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Germany 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 Germany

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

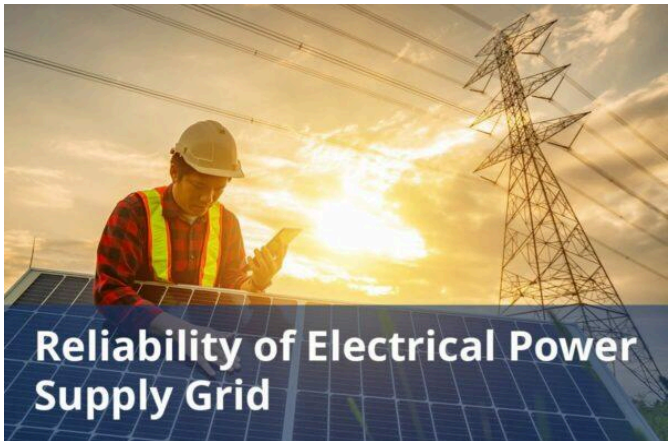
Yearly Sunshine:
- Average yearly sunshine is approximately 300 sunny days.

kWh per kWp installed

kWh Per kWp:
- Each kWp of solar panel typically generates about 1200 kWh annually.

Average cost per kWh from utility company

Average Cost Per kWh:
- The average cost for residential customers is $0.125/kWh.
- For commercial customers, it's $0.110/kWh.



Reliability of electrical power supply grid

Reliability:
- Solar energy systems have a reliability of about 98% during peak production.




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total Solar Panel Installed:
- Approximately 2 million solar panels are installed across the region.

Total solar panel production capacity (projected)

Total Solar Panel Projected:
- By 2030, installations are expected to reach over 5 million panels.

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

Average Costs:
- The average installation cost for residential solar systems is $2.75/watt.
- Maintenance costs are around $100/year.

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

Percentages Of Electricity:
- Solar energy contributes approximately 15% to the energy mix.

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

Daily Availability:
- On average, solar power is available for about 5 peak sun hours per day.

Number of residential solar panel installations

Number Residential Panel:
- Households typically install between 15 to 25 solar panels.

Total number of solar farms (installed and projected)

Number Of Farms:
- There are around 500 solar farms operating in the area.

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

Off-grid market demand for solar panels in Germany is relatively niche compared to grid-connected installations, given the country's well-developed and extensive electrical grid.

Current Demand

- Germany's current installed capacity of off-grid solar systems is relatively small, estimated at 50-100 MW.
- Off-grid solar solutions are mainly used in remote areas, such as mountainous regions and small islands in the North and Baltic Seas, due to Germany's extensive grid coverage.
- These systems are used for:
- Rural and remote areas: Small off-grid systems power agricultural applications like irrigation systems, greenhouses, and remote farm buildings.
- Recreational use: Solar panels are used by caravan and RV owners to provide power while traveling, and on boats and yachts to supply electricity for onboard needs.

Projected Growth

- The off-grid solar market in Germany is projected to grow at a moderate annual rate of 5-10% over the next decade, potentially reaching an installed capacity of 200-300 MW by 2034, contingent upon technological advancements and market conditions.
- There is a growing trend of eco-friendly homes and communities opting for off-grid solar solutions to reduce environmental impact and achieve energy independence.
- Increasing interest in sustainable, self-sufficient living may drive demand for off-grid solar systems.

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

On-grid market demand for solar panels in Germany has experienced significant growth over the past decades.

Current Demand

- Installed Capacity
- By the end of 2023, Germany had established itself as a global leader in solar photovoltaic (PV) installations, boasting a cumulative installed capacity of over 55 gigawatts (GW) across more than 2 million solar PV systems spanning residential, commercial, and industrial sectors.

Rooftop and Large-Scale Installations
- Residential rooftops account for a significant portion of the installed capacity, with homeowners opting for solar PV to reduce electricity bills and contribute to sustainability.
- Many businesses and industries have installed large-scale solar PV systems to meet their energy needs and reduce carbon footprints.

Projected Demand
- Germany targets a 65% share of renewable energy sources in its electricity consumption by 2030, planning to achieve this by installing an additional 30 GW of solar PV capacity, bringing the total to 85 GW by 2030.

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

The average salary for a Solar Installer in Germany is approximately $4,752 per month, and the average additional cash compensation is approximately $2,592 per month.

Population of the country

The current population of Germany is 83254890.

