J. v. G. technology GmbH
The DESERT company

Lebanon Solar Report

Prepared by J.v.G. Technology GmbH
J.v.G. Technology GmbH is a German engineering company specializing in turnkey solar module production lines and manufacturing consulting, with project experience ranging from 20 MW to 500 MW per production line, including multi-line and gigafactory projects exceeding this scale.

This Solar Report is part of the **PVKnowHow** Knowledge Network.
The data, analysis, and conclusions in this document are based on real research, consulting insights, and international solar market data.

Gain comprehensive insights into the statistics and metrics surrounding the solar production industry in Lebanon

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

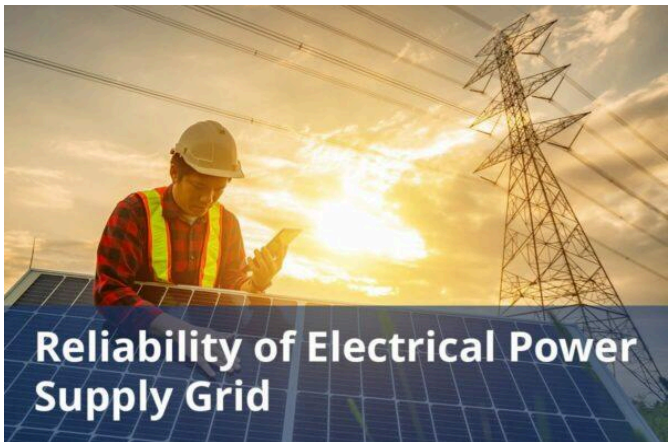
Annual sunshine hours:
- Region A: 2500 hours
- Region B: 3000 hours
- Region C: 2800 hours

kWh per kWp installed

Efficiency ratings:
- Standard panels: 1500 kWh/kWp
- High-efficiency panels: 1700 kWh/kWp

Average cost per kWh from utility company

Electricity pricing:
- Residential rate: $0.12/kWh
- Commercial rate: $0.10/kWh



Reliability of electrical power supply grid

System reliability:
- Expected lifespan: 25 years
- Warranty period: 10 years




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Installed solar capacity:
- Total panels installed: 1000000
- Capacity in MW: 3000 MW

Total solar panel production capacity (projected)

Future projections:
- Panels projected by 2025: 1500000
- Capacity projection in MW: 4500 MW

Average costs of various electricity generation sources (coal, natural gas, solar, etc)

Cost breakdown:
- Installation cost per panel: $250/panel
- Maintenance cost per year: $15/panel

Percentages of various electricity generation sources (coal, natural gas, solar, etc)

Electricity generation breakdown:
- Solar: 20%
- Wind: 25%
- Hydro: 30%

Average daily availability of electricity from the national grid (measured in hours)

Daily energy availability:
- Average generation per day: 5 kWh
- Peak generation hours: 6 hours

Number of residential solar panel installations

Residential setups:
- Total residential panels: 500000
- Average panels per house: 4

Total number of solar farms (installed and projected)

Solar farms:
- Number of solar farms: 300
- Average size per farm: 10 MW

Off-grid market demand for solar panels (current and projected)

Current Off-Grid Solar Demand in Lebanon:
- Lebanon’s energy sector faces challenges like political instability, economic issues, and infrastructure problems, leading to frequent power outages. Many households and businesses are turning to off-grid solar solutions, especially in rural areas.

- By the end of 2020, Lebanon had installed 89.84 MW of solar capacity, with many off-grid systems installed by citizens and businesses. By 2022, this capacity reached around 870 MW.
- The high cost of solar installations and the devaluation of the Lebanese pound make it hard for many to afford solar systems. However, operational savings and more stable power supply are driving increased adoption.

