International Renewable Energy Agency (IRENA, 2020) estimates that the technical potential for utility-scale solar photovoltaic (PV) systems could reach around 182 gigawatts (GW). However, more detailed estimates of practically useable capacity suggest 5.5–10.5 GW (IFI-AUB and LFRE, 2019). Actual installed capacity was tiny a decade ago, but capacity growth from 2010 to 2019 averaged 89% per year, reaching a total of 78.65 megawatt peak (MWp) installed capacity, with total investments of $125.83 million (LCEC and Ministry of Energy and Water, 2021). This was driven by improvements in technology and dramatic declines in cost, which saw the number of solar PV projects implemented in Lebanon increase from 25 in 2011 to 360 in 2019. However, almost all of these projects are small-scale distributed renewable projects – the country still lacks significant utility-scale renewable projects and solar power still represents only 0.73% of the total annual electricity generated by EDL.

A rapid expansion of utility-scale renewables could help address Lebanon's electricity crisis. Policy-makers are under pressure to reduce the use of foreign reserves to subsidise essential goods, including fuel imports. A greater use of renewable energy could help to minimise the need for foreign exchange, improve Lebanon's energy security, and reduce its reliance on fossil fuels. Moreover, public and private investments in renewable energy projects would create jobs and reduce the health and environmental costs of diesel generators.

But EDL has not been able to invest significantly in renewables. Lebanon's current policies require EDL to sell electricity far below the cost of supply, and consequently it faces large losses each year. This makes it difficult for the utility to raise capital to invest in renewable technology, even when doing so might lower its overall costs. While a new Distributed Renewable Energy Law is currently being drafted to encourage private investment in the sector, this has still not been passed to parliament.

On the other hand, a local private concession – Electricité de Zahle (EDZ) – has made notable steps towards integrating renewables. EDZ is the largest of a small number of private electricity concession holders in Lebanon. Its geographic coverage includes a concentration of significant commercial, industrial and agricultural activities that are important to the national economy. EDZ acts as an electricity distributor when power from EDL is available; but when it is not, EDZ undertakes its own generation using 60MW of diesel generators operated by Aggreko. This has enabled EDZ to provide a high-quality service with 24/7 electricity coverage in Zahle and surrounding areas.[1] Since EDZ has to source diesel for its own generation, however, it has a strong incentive to reduce fuel use. As a result, EDZ has incorporated renewable energy into its operations, with around 600 net-metering subscriptions that account for a total capacity of 8MW.[2] Because of its low level of technical grid losses,[3] most of the renewable electricity that is provided to EDZ's grid via net-metering is transferred to consumers and not wasted. Moreover, EDZ has gained expertise in monitoring and balancing the grid while incorporating distributable renewable projects.

1 See Ahmad et al. (2020) for a detailed description of the strengths and weaknesses of the EDZ model.

2 According to EDZ CEO, Assad Nakad.

3 Around 5%, according to EDZ data.

Enabling regional concessions to invest in utility-scale renewables could have major benefits. Regional concessions – particularly those located inland such as EDZ – could play a major role in enabling Lebanon to take advantage of its renewable energy resources. The Bekaa region, where EDZ is located, has the second highest solar radiation levels in Lebanon after the Baalbak-Hermel region. As noted, incorporating utility-scale solar PV into the business model of EDZ could have major benefits, including limiting the drain of hard currency spent on importing fossil fuels plus significant environmental and health benefits from reducing the use of polluting diesel generators. Although solar PV projects are capital intensive, they are relatively easy to finance given the enthusiasm of development banks and donors to support climate-responsive projects. Investing in renewable energy could boost Lebanon's reputation in this regard and would enable concessions such as EDZ to brand themselves as modern, reformed and future-looking utilities.

