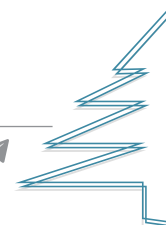




Case Analysis

September 2026

Can the Energy Crisis accelerate Lebanon's Transition to Renewable Energy?



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1. Introduction

The global energy system is shaped not only by supply and demand but also by geopolitical structures that influence the production, transportation, and pricing of energy resources. As Iran swings between the states of war and no-war, the global energy system is affecting national economies and market dynamics in an unpredictable way.

The geopolitical instability concentrated in critical maritime "chokepoints"- particularly the Strait of Hormuz- through which large volumes of global energy trade must pass, is shaping the global energy system. The escalation of tensions in the region has produced, and continues to produce, immediate and far-reaching effects on global energy prices, supply chains, and macroeconomic stability.

The disruptions witnessed in global oil supply are having far-reaching consequences for countries, particularly those that rely heavily on imported oil and gas products. At the same time, this international energy crisis has triggered a rapid and largely decentralized transition towards renewable energy, especially in those energy-import-dependent economies. This transformation is not primarily driven by climate policy but by necessity, economic survival, and energy security concerns.

This article analyzes the implications of the geopolitical instability in the Strait of Hormuz on the development of renewable energy specifically. It examines how these effects are transmitted to Lebanon, a country with a long-standing electricity crisis. Combined with the collapse of its financial and energy infrastructure since 2019, Lebanon is highly sensitive to global energy shocks. The crisis in 2019 was a catalyst for the "first green energy revolution" in the country, accelerating structural transitions towards renewable energy.

Using available data on energy consumption patterns and renewable energy installations in the country, the study explores the current energy framework. It aims to identify the latest developments in the legal and institutional arenas, and examines whether the current situation could create a new spike in renewable energy installations. Given the significant challenges posed to Lebanon by the current international energy crisis, the analysis investigates whether the situation could lead to a "second green energy revolution", opening the door for new investment opportunities.

2. Clean Energy Development Worldwide: Shaping and Shaking Energy Dynamics

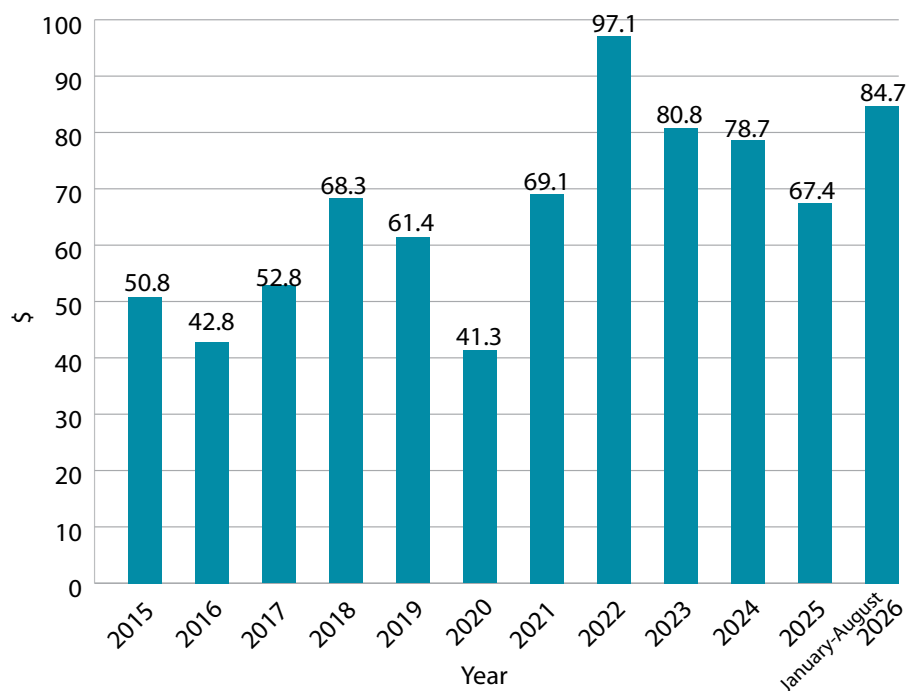
Energy is a foundational input in nearly all economic sectors; disruptions in energy markets have wide-ranging macroeconomic effects. Around the world, energy markets are highly sensitive to geopolitical uncertainty. The International Monetary Fund (IMF) has consistently shown that oil price shocks tend to reduce global economic growth while simultaneously increasing inflation. This creates a difficult macroeconomic environment, particularly for energy-import-dependent economies that face both rising costs and declining purchasing power.

