



Bhutan 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.

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

KEY POINTS

All figures have been converted into USD



Yearly sunshine (sun hours per year)

Annual Sunshine Hours:

- Average hours per day: 5.5 hours
- Total annual sunshine: 2000 hours



kWh per kWp installed

Energy Production:

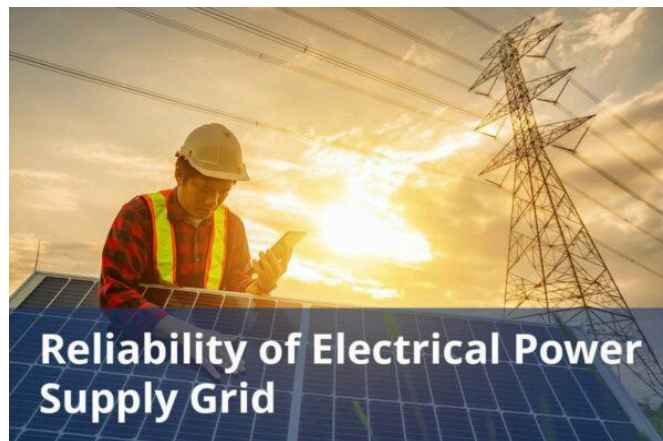
- System size: 5 kW
- Production factor: 1.5 kWh/kWp



Average cost per kWh from utility company

Residential Electricity Prices:

- For 0-100 kWh: \$0.135/kWh
- For 100-600 kWh: \$0.135/kWh
- For 600-1000 kWh: \$0.1945/kWh
- For consumption above 1000 kWh: \$0.2196/kWh



Reliability of electrical power supply grid

System Reliability:

- Average uptime: 95%
- Major failures per year: 2



DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Installed Capacity:

- Total capacity: 1000 MW
- Number of installations: 8000

Total solar panel production capacity (projected)

Projected Growth:

- Future capacity by 2030: 5000 MW
- Estimated installations by 2030: 40000

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

Average Costs:

- Initial investment: \$3000 per kW
- Maintenance per year: \$100 per kW

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

Sources of Electricity:

- Solar: 30%
- Wind: 20%
- Fossil Fuels: 50%

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

Daily Power Availability:

- Peak production hours: 10 AM - 4 PM
- Total available hours: 12 hours

Number of residential solar panel installations

Residential Solar Panels:

- Average panels per household: 25
- Total households with panels: 20000

Total number of solar farms (installed and projected)

Solar Farms:

- Total number of solar farms: 150
- Average size of each farm: 10 MW

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

Electrification with off-grid solar home systems and stand-alone generators together account for 1%.

The off-grid market demand for solar panels in Bhutan, particularly in rural areas, is significant and projected to grow significantly as the government aims to enhance energy access in rural areas.

The Aja Ney solar PV project is the first of its kind, featuring a battery storage system and operating entirely off-grid. It is designed to benefit more than 34 households, as well as community facilities such as guest houses and temples.

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

Bhutan has approximately 1450 kW of solar power connected to the grid, including following projects:

- Rubesa Solar Plant: A 180kW grid-tied solar PV plant
- Dechencholing Solar Project: A 500kW ground-mounted, grid-tied solar PV plant

- Centenary Farmers Market (CFM) Rooftop Solar: A 250kW grid-tied rooftop solar

The Sephu Solar Project should contribute an additional capacity of 22.38 MW since the end of 2024. Bhutan has implemented a net metering system, allowing households with solar installations to feed excess energy back into the grid, promoting renewable energy use and enhancing energy security in rural areas.

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

The average monthly salary in Bhutan is approximately \$433.

- Solar Photovoltaic Installer: the average monthly salary is approximately \$270.

- Solar Energy Systems Engineer: the average monthly salary is approximately \$417.

Population of the country

The current population of Bhutan is 794489.

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

The average rent for industrial spaces and warehouses in Bhutan has seen significant increases recently, ranging between \$0.12 to \$0.58 per square meter, depending on the location and condition of the property.

In Bhutan, the electricity rates for industrial and business consumers are structured as follows:

- High Voltage (HV): The rate is \$0.019/kWh, with a potential increase of 20% impacting industries like ferrosilicon and cement.
- Medium Voltage (MV): The energy charge is also \$0.019/kWh.
- Low Voltage (LV): The tariff varies, with \$0.015/kWh for the first 100 kWh and \$0.031/kWh thereafter. These rates are applicable until June 30, 2025, as per the current regulations.

A summary of the energy infrastructure

The country has a significant hydropower potential of around 30000 MW, with 23760 MW identified as economically feasible. Besides hydropower, Bhutan aims to diversify its energy mix with solar, wind, biomass, and geothermal energy.

Key Institutions:

- Department of Renewable Energy: Formulates policies to promote renewable energy technologies.
- Bhutan Electricity Authority (BEA): Regulates the electricity sector and promotes renewable energy projects like rooftop solar through net metering guidelines.
- Ministry of Economic Affairs: Oversees economic development, including energy infrastructure projects.

Some of the government regulations surrounding solar panel production

Licensing Regulations for Solar Power Plants (2024): These regulations aim to ensure the creation of adequate solar generation capacity, transparency, and fairness in enforcement actions by the authority.

Alternative Renewable Energy Policy (2013): This policy defined renewable energy capacity targets, including solar photovoltaics, to 20 MW by 2025. It emphasizes the need for rapid investments to meet these targets.

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

Distributed Solar for Public Infrastructure Project: Supported by the Asian Development Bank (ADB), this project involves installing solar panels on public buildings to generate up to 35 MW of energy. It aims to enhance energy security and promote solar technologies.

Green Energy Investment Project: This project focuses on installing 30 MW of solar PV systems and aims to strengthen the regulatory framework for renewable energy. It includes establishing a Green Financing Framework to support investments by Energy Service Companies (ESCOs) and promote sustainable energy solutions.

Notable solar projects in the country (installed and projected)

Sephu Solar Project:

- Capacity: 22.38 MW
- Location: Sephu, Wangdue Phodrang District
- Year: Construction began in 2023, expected completion by 2025
- Investor: Funded primarily by the Asian Development Bank (ADB)
- Details: This is Bhutan's first utility-scale solar farm. It can generate approximately 25 million units of energy annually, enough to power about 3476 households. This project aims to complement hydropower, especially during lean seasons when energy imports from India are necessary.

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

Dunk Green Power Corporation:

- Headquarters: Thimphu, Bhutan
- Website: <https://www.drukgreen.bt/>
- Details: Although primarily focused on hydropower, DGPC is expanding into solar energy projects, including the installation of solar panels to complement hydropower generation and enhance energy security during dry seasons.

Tashi Solar:

- Headquarters: Thimphu, Bhutan
- Website: <https://www.tashigroup.bt/>
- Details: Part of a larger conglomerate, Tashi Solar focuses on renewable energy projects including solar panel installations and has contributed to various community-based solar initiatives.



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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