Future Off-Grid Solar Demand in Lebanon:
- The government aims to achieve 30% renewable energy by 2030, mainly from solar energy, which is expected to boost off-grid solar demand.
- The off-grid solar market is projected to grow between 2023 and 2029, driven by demand from residential, commercial, and industrial users seeking reliable and cost-effective energy solutions.
- As Lebanon's economy recovers, there could be increased investment in renewable energy and improved financing options, making solar energy more affordable for more people.
- Technological advancements in solar and energy storage will make off-grid systems more efficient and affordable, increasing their attractiveness.
- International partnerships and funding from organizations like the World Bank and UNDP will provide the support needed to scale up solar initiatives and meet Lebanon's renewable energy goals.

On-grid market demand for solar panels (current and projected)

Current On-Grid Solar Demand in Lebanon:
- Lebanon's on-grid solar demand is rising as the country seeks to diversify its energy mix and reduce reliance on traditional fossil fuels.

- The ongoing electricity crisis has increased interest in renewable energy solutions, particularly solar power, as a way to address unreliable electricity supply.
- By 2023, Lebanon's total installed solar PV capacity reached 1005 MW, with much of this coming from distributed generation systems installed by citizens and businesses.
- Lebanon's solar sector has expanded rapidly since 2020, especially with off-grid solar and battery installations in homes and businesses to mitigate power shortages.
- The Lebanese government has set a target to source 30% of electricity from renewable energy by 2030, focusing on integrating large-scale solar projects into the national grid.
- Notable projects include the 8 MW solar plant near the Beirut River, which will supply power to Electricité du Liban and is currently open for bids (due by October 23, 2024).
- The success of the Baabdat microgrid project, which integrates solar power into the grid, has set a precedent for future solar initiatives, with plans to expand to power the entire village.
- Challenges remain, such as investment needs, political instability, and the need for grid infrastructure modernization to handle renewable energy inputs efficiently.

Future On-Grid Solar Demand in Lebanon:
- Future demand for on-grid solar in Lebanon is expected to grow significantly as the country works toward its renewable energy targets and energy independence.
- The government's renewable energy strategy, including large-scale solar projects and grid modernization, aims to meet the goal of sourcing 30% of electricity from renewables by 2030.
- Expansion of solar energy will be supported by both government projects and private-sector investments, driving the continued growth of the sector.

- The Lebanese government is emphasizing the development of solar infrastructure and community-scale solar solutions, such as the Baabdat microgrid, which has become a model for integrating solar into the grid.
- International partnerships and investments, including those from organizations like the World Bank and IRENA, are expected to support large-scale renewable energy projects and help address financial barriers.
- The increasing affordability of solar technology will make on-grid solar installations more accessible, encouraging both public and private entities to invest in solar projects.
- The future of solar energy integration will also depend on the development of energy storage systems to address challenges related to supply during low sunlight periods or peak demand.
- Lebanon's future demand will be influenced by stronger policies and incentives to encourage private sector investment, addressing financial barriers and accelerating solar adoption across the country.

Average monthly income of workers in solar industry (labor cost)

Average monthly income of workers in solar industry:
- A Solar Photovoltaic Installer working in Lebanon will typically earn around $1053.41 USD per year, with the salary ranging from the lowest average of $527.58 USD to the highest average of $1631.43 USD.

Population of the country

Population of the country:
- The current population of Lebanon is 5832296.

Average overhead costs of solar panel production (with a brief breakdown)

Average overhead costs of solar panel production:
Estimate for Factory Rent:
- Monthly Average Warehouse Rental Cost:
- Highest Rent: A 330 square meter warehouse in Mazraat Yachouh, Metn is listed for $3750.00/month.
- Lowest Rent: A 210 square meter warehouse in Fouar Antelias is listed for $500.00/month.

Key Components of Administrative Costs:
- Salaries and Wages: A Solar Photovoltaic Installer working in Lebanon will typically earn around $1053.41 USD per year, with the salary ranging from the lowest average of $527.58 USD to the highest average of $1631.43 USD.