Quantifying the benefits of utility-scale solar for EDZ

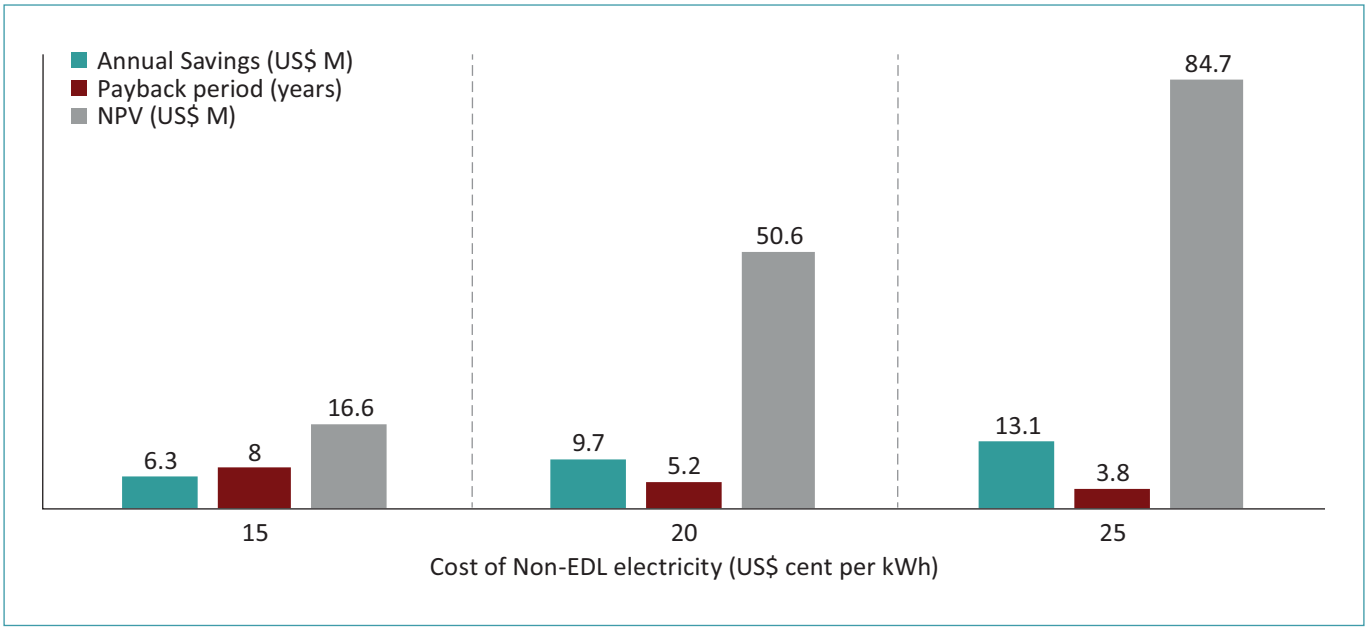
The economic value of solar PV integration depends on the size of the PV plant. Given EDZ's technical experience, as well as limitations on the availability of land in the Bekaa region, we have estimated the savings from a medium-sized solar PV plant covering 20% of the demand currently supplied by diesel-based power generation (via Aggreko). According to a CEDRO-UNDP (2016) report, a smaller plant would reduce the fuel savings and environmental benefits, while a larger plant would require substantially higher capital and investments due to higher levels of complexity. Consequently, the capacity of the proposed medium-sized solar PV plant is estimated at 63 MWp (see Table 1).

Incorporating a solar PV power plant within EDZ's generation could save millions of dollars. The financial impact of incorporating a 63-MWp solar PV power plant within EDZ's asset base is shown in Figure 1. The financial saving depends on the price of the electricity generated by diesel fuel via Aggreko. Since EDZ is responsible for procuring this fuel, it is safe to assume that this represents the dominant proportion of generation costs since fuel cost typically constitutes around 90% of the costs of electricity generated by diesel generators. Figure 1 shows the variations of three indicators: 1) annual savings, 2) payback period and 3) net present value at three cost levels of 15, 20 and 25 cents per kWh of diesel-based power generation. These costs are indicative of the possible volatility of diesel fuel prices.

Table 1: Design parameters and assumptions of a proposed solar PV plant for EDZ

Parameter	Value	Source/comment
EDZ total annual demand (GWh)	850	Authors' estimates
EDZ supply from Aggreko (GWh)	340	40% of the total demand as per reviewed EDZ electricity bills
EDZ average daily demand from Aggreko's diesel generators (GWh)	0.93	Derived from previous row
Solar fraction (SF)	20%	Assumes medium-level integration of solar PV without substantial investments costs
Daily supply needed from solar plant (MWh)	185	0.2 x 930 MWh
Peak Sun Hour (PSH) during darkest month (January) (h/day)	4.2	UNDP-Lebanon (2015)
Performance ratio (PR)	0.7	Electricity output as share of peak capacity. Usually between 0.6 and 0.8
Solar PV plant capacity (MWp)	63	63 MWp x 0.7 x 4.2 hours/day = 185 MWh/day
Land requirement	~0.5 km2	Area needed per 1 kWp of solar PV capacity = 7m^2
Capital cost (US$ million)	~50	Assuming capital costs of US$800 per kWp
Cost of solar electricity (US$ cents per kWh)	5.7	Based on the latest solar bid in the Bekaa region (IRENA, 2020)

Figure 1: Financial impact of a 63-MWp solar PV plant on EDZ's electricity costs. NPV = Net Present Value.



Source: The authors.

The benefits of solar generation rise with the price of diesel fuel. The cost of solar generation – at 5.7 cents/kWh – is much lower than the cost of diesel-based generation. Therefore, introducing a 63-MWp solar PV plant yields large financial benefits that become even more substantial as the diesel fuel price rises. Even at a price of 15 cents/kWh – the cost level that EDL electricity is projected to reach after reforms and tariff adjustment – annual savings are about US$6 million. If diesel-based generation cost 25 cents/kWh, the saving would be over $13 million and the payback period less than four years. Furthermore, when EDL supply is available, EDZ could export its solar PV generation back to EDL's grid, providing a benefit for the country as a whole.