The current situation in the Strait of Hormuz is unique in global energy geography because it represents a point of extreme concentration. Several of the world's largest oil and gas producers rely on this strait as their

primary export route. These include Saudi Arabia, Iraq, Kuwait, the United Arab Emirates, Qatar, and Iran. The World Bank has identified such chokepoints as "systemic risk nodes" in global infrastructure systems. This means that disruption in one location can generate cascading effects across global markets, even if physical disruption does not actually occur.

In terms of numbers, the average oil price today is slightly below the USD 100 threshold. Over the past ten years, the average oil price has ranged from a low of USD 41.3 and a high of USD 97.1 as can be shown in the graph below⁽¹⁾.

Figure 1. Average crude oil price/Barrel (USD)⁽²⁾



(source: World Bank, Commodity Price Data (Pink Sheet), September 2026) at: <https://acr.ps/hBy2SM0>

Several short-term and medium-term measures are being implemented by different countries to limit this price increase. These measures include the increase of supply in different countries around the world, reducing domestic prices, and most importantly releasing oil from strategic reserves. The impact, however, is uneven across regions: industrialized economies may absorb price shocks through subsidies or diversified energy systems, but developing economies are far more exposed.

Periods of high oil price volatility tend to improve the relative economic attractiveness of renewable energy systems. The International Renewable Energy Agency (IRENA) has emphasized that renewable energy becomes particularly competitive in environments where fossil fuel prices are unstable or subject to structural uncertainty. IRENA also highlights that the global energy transition is occurring in a context where fossil fuel infrastructure remains highly exposed to geopolitical instability.

(1) World Bank, Commodity Price Data (Pink Sheet), September 2026, at: <https://acr.ps/hBy2SM0>

(2) *ibid.*

According to the International Energy Agency (IEA), global investment in clean energy has accelerated significantly since the early 2020s, with capital shifting toward solar photovoltaic (PV), wind, and battery storage technologies. One of the key drivers of this shift is the recognition that renewable energy reduces exposure to geopolitical risk. This structural characteristic makes renewable energy particularly attractive.

Globally, renewable energy capacity reached 4,448 GW in 2024, following a record annual increase of 585 GW, representing 92.5% of all new power capacity added worldwide. Solar and wind energy accounted for 96.6% of new renewable capacity additions, with solar capacity alone expanding by 452 GW in a single year⁽³⁾.

The renewable capacity added worldwide in 2025 was estimated to generate roughly 1,100 terawatt-hours (TWh) of electricity annually, almost double the energy equivalent of the the liquefied natural gas (LNG) that normally passes through the Strait of Hormuz. Evidence from global electricity markets showed that solar and wind generation continued to expand rapidly, with solar output increasing by about 14% and wind generation by 8% in several major economies.

The Middle East occupies a central position in global energy markets due to its vast reserves of oil and natural gas. Several countries in the region are among the largest exporters of hydrocarbons in the world. IRENA highlights that the Middle East has some of the highest solar irradiation levels globally, making it structurally well-positioned for large-scale solar deployment. However, the pace of transition remains uneven due to institutional, economic, and geopolitical constraints.

In 2024, the Middle East added approximately 4 GW of renewable capacity, representing an annual growth of 10.8%. The region's share of renewables in total electricity capacity increased from 10.2% to 11.0% in one year. The United Arab Emirates reached about 6.8 GW of renewable capacity, while Saudi Arabia's renewable capacity expanded to approximately 4.7 GW, recording one of the region's fastest growth rates (59% between 2023 and 2024).

Jordan reached around 2.7 GW of renewable capacity, while Oman reached about 722 MW. In addition, the MENA region's total solar capacity reached approximately 24 GW in 2024, with more than 80% of new solar installations concentrated in Saudi Arabia, the UAE, and Egypt.

Renewable energy is certainly shaking energy dynamics worldwide and in the Middle East and is consequently shaping a new energy landscape. Within this shifting global energy system, Lebanon represents a particularly fragile case. The country is almost completely dependent on imported fossil fuels for electricity generation, transportation, and industrial activity. Unlike energy-producing states like the Gulf countries, Lebanon has no significant domestic energy production capacity and is constrained by a fragile electricity network. The current crisis is placing additional pressure on the country, and more specifically its electricity system.

