

# Challenges of energy supply for water and sanitation services in Lebanon

## Why is it a matter of interest ?

The challenges facing Lebanon's water and sanitation sector are compounded by the financial crisis.

The current situation highlights the fragility of the energy supply system for the water and sanitation sector, based on a partial public service (currently a few hours a day) and palliative solutions provided by private operators now offering alternative electricity services from local generators. This system is currently paralyzed by the shortage of fuel oil.

With that comes the cost of electricity, which is very high and constantly increasing : in 2020, electricity accounted for 20% of annual budgets for NLWE<sup>1</sup> and BMLWE<sup>2</sup>, and 36% for BWE<sup>3</sup> ([Water Energy Nexus, OXFAM, 2021](#))

## Energy supply for water and sanitation services in Lebanon

Water and sanitation infrastructure in Lebanon is supplied with electricity by :

- Public electricity (EDL), most often thanks to special priority lines called "service lines" dedicated to the supply of essential electricity services. The infrastructure thus connected is not equipped with emergency generators

e.g. pumping stations in Dbaye, Jeita, Ashrafieh, Mishrif (BMLWE)

- Generators, when the infrastructure is not connected to the service lines

e.g. pumping stations managed by BML and equipped with generators manage to operate 12 hours a day

- An off-grid system powered by renewable energies

e.g. Kesarwen, high Metn powered by dam (BMLWE); small solar stations (Bekaa).

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<sup>1</sup> North Lebanon Water Establishment

<sup>2</sup> Beirut Mount Lebanon Water Establishment

<sup>3</sup> Bekaa Water Establishment

## Impact of the crisis

Fuel shortages are currently impacting both service lines, which can no longer ensure continuous supply; and local electricity generators, also supplied with oil.

Shortages are accompanied by high and steadily rising prices in recent months. At the beginning of October 2022, 20 liters of gasoline at 95 octanes cost 710,000 LL (+11,000 LL compared to the previous month) and 20 liters of diesel cost 83100 (+21000). (*L'Orient le Jour, October 7th, 2022*)

Thus, pumping stations supplied with electricity by a service line or by private generators operate only a few hours a day. In a few cases and in the most severe periods of shortages, municipalities have been able to help water and sanitation infrastructure to obtain fuel, particularly in the Bekaa.

The operation of wastewater treatment plants is also impacted, leading to discharges of untreated water, particularly in the Bekaa, where treatment lines have been shut down to adapt to these energy shortages.

The current generalized crisis and its consequences, in particular on the availability of fuel, highlights the fragility of the current system. If this situation implies urgent needs, it can also be seen as an opportunity for an overhaul of the energy strategy of the water and sanitation sectors.

## Renewable energy prospects in Lebanon

### Lebanese context : renewable energy

On the policy level, Lebanon's earliest tangible commitment to RE was observed in 2009 when the government announced its first target of reaching 12% RE of the country's energy mix by 2020. The Nationally Determined Contribution (NDC) for the 2015 Paris Agreement expanded this target further, aiming to reach 20% by 2030, and 30% conditional upon additional international support. The latest commitments to RE targets were announced in the Updated Policy Paper for the Electricity Sector in 2019. The paper briefly mentioned a commitment to more than 480 MW of solar PV, and that 600 MW of wind power-plants are planned for construction in the coming years (MoEW, 2019).

Working hand in hand with the MoEW, the Lebanese Center for Energy Conservation (LCEC) is a major actor for renewable energy. The LCEC acts as the technical arm of the Lebanese Government and specifically the MoEW in all issues related to energy efficiency and renewable energy. The main role of the LCEC is to setup national action plans and strategies to develop the sustainable energy sector in Lebanon.

Despite Lebanon being a small market for RE, technology know-how and a capable private sector exist, and await for an enabling environment to grow in different sectors, including water and wastewater. Indeed, the LCEC published in June 2022 a list of 146 private actors carrying out solar pumping projects in Lebanon : you can find it [here](#).

However, the potential of this market is constrained by some real challenges : the absence of enabling a legal framework; the lack of financial incentive and performance-driven assessments; and the perpetual cycle of operating in "crisis mode" at the centralized and utility levels, which impedes the uptake of energy and cost-saving interventions.

- Solar energy

Solar PV already has an established market in the country with over 60 companies competing in other parts of the value chain; mainly the installation and maintenance of solar panels for pumping, and tertiary uses, such as buildings' lighting and ventilation. ([Water Energy Nexus, OXFAM, 2021](#))

The Small Decentralized Renewable Energy Power Generation (DREG) project, led by UNDP and implemented with the MoEW and the LCEC and funded by the Global Environment Facility (GEF), has published annually since 2016 a census of existing solar pumping projects in the territory. In 2018, the Decentralized Renewable Energy Generation (DREG) new Master Sheet recorded 76 projects, between 2013 and 2018, with a capacity of 3,357 kW, and a total annual electricity generation exceeding 4.7GkWh.

Besides, the LCEC recently devised a primary non-exclusive list upon request, which does not include all solar pumping projects as of May 2019. It counts 34 private projects undertaken and funded by NEEREA (National Energy Efficiency and Renewable Energy Action). Interestingly, 12 of them have been confirmed to be operational, while there is no information available on the operation status for the rest of them. Based on this list, 11 operational projects have been funded by the World Bank for the benefit of the Bekaa Water Establishment.