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

1. Labor Costs
- Skilled labor costs range from $3360 per month to $5600 per month.

2. Installation Cost
- In Germany, installation costs typically range from 10% to 25% of the total system price, depending on the complexity of the installation and structure.
- With an average system size of around 7.5 kilowatts, the total cost of a solar installation is approximately $25618.
- However, after applying the federal solar tax credit, the cost is reduced to around $17915.

3. Material Costs
- Average cost of materials approximately minimum $0.224 per watt to $0.336 per watt.

4. Energy Costs
- The average price of electricity for is 42.22 cents per kilowatt hour (kWh).

5. Depreciation and Maintenance
- Annual costs for maintenance and depreciation of equipment range from $1.12 million to $2.24 million.

A summary of the energy infrastructure

In 2023, Germany's electricity mix consisted of:
- Fossil fuels: 46% (primarily coal and natural gas)
- Nuclear power: 0.7% (declining since 2005 as part of the Energiewende plan)
- Renewable energy: 19.6% (with wind power becoming the largest source of electricity, surpassing coal).

Transmission & Distribution
- Germany's electricity grid is a complex network comprising:
- Transmission grids: High-voltage networks that transport electricity over long distances.
- Distribution grids: Local networks that supply electricity to consumers at various voltage levels, including:
- High-voltage (110 kV to 220 kV) for industrial and commercial consumers
- Medium-voltage (1 kV to 110 kV) for smaller commercial and residential consumers
- Low-voltage (230 V to 1 kV) for individual households and small businesses.
- This multi-layered grid system ensures reliable and efficient electricity supply to meet Germany's diverse energy demands.

Some of the government regulations surrounding solar panel production

The regulations surrounding solar panel production and installation in Germany focus on several key aspects:

1. Renewable Energy Sources Act (EEG): This act mandates that 80% of Germany's energy comes from renewable sources by 2030. It ensures stable prices for power produced by renewable sources, making investment in solar energy more secure.

2. Solarpaket I (2024): The German parliament approved this legislation to promote the adoption of plugin solar installations.

3. Tax Incentives and VAT Reductions: Germany offers VAT incentives, with a 0% rate on solar installations, making solar panel adoption more affordable.

4. Encouragement for Urban Installations: With high urban rental rates, the law now allows tenants in apartment buildings to install solar panels without landlord vetoes.

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

Government Subsidies and Financial Incentives
- Various subsidies to offset installation costs for homeowners and businesses.
- Renewable Energy Sources Act (EEG) guarantees fixed feed-in tariffs for solar electricity.

Zero VAT Rate for Solar Modules and Installation
- Zero VAT rate introduced on January 1, 2023.

Solar strom bonus (Feed-in Tariff for Solar Power)
- Introduced in 2009, valid until 2029.

Solar PLUS – Photovoltaic Funding for Berlin
- Grants for purchasing and installing solar systems, as well as solar energy storage.

Notable solar projects in the country (installed and projected)

Facility
- Solar park Weesow-Willmersdorf: The largest solar project built in the federal state of Brandenburg.
- Solar park Alttrebbin: Located in eastern Brandenburg on an area of around 149 hectares.

- Solar park Gottespark: Located about 60 km east of Berlin.
- Solar komplex Senftenberg: A large solar power plant near Senftenberg and Shipkau in Brandenburg.

Projected Projects
- Verbund Visiolar Germany Solar PV Park: Expected to enter commercial operation in 2024.
- LEAG Holding Solar PV Park: Expected to come online by 2026.

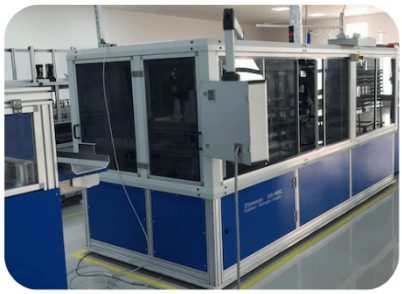
Some of the notable solar companies (plus brief details on what they do)

1. MVV Energie AG
- Website: mvv.de
- Headquarters: Mannheim, Baden-Wurttemberg, Germany
- Founded: 1974
- Headcount: 5001-10000
- They offer energy solutions and services to private and commercial customers.

2. Sonnen GmbH
- Website: sonnen.de
- Headquarters: Wildpoldsried, Bavaria, Germany
- Founded: 2010
- Headcount: 501-1000
- Offers intelligent energy solutions for a clean energy future.

3. EnviaM-Gruppe
- Website: enviam-gruppe.de
- Headquarters: Chemnitz, Sachsen, Germany
- Founded: 2002
- Headcount: 1001-5000

- Specializes in renewable energy solutions, with a focus on the installation of bifacial solar cells.



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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