A summary of the energy infrastructure

A summary of the energy infrastructure:
Electricity Generation:
- Lebanon’s electricity generation in 2022 was primarily derived from oil, with contributions from hydro.
- Despite a growing share of renewable energy sources like solar, oil remains the dominant fuel for electricity production, contributing to the country’s CO2 emissions.
- The total electricity production in Lebanon reached 4333 GWh in 2022, with limited electricity imports.

Transmission & Distribution:

- In Lebanon, electricity transmission is mainly handled by “Électricité du Liban” (EDL), which operates a network of high-voltage power lines ranging from 66kV to 400kV.
- EDL uses key substations to step down the power from high voltage to medium voltage for distribution.
- The network spans over 1500 km and includes both overhead lines and underground cables throughout the country.

Energy Access:
- Available data indicates that Lebanon has nearly universal access to electricity, with nearly 100% of the population connected.
- However, the country struggles with frequent power outages and heavily depends on costly private generators to compensate for the unreliable electricity supply from the state.

Some of the government regulations surrounding solar panel production

Some of the government regulations surrounding solar panel production:
Distributed Renewable Energy (DRE) Law (2023):
- Ratified on December 14, 2023 (Law No. 318/2023).
- Promotes decentralized renewable energy production, including net metering and peer-to-peer trading of renewable energy.
- Allows peer-to-peer energy trading between private sector entities, with a maximum capacity of 10 MW per project.
- For projects located in the same or adjacent plots, energy can be traded without using the national grid. If the projects are located further apart, trading requires the use of the grid (through wheeling).
- Introduces various forms of net metering, such as individual, multiple-tenants, and collective net metering.
- Enables greater flexibility and incentivizes renewable energy adoption across various sectors and communities.

Decree 6887 (2020):
- Makes national standards for solar energy and photovoltaic systems mandatory.
- Requires verification of these standards by accredited labs, like the Industrial Research Institute (IRI).
- Includes mandatory standards for solar water heating technologies and updates outdated standards initially adopted in 2003.
- Aims to eliminate technological barriers and improve the solar market development in Lebanon.

Government initiatives in solar panel production (includes investments and subsidies)

Government initiatives in solar panel production (includes investments and subsidies):
1. National Energy Efficiency and Renewable Energy Action (NEEREA): Launched in 2010 by the Central Bank of Lebanon (Banque du Liban), NEEREA offers subsidized loans for environmentally friendly projects, including solar energy installations. These loans can reach up to $20 million with favorable terms. However, following the 2019 economic collapse, NEEREA's funding has been significantly limited, affecting its capacity to support new projects.
2. Solar Water Heater Subsidy Program: Managed by the Lebanese Center for Energy Conservation (LCEC), this program provides subsidies for the installation of solar water heaters. The initiative aims to reduce electricity consumption and promote renewable energy use in residential and commercial sectors.
3. U.S. Energy Fund: In 2023, U.S. Ambassador Dorothy Shea announced a $20 million Solar & Renewable Energy Fund to assist Lebanese entities in financing renewable energy solutions. This fund is

intended to support the adoption of solar energy technologies across various sectors in Lebanon.
4. Beirut River Solar Snake (BRSS): Initiated by the Ministry of Energy and Water in 2013, BRSS is Lebanon's first pilot project to produce electricity from solar energy. The project aims to install solar panels along the Beirut River, with an initial phase of 1 MW capacity, to generate and supply clean energy to the national grid.
5. Net Metering Policy: Lebanon has implemented a net metering policy that allows consumers with solar systems to send excess electricity back to the grid in exchange for credits. This policy encourages the adoption of solar energy by making it more financially attractive for consumers.
6. International Support and Derisking Measures: International organizations have supported Lebanon's renewable energy sector through various initiatives. For instance, the United Nations Development Programme (UNDP) has provided support to derisk renewable energy investments, aiming to lower financing costs and attract private sector investments in solar and wind energy projects.

Notable solar projects in the country (installed and projected)

Notable solar projects in the country (installed and projected):
Current Operational Projects:
- Beirut River Solar Snake (BRSS) Expansion
  - Location: Near the Beirut River, Lebanon
  - Capacity: 8 MW
  - Launching Date: Tender opened on September 13, 2024.
  - Other Details:
    - The project will be publicly funded.
    - It will be connected to the medium-voltage grid to supply power to Electricité du Liban.

