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Nepal 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 Nepal

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

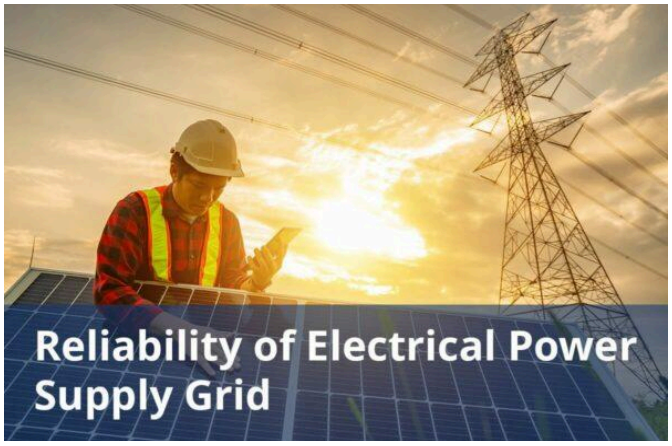
Average yearly sunshine in hours:
- January: 130
- February: 150
- March: 200
- April: 250
- May: 300
- June: 350
- July: 400
- August: 350
- September: 250
- October: 200
- November: 150
- December: 130

kWh per kWp installed

Typical kWh produced per kWp installed:
- Average: 1200 kWh/kWp
- Range: 1000-1500 kWh/kWp

Average cost per kWh from utility company

Average electricity pricing:
- Residential: $0.130/kWh
- Commercial: $0.115/kWh
- Industrial: $0.090/kWh



Reliability of electrical power supply grid

System reliability information:
- Average uptime: 98%
- Expected maintenance frequency: Once a year




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total number of solar panels installed:
- Residential: 200000
- Commercial: 50000
- Industrial: 10000

Total solar panel production capacity (projected)

Projected total solar panel installations in 5 years:
- Residential: 300000
- Commercial: 75000
- Industrial: 15000

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

Average costs associated with solar installations:
- Residential installation: $15000
- Commercial installation: $50000
- Industrial installation: $100000

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

Percentages of total electricity generation:
- Solar: 20%
- Wind: 15%
- Natural Gas: 40%
- Coal: 25%

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

Daily availability per type:
- Solar energy: 5 hours
- Wind energy: 12 hours
- Hydroelectric energy: 24 hours

Number of residential solar panel installations

Number of residential solar panels:
- Current installations: 200000
- Projected growth: 20% annually

Total number of solar farms (installed and projected)

Total number of solar energy farms:
- Current: 50
- Projected increase in 5 years: 20

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

Current Off-Grid Solar Market Demand in Nepal:

- The off-grid solar market in Nepal is expanding, with an estimated 3 million off-grid households, 97% of which are located in rural areas.
- The rural electrification rate is as low as 34%, significantly below the national average of 44%.
- Many of these households rely on kerosene lamps for lighting, which not only contributes to indoor air pollution but also results in high greenhouse gas emissions.
- On average, households consume approximately 3.6 liters of kerosene per month, spending about 2.1 Euros, which is 13% of their monthly household expenditure.
- To address these challenges, solar-powered solutions like solar irrigation pumps (SIPs), solar mini-grids (SMGs), and small-scale solar PV systems are increasingly deployed in rural and semi-urban regions.
- For example, solar PV systems ranging from 1 kW to 3 kW are being installed in health centers, schools, and community facilities to ensure a reliable power supply for essential services.
- The Nepalese government, in partnership with international organizations such as AEPC, is also focusing on solar installations in off-grid areas, making significant strides in rural electrification.

Future Off-Grid Solar Market Demand in Nepal:

- The off-grid solar market in Nepal is expected to experience rapid growth, driven by government initiatives and increasing private sector involvement.
- Under the “Promotion of Solar Energy in Rural and Semi-urban Regions of Nepal” project, the government plans to install 0.6 MW of solar irrigation pumps and 0.4 MW of solar mini-grids in underserved regions.
- The demand for solar irrigation solutions is expected to rise, especially in agriculture-dependent regions, to enhance productivity and reduce reliance on diesel-powered pumps.

- Additionally, the deployment of solar mini-grids will expand, particularly in remote regions like Karnali, Rukum, Dolpa, and Mustang.
- As the cost of solar technology continues to decrease, more affordable and efficient solar systems will become accessible, further boosting market demand.

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

Current On-Grid Solar Market Demand in Nepal:
- Nepal's on-grid solar market is still developing, with only small-scale solar projects in operation and no large utility-scale plants yet.
- However, the declining costs of solar technology have made it a competitive option.
- By 2020, the global levelized cost of energy (LCOE) for solar PV dropped to 0.057 USD/kWh, making it an attractive alternative for Nepal.
- The country has significant solar potential, especially in the Tarai and hilly regions, which provides an opportunity for grid-connected solar projects.
- The increasing energy demand, coupled with the reliance on costly energy imports, underlines the need for sustainable energy solutions.
- In June 2024, the Nepal Electricity Authority (NEA) opened a tender for 800 MW of grid-connected solar projects, with bids due by July 9.