Implementation challenges

If such large gains can be made from implementation of utility-scale renewables in Lebanon, why has this not yet happened? The answer is political. EDZ has already studied the possibility of building a solar PV plant, but has not been able to proceed because of the uncertainty surrounding its own concession. Investors in utility-scale power plants need to have the assurance of a long-term Power Purchase Agreement covering the duration of the plant's lifetime. However, EDZ's current concession contract lasts only until 2022, making it difficult for it to enter into long-term contractual agreements. Indeed, the EDZ's short concession contract reflects a broader and contentious debate about the best approach to reform Lebanon's electricity sector. Some argue that the success of EDZ's private concession model suggests that it should be replicated around the country, albeit with modifications to ensure that it does not burden the central state. Others believe that the focus should be on reform of EDL and rebuilding the capacity of the state to provide for citizens.[4]

There are also more self-interested motivations for blocking utility-scale renewables. Huge sums are alleged to be made from corruption within the fuel supply chain in Lebanon, as politically connected actors obtain subsidised foreign exchange which is then used to purchase fuel that is sold on the black market (Ahmad, 2020). At the municipal level, thousands of individuals earn substantial sums from the delivery of electricity from local diesel generators. An expansion of renewables could reduce the profitability of these activities as the demand for fuel would fall.

4 See Ahmad et al. (2021) for a recent Discussion Brief that lays out these positions.

For implementation to be successful, the nature of Lebanon's political settlement needs to be considered. Recent evidence on anti-corruption interventions suggests reform efforts are more likely to be successful if they take into account the incentives facing key political actors.[5] It is important to ensure that key players see tangible benefits from investments in renewables. This may entail helping to de-risk such investments to encourage long-term investments; work could also be done to pro-actively build coalitions in support of such investments and to design projects differently in particular areas to reflect the variations in local political context. Progress will also require resolving key legal rights through the passage of the Distributed Renewable Energy Law.[6]

Conclusions and recommendations

Lebanon desperately needs power. Its severe economic crisis, combined with its dependence on fossil fuels, is leading to a rapid deterioration in its electricity provision. However, there is clear potential for utility-scale renewables to be profitable while simultaneously lowering costs for providers and for customers.

It is essential that a political solution is found to enable such investments in renewables to proceed. To achieve this, the government should do four things:

1. **Pass the draft Distributed Renewable Energy Law** This would provide the legal and regulatory basis for renewables investments by allowing net metering, the wheeling of power across networks and point-to-point sales of electricity. The law should therefore be passed by parliament to facilitate greater investment in renewables.

2. **Grant generation licences for renewables** The current draft Distributed Renewable Energy Law focuses on small-scale renewables of under 10MW. But if passed, the law would establish the legal basis for renewable investments more generally, including for larger projects. Under the current law 129/2019,[7] the Council of Ministers can then issue generation licences for such projects.[8] The Council of Ministers should indicate that it would be willing to grant licences to suitable projects as a matter of urgency.

3. **Facilitate the emergence of private regional concessions with long-term contracts** Despite its weaknesses, EDZ is a high-quality regional utility. The government should consider a model which would allow greater use of private regional concessions. To invest in better services, such concessions need to have long-term contracts, which would also enable them to enter into long-term Power Purchase Agreements with renewables investors.

4. **Ensure appropriate tariff regulation across the country** A key challenge of Lebanon's private concession model is ensuring that customers are treated fairly on tariffs. Agreeing and enforcing tariff models that enable concessions to obtain an acceptable return while protecting customers will be critical for success.

Donors should support the expansion of renewables in Lebanon by being willing to underwrite government guarantees to investors in utility-scale projects. This would be conditional on the government taking the necessary legal and regulatory steps to facilitate such investments, including those listed above. In this way, donors and the government can ensure that the development of renewables represents a win-win political solution with major economic, environmental and health benefits for the people of Lebanon.

5 See the extensive work on this by the SOAS Consortium Anti-Corruption Evidence (ACE) research programme (https://ace.soas.ac.uk/).

6 For more on the linkages between electricity in Lebanon and anti-corruption strategies listen to the podcast 'Risk reduction as anti-corruption to power up the electricity sector' (https://ace.soas.ac.uk/risk-reduction-as-anti-corruption-to-power-up-the-electricity-sector/).

7 The law expires in April 2022.

8 If an Electricity Regulatory Authority (ERA) is eventually established as per law 462/2002, then the responsibility to issue licences would move to the ERA.

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ACE takes an innovative approach to anti-corruption policy and practice. Funded by UK aid, ACE is responding to the serious challenges facing people and economies affected by corruption by generating evidence that makes anti-corruption real, and using those findings to help policymakers, business and civil society adopt new, feasible, high-impact strategies to tackle corruption.

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