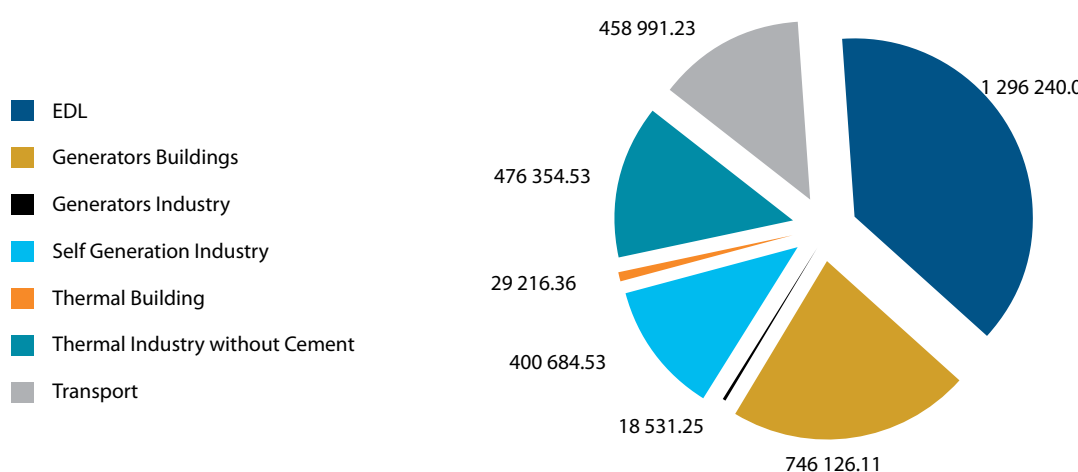
(3) "Record-Breaking Annual Growth in Renewable Power Capacity", *International Renewable Energy Agency IRENA*, 26 March 2025 at: <https://shorturl.at/SEmx2>

3. Structure of Lebanon's Electricity System: Waning Under Recurrent Crises

Lebanon's electricity sector is characterized by structural inefficiencies and chronic shortages, fully deserving the label "fragile". Over the years, Electricité du Liban (EDL) has struggled with financial deficits and operational limitations, failing to ensure a minimum level of consistent electricity supply.

Oil-based products are extensively used for electricity generation by EDL and by the hundreds of private neighborhood generators all over the country. For instance, the following pie chart shows the different uses of diesel oil in Lebanon during the year 2018. A large share of diesel oil is consumed by the electricity sector, with the transportation, industrial, and heating sectors also relying heavily on this type of fuel.

Figure 2. Diesel usage per sector in 2018⁽⁴⁾



(source: LCEC, *The National Renewable Energy Action Plan of Lebanon 2025-2030*)

Most of the country's electricity is generated using oil-based fuels, primarily fuel oil and diesel. Lebanon operates several thermal power plants, including the two main power plants in Deir Ammar (North Lebanon) and Zahrani (South Lebanon). Both plants operate using imported diesel oil. Other older power plants include the power plants in Zouk and Jiyeh, both of which operate using fuel oil. These plants rely on imported fuel shipments, making the electricity sector highly sensitive to international oil prices.

Since the financial collapse in 2019, Lebanon's electricity sector has undergone severe deterioration. The national utility, EDL, has been unable to maintain stable electricity production due to fuel shortages, lack of foreign currency reserves, and most importantly institutional weakness. As a result, public electricity supply has declined dramatically, in some cases to only a few hours per day.

According to the World Bank, Lebanon's energy crisis has become one of the central drivers of its broader economic collapse, contributing to inflation, fiscal imbalances, and declining economic output. This has forced

(4) The Lebanese Center for Energy Conservation (LCEC), *The National Renewable Energy Action Plan of Lebanon 2025-2030*, p.12, at: https://lcec.org.lb/sites/default/files/2025-10/NREAP-of-Lebanon-2025_2030.pdf

households and businesses to rely heavily on private diesel generators, which are significantly more expensive and environmentally damaging. While this system has provided continuity of supply, it introduced significant economic and social costs.