- The tender for the project has been opened, with developers required to submit bids by October 23, 2024.

- Solar PV Farms – 180 MW
  - Location: Distributed across four main Lebanese regions: North, South, Mount Lebanon, Bekaa
  - Capacity: 180 MW (divided across 12 PV farms, with equal distribution among the regions)
  - Other Details:
    - The project aims to add 180 MW of solar capacity across four Lebanese regions (North, South, Mount Lebanon, and Bekaa).
    - Initiated with an Expression of Interest (EOI) in 2017, followed by a Request for Proposals (RFP).
    - 11 bidders were selected after technical and financial evaluations, agreeing to tariffs of 5.7 US cents/kWh (Bekaa) and 6.27 US cents/kWh (other regions) for 25 years.

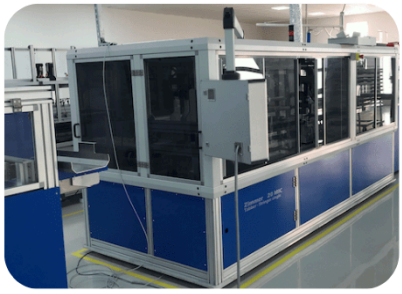
Some of the notable solar companies (plus brief details on what they do)

Some of the notable solar companies (plus brief details on what they do):
Company Name: A Team
- Location: Lebanon
- Website: https://www.ateamlb.com/
- Products and Services:
  - Kingston Ups Systems (USA)
  - Infosec Ups (France)
  - Unikor Batteries (Korea)
  - HITEC – Power Protection
- Services:
  - Power protection and backup systems
  - UPS (Uninterruptible Power Supply) systems

- Batteries for power backup systems
- Quality support services

Company Name: Arina Energy
- Locations: Lebanon (KORE Central, Jabra Building, Charles Helou Street, Horsh Tabet)
- Website: www.arinaenergy.com
- Products and Services:
  - Solar Energy Systems: Development and planning of solar systems for industrial and residential projects.
  - Energy Storage Solutions: Providing sustainable energy storage systems.
  - Electric Powered Projects: Planning and development for electric-powered infrastructure.
  - Energy Efficiency Management Systems: Solutions for improving energy efficiency in various systems.
  - Electric Vehicle Chargers: Providing EV charging infrastructure.
  - Wind Systems: Wind energy solutions.
  - Energy Management System (Arina-EMS): System to manage and optimize energy usage.
- Services:
  - Operation and Maintenance: Ongoing support for solar and energy systems.

Company Name: Apex Energy
- Location: Lebanon
- Website: www.apexenergy.pro
- Products and Services:
  - Solar Energy: Design, supply, and installation of on-grid solar systems for residential, commercial, industrial, agricultural, and utility sectors.
  - Panel Building: Custom electrical panel building to meet specific requirements.



ABOUT THIS REPORT

This Solar Report is part of the PVKnowHow Knowledge Network, developed by J.v.G. Technology GmbH - a German engineering company, specializing in turnkey solar module production lines (ranging from 20 MW to 500 MW per production line, including multi-line and gigafactory projects exceeding this scale).

All market data, analysis, and conclusions follow JvG's internal consulting standards and international PV market research practices.