The LCEC suggested that there may be other existing solar pumping systems in other water establishments that have not been tracked and recorded.

Thus, it appears that the potential for solar PV in this sector is still mostly untapped, despite the growing number of solar PV in the private sector.

- Biomass energy

Biomass refers to all organic matter that can be transformed into energy. It can take three different forms: solids (straws, chips, logs); liquid (vegetable oil, organic alcohols); gaseous (biogas). It makes it possible to recover the "waste" of the agricultural sector, an invasive plant for the production of improved cooking methods, insulating materials and electricity. Biomass energy is produced in a sustainable way.

In addition, anaerobic digestion of sludge reduces the mass (dry material) of sludge from wastewater treatment. Digestion also aims to stabilize organic matter in order to reduce olfactory nuisance while producing a recoverable energy, biogas.

Bioenergy is still a niche technology in Lebanon, and has yet to become a focus area in the government's long-term plans. The major study on the potential of biogas in Lebanon was done

by CEDRO in 2013. Only six plants meet a set of technical criteria to implement anaerobic digestion (Sour, Abade, Majdal Anjar, Saida, Sarafand, and Tripoli). In practice, generation of biogas from anaerobic digestion of sludge was included in the design of two wastewater treatment plants—Sour and Tripoli; however, both plants are not fully operational. The study conducted by CEDRO is available [here](#).

## Ongoing work on the topic

### Conclusions from the Water Energy Nexus, OXFAM

The Joint Humanitarian Development Framework (JHDF) identified WaSH as a key priority sector for Lebanon. H2ALL, a WaSH consortium that consists of the Norwegian Refugee Council (NRC), Oxfam, World Vision International (WVI), and Gruppo di Volontario Civile (GVC) have come together to implement the project “Improving access to safe and affordable water to vulnerable communities”, under the EU Madad Trust Fund program “Water, Sanitation and Hygiene (WaSH) programme for Syrian refugees and Lebanese host communities”. Within this framework, Oxfam in Lebanon commissioned the Issam Fares Institute for Public Policy and International Affairs at the American University of Beirut to undertake the “Water Energy Nexus of Water and Wastewater Services in Lebanon” study. The project aims to contribute to effective, sustainable, and multi-level water governance in crisis-affected Lebanon, through empowering local and regional authorities, and demonstrating cost-effective systems for water-service provision.

This study lasted from June 2019 to June 2021. It depicts the water sector's dependence on the energy sector. The study identifies existing and planned renewable energy equipment for the electricity supply of water and sanitation infrastructure, examines with a contextualized approach the feasibility of different forms of renewable energy and issues recommendations for their generalization.

The recommendations focus on governance, financing, project management and infrastructure management strategies and target in particular the "energy resilience" of Water Establishments, through the development of their energy autonomy and the strengthening of coordination between Electricité du Liban (EDL) and water establishments. The relationship between the Water and the Nergy departments of the MoEW would also benefit from an in-depth analysis.

### Workshops on the Water Energy Nexus organized by LEWAP in Lebanon

On March 2nd and 3rd, LEWAP, the Issam Fares Institute for Public Policy and International Affairs (IFI) at AUB, and Oxfam Lebanon, held a 2-sessions workshop on the Water-Energy nexus, sharing and discussing recommendations to increase power supply of water and wastewater infrastructures in response to the electricity crisis in Lebanon. The workshop was coordinated and facilitated by LEWAP to capitalize on previous experience and build actor's capacities to intervene in this context.

During the first session, 46 participants from different organizations received information on solutions to increase energy supply for water and wastewater services in Lebanon. The second session aimed at initiating discussions on the sector's needs and priorities to be considered regarding to the water-energy nexus, with 25 participants from different organizations that were divided in four groups based on the four regional water establishments geographic coverage. A non-exhaustive mapping of projects using solar energy for water and sanitation services was also prepared.

The resume of the workshops can be found [here](#).

## Ressources

IFI, OXFAM, Water Energy Nexus, 2021: [Volume I \(executive summary\)](#); [Volume IV \(renewable energy potential and market assessment\)](#)

[UNICEF Water mission, Solar Powered Water Systems: design and installation guide, 2021](#)

[UNDP, Solar-powered pumping in Lebanon: a comprehensive guide on solar water pumping solutions, 2015](#)

[pS-Eau & Arene, Le pompage solaire : options techniques et retours d'expériences, des repères pour l'action](#)

[Alliance to Save Energy & Watergy – Watergy: Energy and water efficiency in municipal water supply and wastewater treatment, 2007](#)

<https://www.hydrology.nl/ihppublications/169-iwrm-guidelines-at-river-basin-level.html>

[https://www.hydrology.nl/images/docs/ihp/IWRM\\_Guidelines/IWRM\\_Part\\_2-1\\_Guidelines\\_for\\_IWRM\\_Coordination.pdf](https://www.hydrology.nl/images/docs/ihp/IWRM_Guidelines/IWRM_Part_2-1_Guidelines_for_IWRM_Coordination.pdf)

<https://www.inbo-news.org/IMG/pdf/GWP-INBOHandbookForIWRMinBasins.pdf>

<https://www.sciencedirect.com/topics/earth-and-planetary-sciences/integrated-water-resources-management>

<https://iahs.info/uploads/dms/15054.35-145-158-Yasuro-Nakajo.pdf>

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