The diesel generator economy has also created a fragmented market structure characterized by limited regulation, price variations across regions, and dependence on imported fuel. Because diesel must be imported and paid for in foreign currency, the system is highly sensitive to global oil price fluctuations and exchange rate instability.

Compared with Gulf countries or diversified energy importers, Lebanon exhibits extreme sensitivity to energy price shocks. This is due to three structural factors: first, complete dependence on imported fossil fuels; second, a lack of strategic energy reserves; and third, the absence of a stabilized electricity pricing system.

Following the 2019 crisis, Lebanon witnessed its "first green energy revolution" as an immediate reaction to the crisis. Electricity supply in Lebanon has shifted from a centralized public utility model toward a fragmented system composed of limited state electricity supply, private diesel generators, and rapidly expanding decentralized renewable energy systems. Between 2019 and 2024, renewable energy established itself as a reliable alternative.

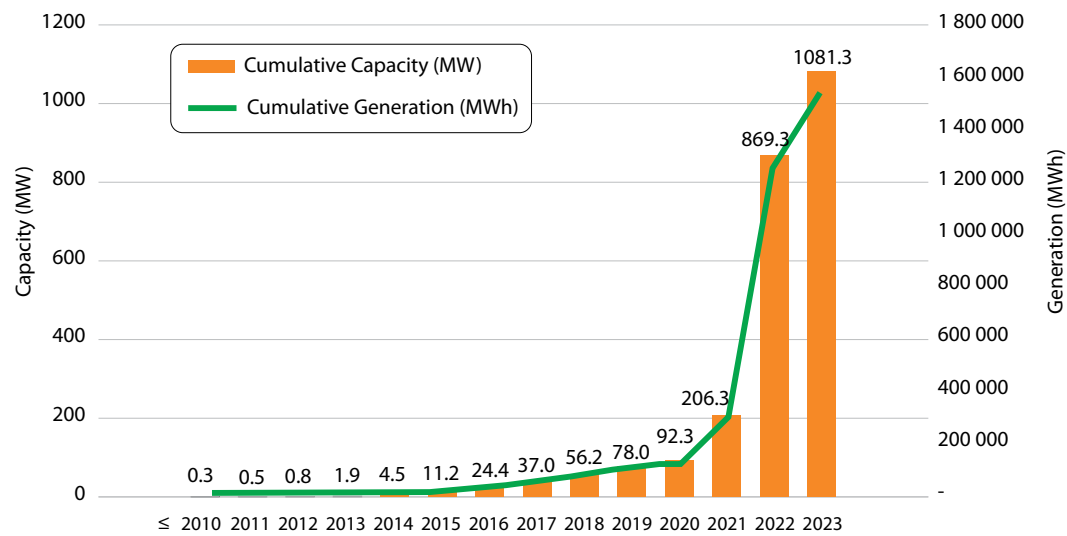
4. A Growing Momentum Despite All Obstacles: Lebanon's Renewable Energy Market

In 2019, and despite the severity of the crisis, the collapse of the electricity system has made traditional energy provision unreliable and economically unsustainable, opening the door to alternative solutions. Renewable energy emerged as a reliable backup solution for thousands of facilities across the country. Lebanon experienced rapid growth in renewable energy deployment, particularly in the form of decentralized rooftop solar systems. This growth was largely driven by necessity as well as by initial long-term planning and government policies developed some fifteen years earlier.

In fact, Lebanon has witnessed a steady increase in the use of solar power since 2010 onward. The severe economic crisis that began in 2019 and the subsequent collapse of EDL in supplying the basic electricity needs then triggered a rapid expansion in the use of solar power.

Between 2010 and 2020, installed solar capacity in Lebanon increased from 0 MW to 92.3 MW. Between 2020 and 2022, installed solar capacity increased by around 777 MW, with cumulative solar installations exceeding 1,200 MW by the end of 2024. A large share of these decentralized rooftop applications includes batteries, making them ideal backup systems when electricity supply is unavailable.