REFERENCES

All References

1. Climate.top. (n.d.). Sunshine & daylight hours in Beirut, Lebanon: Sunlight, cloud & day length. Retrieved February 6, 2025, from <https://www.climate.top/lebanon/beirut/sunlight/>
2. profileSOLAR. (n.d.). Solar PV analysis of Beirut, Lebanon. Retrieved February 6, 2025, from <https://profilesolar.com/locations/Lebanon/Beirut/#google%5Fvignette>

3. GlobalPetrolPrices.com. (2024, June). Lebanon electricity prices, June 2024\. Retrieved February 7, 2025, from <https://www.globalpetrolprices.com/Lebanon/electricity%5Fprices/>
4. Sinalda. (n.d.). Voltage in Lebanon: Electricity supply and power quality overview. Retrieved February 6, 2025, from <https://www.sinalda.com/world-voltages/middle-east/voltage-lebanon/>
5. International Renewable Energy Agency. (2024). Renewable energy statistics 2024\. Retrieved February 6, 2023, from <https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2024/Jul/IRENA%5FRenewable%5FEnergy%5FStatistics%5F2024.pdf>
6. Lebanon Center for Energy Conservation. (2021, March). 2018 Solar PV Status Report. Retrieved February 6, 2025, from <https://lcec.org.lb/sites/default/files/2021-03/191107014906152~2018%20Solar%20PV%20Status%20Report.pdf>
7. Bonex-prima.eu. (n.d.). A bright future: Renewable energy in Lebanon. Retrieved February 6, 2025, from <https://bonex-prima.eu/a-bright-future-renewable-energy-in-lebanon/>
8. Arab Reform Initiative. (2024). _Solar power equity in Lebanon_. Retrieved from <https://www.arab-reform.net/publication/solar-power-equity-in-lebanon>, Retrieved February 6.
9. Wilson Center. (2024, July). There’s still time to back solar power in Lebanon. Retrieved February 6, 2025, from <https://www.wilsoncenter.org/article/theres-still-time-back-solar-power-lebanon>
10. BBC. (2023, May 17). How solar power is keeping Lebanon’s lights on. Retrieved February 6, 2025, from <https://www.bbc.com/future/article/20230517-how-solar-power-is-keeping-lebanons-lights-on>
11. Wikipedia. (n.d.). Solar power by country. Retrieved February 6, 2025, from <https://en.wikipedia.org/wiki/Solar%5Fpower%5Fby%5Fcountry>

12. L’Orient Today. (2024, January 13). Lebanon finally signs contracts to build 11 solar farms. Retrieved February 7, 2025, from <https://today.lorientlejour.com/article/1336776/lebanon-finally-signs-contracts-to-build-11-solar-farms.html>
13. Middle East Research and Information Project. (2024, July). Off the grid: Why solar won’t solve Lebanon’s electricity crisis. Retrieved February 7, 2025, from <https://merip.org/2024/07/off-the-grid-why-solar-wont-solve-lebanons-electricity-crisis/>
14. PV Magazine. (2023, June 8). Lebanese households fight economic crisis with record rooftop PV additions. Retrieved February 6, 2025, from <https://www.pv-magazine.com/2023/06/08/lebanese-households-fight-economic-crisis-with-record-rooftop-pv-additions/>
15. 6WResearch. (n.d.). Lebanon off-grid solar energy market. Retrieved February 6, 2025, from <https://www.6wresearch.com/industry-report/lebanon-off-grid-solar-energy-market>
16. PV Magazine International. (2024, September 13). Lebanon launches tender for 8 MW solar plant. Retrieved February 6, 2025, from <https://www.pv-magazine.com/2024/09/13/lebanon-launches-tender-for-8-mw-solar-plant/>
17. World Bank. (2023). _Distributed power generation for Lebanon: Market assessment and policy pathways_. https://documents1.worldbank.org/curated/ar/353531589865018948/pdf/Distributed-Power-Generation-for-Lebanon-Market-Assessment-and-Policy-Pathways.pdf
18. Worldsalaries.com. (n.d.). Average solar photovoltaic installer salary in Lebanon for 2025\. Retrieved February 7, 2025, from <https://worldsalaries.com/average-solar-photovoltaic-installer-salary-in-lebanon/>