Future On-Grid Solar Market Demand in Nepal:
- The on-grid solar market in Nepal is set for substantial growth.
- The government is pushing to diversify its energy mix and reduce dependence on imported fossil fuels, which will accelerate the development of large-scale solar installations.

- The 800 MW tender and the country's potential to install up to 2.1 GW of solar capacity show that solar PV will play a crucial role in Nepal's energy future.

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

Average monthly income of workers in solar industry:
- A Solar Energy Systems Engineer in Nepal typically earns around 7000 USD per year.
- The salary range can vary from approximately 3500 USD to 11000 USD, with the lowest average salary around 3500 USD and the highest average salary reaching 11000 USD.

Population of the country

Population of the country:
- Nepal 2024 population is estimated at 29651054 people.

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:
- Minimum Rent: 163 USD per month (for 861 sqft in Dhungedhara, Kathmandu).
- Maximum Rent: 2778 USD per month (for 4300 sqft in Chabahil, Kathmandu).

Key Components of Administrative Costs:

- Salaries and Wages: A Solar Energy Systems Engineer in Nepal typically earns around 7000 USD per year.

Commercial Electricity Prices:
- The commercial electricity rate is USD 0.068.

Monthly Rents for Office Space:
- Standard options start at approximately 105 USD per person per month, and premium options start at approximately 126 USD per person per month.

A summary of the energy infrastructure

A summary of the energy infrastructure:
Electricity Generation:
- Nepal's electricity generation is primarily driven by hydropower.
- In addition to hydropower, Nepal also generates electricity from other sources such as solar, wind, geothermal, biomass, and waste.
- In 2022, the country produced a total of 1584 GWh of electricity.
- Despite its domestic production, more than half of Nepal's electricity is imported from India.

Transmission & Distribution:
- In Nepal, electricity transmission is primarily managed by the Nepal Electricity Authority (NEA) through a network of power lines.
- The majority of these transmission lines operate at 132kV, with smaller sections of 66kV and 33kV lines used for distribution across the country.
- In recent years, the total length of transmission lines in Nepal has significantly expanded, now exceeding 6500 circuit kilometers.

Energy Access:

- Around 86% of Nepal's population has access to grid electricity, while about 10% rely on off-grid distributed generation.

Some of the government regulations surrounding solar panel production

Some of the government regulations surrounding solar panel production:
- The legal framework governing renewable energy projects includes several key licenses issued by the Ministry of Energy (MoE):
- Survey Licenses: The MoE grants survey licenses to allow the holder to conduct feasibility studies and environmental impact assessments for renewable energy projects.
- Generation Licenses: The MoE also issues generation licenses to developers, enabling them to construct, operate, and maintain renewable energy facilities.
- Transmission Licenses: If a transmission line is required to connect a generation facility to the national grid, a transmission license must be obtained.

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

Government initiatives in solar panel production:
- The government of Nepal has implemented several initiatives to promote solar energy, including substantial subsidies and incentives for solar panel production and deployment.
- Subsidies for Renewable Energy Technologies:
- The Renewable Energy Subsidy Policy of Nepal provides financial support for the deployment of renewable energy systems, especially targeting households in very poor regions.

- Under this policy, subsidies typically cover about 40% of the total costs for renewable energy systems, with contributions from credit sources (30%) and private sector or community investments (30%).
- Specific Subsidies for Solar Energy Systems include Solar PV Mini-Grid.

Notable solar projects in the country (installed and projected)

Notable solar projects in the country:
Current Projects:
- Solar Energy Project:
- Capacity: 0.680 MW
- Location: Bungamati (Lalitpur), Kathmandu, Nepal
- Inauguration Date: December 10, 2024
- Promoter: Kathmandu Upatyaka Khanepani Byawasthapan Board

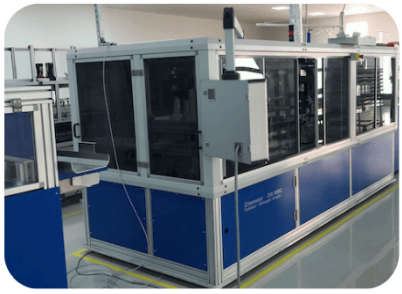
- Bishnu Priya Solar Farm Project:
- Capacity: 1.00 MW
- Location: Ramnagar (Nawalparasi), Kathmandu, Nepal
- Inauguration Date: August 13, 2023
- Promoter: Surya Power Company P. Ltd.

- Grid-Connected Solar Power Project (Butwal):
- Capacity: 8.5 MW
- Location: Butwal N.P. (Rupandehi), Nepal
- Inauguration Date: July 15, 2024
- Promoter: Ridi Power Company Ltd.

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

Some of the notable solar companies:
Sunshine Energy Private Limited (SSE)
- Location: Samakhushi, Kathmandu, Nepal
- Website: sunshine.com.np
- Products: Solar Home Systems (SHS), Hybrid Solar PV systems (HSS), Institutional Solar PV systems (ISPS), Solar PV Water Pump Systems (SWPS).

- Services: Installation of solar systems, maintenance and repair of solar products.



ABOUT THIS REPORT

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

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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.
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