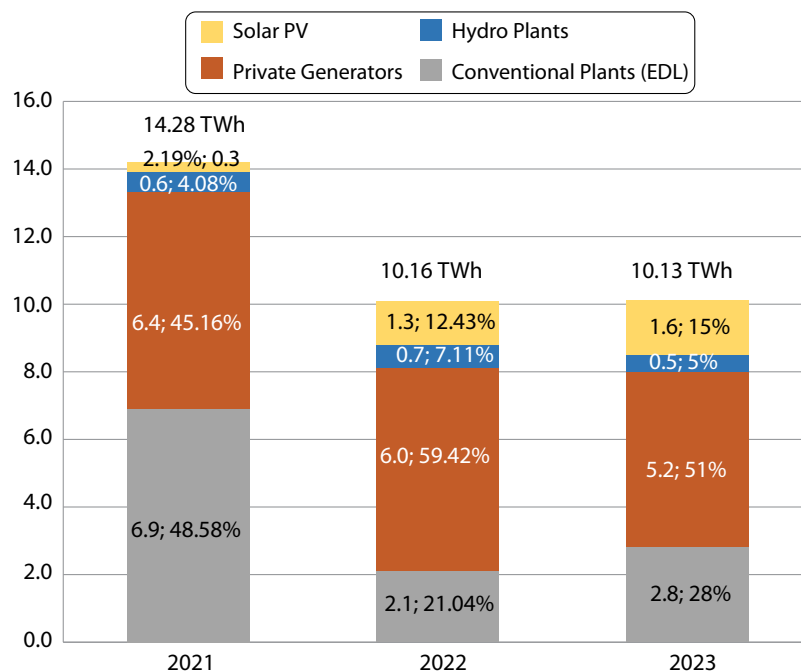
Households, businesses, hospitals, and municipalities have increasingly turned to solar energy as a way to reduce dependence on unreliable grid electricity and expensive diesel generators. As reported by IRENA, Lebanon's installed solar capacity has increased significantly since 2020, exceeding one gigawatt in recent years.

Figure 3. Solar PV installation 2010-2023⁽⁵⁾

(source: LCEC, *The National Renewable Energy Action Plan of Lebanon 2025-2030*)

Most existing renewable systems operate independently of the national grid or in hybrid configurations. This reflects the absence of coordinated action between the private sector and EDL as well as the weakness of Lebanon's electricity infrastructure. In this sense, Lebanon's 2019 energy crisis represents not only a collapse but also a turning point. It marks a shift from centralized fossil fuel dependence toward decentralized renewable energy systems.

By the end of the year 2023, solar photovoltaic systems covered around 15% to 20% of the country's electricity generation, as depicted from the graph below, making this sector a reliable backup in times of crises.

Figure 4. Electricity generation mix: TWh; %

(source: LCEC, *The 2023 Solar PV Status Report for Lebanon*, April 2025)

(5) The Lebanese Center for Energy Conservation (LCEC), *The 2023 Solar PV Status Report for Lebanon*, April 2025, at: <https://shorturl.at/ESTCX>

According to the latest analysis conducted by the LCEC, renewable energy systems reached a peak in 2024. Over the past two years, the solar photovoltaic market has stabilized, with a clear shift toward medium- to large-scale solar systems for industrial and commercial facilities. Visible growth in the installation of battery storage systems has also been observed during the past two years. Another trend worth mentioning is the emerging fleet of electric vehicles in the country, which has been increasing steadily and significantly.

The development of renewable energy in Lebanon is moving hand in hand with the deterioration of EDL's services. The energy shock resulting from the tensions in the Strait of Hormuz is aggravating this phenomenon. The international crisis represents a serious "misfortune" for EDL, yet could prove to be a significant "benefit" for the country's renewable energy market.

5. "The Misfortunes of Some": EDL's Challenges and Failures

Lebanon's volatile and fragile energy system is influenced by disruptions and tensions in the Strait of Hormuz. These disruptions are reshaping the country's energy transition. As the country imports nearly all of its petroleum products, the current global dynamics are directly affecting the domestic energy costs. When global oil prices rise, the cost of electricity increases almost immediately, feeding into broader price increases across goods and services.

Lebanon represents therefore one of the most highly exposed energy economies in the global system. The combination of full import dependence and fragmented electricity infrastructure creates a system in which external geopolitical shocks are transmitted almost directly into domestic economic conditions.

The current crisis is adding to EDL's financial instability. The increase in international oil prices will increase the generating costs, and EDL has shown no interest in passing this increase on to final consumers.