19. Worldometer. (n.d.). Lebanon population (2025). Retrieved February 6, 2025, from <https://www.worldometers.info/world-population/lebanon-population/>
20. Dubizzle. (n.d.). Warehouse for rent in Lebanon. Retrieved February 7, 2025, from <https://www.dubizzle.com.lb/properties/q-warehouse-for-rent/>
21. Regus. (n.d.). Serviced office space in Beirut | Offices for rent. Retrieved February 7, 2025, from <https://www.regus.com/en-gb/lebanon/beirut>
22. International Energy Agency. (n.d.). Lebanon: Electricity. Retrieved February 6, 2025, from <https://www.iea.org/countries/lebanon/electricity>,
23. Electricité du Liban. (n.d.). Electricity law in Lebanon. Retrieved February 7, 2025, from <http://www.edl.gov.lb/page.php?pid=30&lang=en>
24. Trading Economics. (n.d.). Lebanon – Access to electricity (% of population). Retrieved February 6, 2025, from <https://tradingeconomics.com/lebanon/access-to-electricity-percent-of-population-wb-data.html>
25. Observatory of Economic Complexity. (n.d.). Crude petroleum in Lebanon. Retrieved February 6, 2025, from <https://oec.world/en/profile/bilateral-product/crude-petroleum/reporter/lbn>
26. Lebanon Center for Policy Studies. (2024, May). Regulating the energy transition: Lebanon’s new law on distributed renewable energy. Retrieved February 7, 2025, from <https://www.lcps-lebanon.org/en/articles/details/4853/monitor-%7C-regulating-the-energy-transition-lebanon%E2%80%99s-new-law-on-distributed-renewable-energy>
27. Lebanon Center for Energy Conservation. (n.d.). Decentralized RE Law. Retrieved February 6, 2025, from <https://lcec.org.lb/our-work/partners/RELaw>

28. Lebanon Center for Energy Conservation. (n.d.). Details of Decree 6997 on mandatory solar standards. Retrieved February 6, 2025, from <https://lcec.org.lb/node/2990>
29. PV Magazine International. (2024, January 2). Lebanon introduces peer-to-peer renewable energy trading. Retrieved February 7, 2025, from <https://www.pv-magazine.com/2024/01/02/lebanon-introduces-peer-to-peer-renewable-energy-trading/>
30. Wikipedia contributors. (n.d.). _Lebanese Center for Energy Conservation_. Wikipedia. <https://en.wikipedia.org/wiki/Lebanese%5FCenter%5Ffor%5FEnergy%5FConservation>
31. U.S. Embassy in Lebanon. (2024, February 3). U.S. Ambassador Shea announces $20 million energy fund to help Lebanese entities finance renewable energy solutions. Retrieved February 7, 2025, from <https://lb.usembassy.gov/u-s-ambassador-shea-announces-20-million-energy-fund-to-help-lebanese-entities-finance-renewable-energy-solutions/>
32. Fawaz, M. (2024, February 7). _Lebanon's solar rollout: In what ways has it been an unjust energy transition?_ Arab Reform Initiative. <https://www.arab-reform.net/publication/lebanons-solar-rollout-in-what-ways-has-it-been-an-unjust-energy-transition>
33. Lebanon Center for Energy Conservation. (n.d.). Solar PV Farms-180 MW bid. Retrieved February 7, 2025, from <https://lcec.org.lb/our-work/MEW/solar-Farm-180>
34. Enel Green Power. (n.d.). Lebanon Solar Project, USA. Retrieved February 7, 2025, from https://www.enelgreenpower.com/our-projects/in-development/lebanon-solar-project

For a detailed list of references and additional information, please visit our website with the current report at:
https://www.pvknowhow.com/solar-report/lebanon/

About J.v.G. Technology GmbH

J.v.G. Technology GmbH is a European engineering and advisory specialist for solar production lines and manufacturing equipment, supporting investors and operators with market, location and production-focused decision frameworks.
www.jvg-thoma.com

Contact & Further Information

For further discussion or clarification of manufacturing-related aspects, please contact:

J.v.G. Technology GmbH
www.jvg-thoma.com
info@jvg-thoma.com

Created with the support of
JVGLABS
AI Automation for Marketing & Sales
www.jvglabs.com