On the other hand, the current crisis will limit EDL's ability to improve its infrastructure. In fact, the World Bank has emphasized that grid modernization is essential for transforming Lebanon's renewable energy sector from a fragmented survival mechanism into a coordinated national energy system. One of the main constraints on Lebanon's renewable energy expansion is the weakness of the national electricity grid. The grid suffers from ageing infrastructure, technical losses, and limited capacity to integrate distributed renewable generation.

Most importantly, the current crisis is forcing EDL into a crisis-mode approach to its work, consequently limiting its ability to focus on planning new projects and future expansions. It is worth noting in this regard that the Government of Lebanon had previously appointed the members of the Electricity Regulatory Authority (ERA). The ERA is now fully functional.

According to laws 462/2002 and 318/2023, the work of the ERA could open the door to significant private-sector investments in both conventional and renewable energy projects. The ERA has the authority to integrate renewable energy into the centralized grid, balancing supply and demand across regions. However, EDL's grid is too unstable to perform this function effectively. Furthermore, to date, there have been no positive signs from EDL regarding its readiness to coordinate its work with the ERA.

Most renewable energy systems currently in operation are independent of the grid. This fragmentation limits the potential efficiency gains of renewable energy systems. Instead of optimizing energy distribution at the national level, production is localized and consumption is decentralized. While this increases resilience at the household level, it reduces system-wide efficiency.

Indicators of renewed momentum in renewable energy are evident today. Despite the rapid growth of solar energy, Lebanon's renewable energy transition is not yet complete. There is clearly a promising new horizon.

6. The Probable Scenario of "Benefits for Others": Renewable Energy Horizons

As a result of the current crisis, the most viable alternative to the increasingly high costs that are imposed by the neighborhood generators is the installation of renewable energy systems. Lebanon is witnessing today a situation similar to that which followed the collapse of its electricity system after 2019. The crisis at the time did not simply create an energy shortage; it fundamentally altered the structure of energy provision in the country. In the absence of a functioning national grid, households, businesses, and public institutions were forced to develop alternative solutions to ensure continuity of electricity supply.

Today, the country has a similar opportunity. In addition, the existence of an active ERA will have significant positive implications. The ERA could strengthen the existing regulatory framework for the private-sector involvement in developing large renewable energy projects.

Renewable energy can now be expanded by state-driven initiatives, while private actors will have the opportunity to invest in this transition. In such a case, renewable energy does not replace the state but compensates for missing elements in the energy sector.

On a positive note, an oil price in the range of USD 150 to USD 200 per barrel would represent another golden opportunity for the already-flourishing solar market. In that case, a "second green energy revolution" might be witnessed in Lebanon.

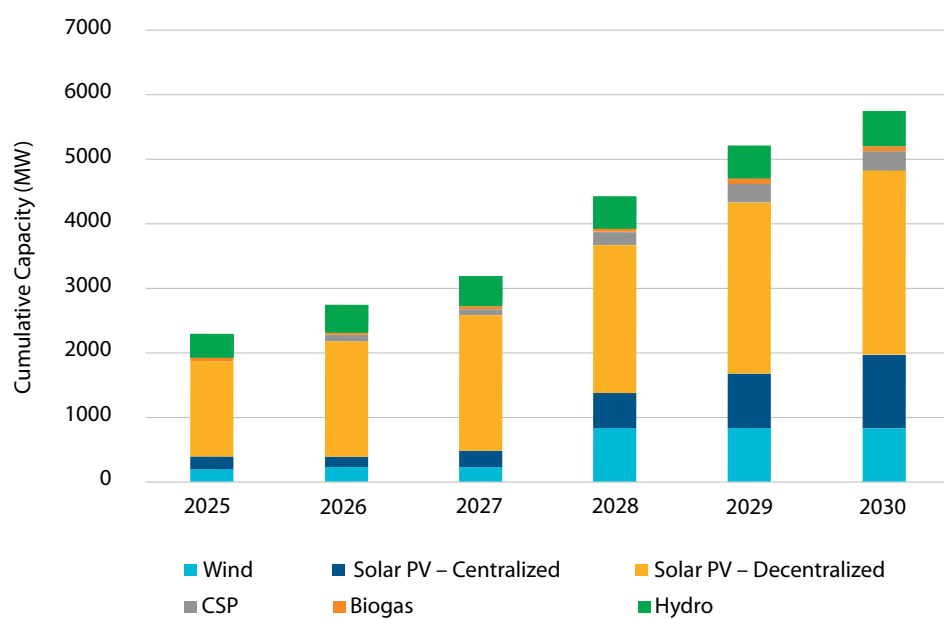
From an investment perspective, Lebanon's renewable energy sector represents a high-risk but structurally high-demand environment. The persistence of electricity shortages ensures sustained demand for alternative energy solutions, particularly in the residential and commercial sectors.

It is, however, worth noting that as oil prices increase due to geopolitical risk, the relative economic attractiveness of solar energy improves. This creates a direct link between global energy insecurity and local renewable adoption. However, this relationship is not purely linear. While higher oil prices encourage renewable investment, they also reduce household purchasing power and limit access to capital for initial investment. As a result, the impact of global shocks is both enabling and constraining. Over time, repeated exposure to energy price volatility tends to reinforce structural incentives for renewable energy adoption.

Investment outcomes remain highly dependent on macroeconomic stability, regulatory clarity, and access to financing. Without improvements in these areas, renewable energy expansion will remain uneven and

fragmented. According to the National Renewable Energy Action Plan 2025-2030, Lebanon is expected to have around 5,700 MW of cumulative renewable energy installations by 2030, as depicted in the following graph. Solar installations alone would represent around 3,000 MW of this target.

Figure 5. Total cumulative installed RE capacity under "Green Revolution" scenario⁽⁶⁾



(source: LCEC National Renewable Energy Action Plan of Lebanon 2025-2030)

The mentioned target would require around USD 6.4 Billion - in investment, mainly from the private sector. The current legal and institutional frameworks are encouraging and market appetite is high.

Solar photovoltaic systems require high initial capital investment but have very low marginal operating costs. Once installed, they provide a stable and predictable source of electricity that is largely insulated from global fuel price shocks. This economic advantage has become increasingly important in the context of Lebanon's currency crisis and inflationary environment.

In view of the current crisis, the present moment offers a significant opportunity to invest in this market. If achieved, the "second green energy revolution" would result in renewable energy accounting for around 54% of the country's total electricity consumption.

7. Conclusion: Transforming the Current Crisis into Investment Opportunities

The Strait of Hormuz crisis illustrates a fundamental shift in the relationship between geopolitics and energy systems. Rather than being a peripheral risk factor, geopolitical instability has become a central driver of energy market behavior and long-term investment decisions. This has accelerated the convergence between energy

(6) The Lebanese Center for Energy Conservation (LCEC), *The National Renewable Energy Action Plan of Lebanon 2025-2030*, p. 33.

security and energy transition agendas. Renewable energy is increasingly understood not only as a tool for emissions reduction but also as a mechanism for reducing exposure to geopolitical risk.

For Lebanon, the effects of this crisis are particularly pronounced due to its extreme import dependence and the collapse of its central electricity infrastructure. However, the same structural vulnerabilities that generate instability are also driving a rapid and largely irreversible shift toward renewable energy in the country. Lebanon's energy transition is therefore not primarily policy-led but crisis-induced, emerging from necessity in addition to strategic planning.

In the medium term, it is clear that renewable energy will play a central role in reshaping Lebanon's energy system, not only as a source of electricity but also as a foundation for economic resilience and energy security. This transition is real and significant. It has already reshaped the structure of electricity provision in the country and reduced dependence on diesel generators in many sectors. Today it represents an opportunity for significant investments in this sector, reaching around USD 6.4 Billion over the next five years.

In the event of a severe oil price surge, Lebanon's already fragile energy system could face serious disruptions. EDL's already weakened ability to provide reliable electricity will deteriorate further. Reducing this vulnerability will require diversification of energy sources, investment in renewable power, and reforms aimed at strengthening the resilience of the country's electricity sector.

The current crisis has significant and long-lasting geopolitical effects, and one of the most viable ways for Lebanon to strengthen its resilience is through renewable energy. Establishing a stable and transparent regulatory framework is necessary to attract investment, reduce uncertainty, and enable large-scale private sector participation in renewable energy projects. The role of the ERA is of prime importance in this regard, and the ERA has demonstrated its willingness to assume this role.

The Strait of Hormuz crisis has definitely been a "misfortune for many". Turning the crisis into business opportunities is within reach; the "benefits" for Lebanon could be tremendous.

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