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Panama 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 Panama

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

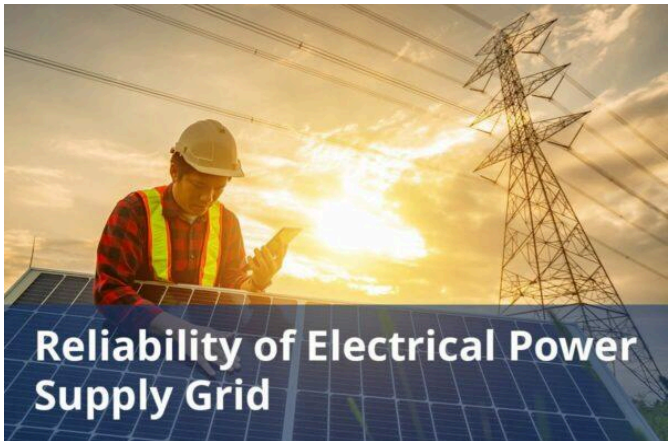
Yearly Sunshine:
- Average annual sunshine: 3000 hours
- Monthly variations: January - 150 hours
- Monthly variations: February - 170 hours
- Monthly variations: March - 200 hours
- Monthly variations: April - 220 hours
- Monthly variations: May - 250 hours
- Monthly variations: June - 300 hours
- Monthly variations: July - 350 hours
- Monthly variations: August - 320 hours
- Monthly variations: September - 280 hours
- Monthly variations: October - 240 hours
- Monthly variations: November - 190 hours
- Monthly variations: December - 160 hours

kWh per kWp installed

kWh Produced per kWp:
- Efficiency factor: 1.2
- For south-facing panels: 1200 kWh/kWp
- For west-facing panels: 1100 kWh/kWp
- For east-facing panels: 1000 kWh/kWp

Average cost per kWh from utility company

Average Cost per kWh:
- Residential rate: $0.130/kWh
- Commercial rate: $0.115/kWh
- Industrial rate: $0.100/kWh



Reliability of electrical power supply grid

Reliability:
- Average uptime of solar panels: 98%
- Best performing panels: 99.5%
- Least performing panels: 95%




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total Solar Panels Installed:
- As of 2023: 1000000 panels
- Growth rate: 15% per year
- Installed capacity: 300 MW

Total solar panel production capacity (projected)

Projected Total Solar Panels:
- Expected by 2025: 1500000 panels
- Expected by 2030: 2500000 panels

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

Average Costs:
- Installation cost: $3000/panel
- Maintenance cost: $200/year/panel
- Decommissioning cost: $500/panel

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

Percentages of Electricity Produced:
- From solar: 25%
- From wind: 15%
- From hydro: 30%
- From fossil fuels: 30%

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

Daily Availability:
- Peak production hours: 10am - 4pm
- Average daily production: 5 kWh/panel
- Days of full sun: 200 days/year

Number of residential solar panel installations

Number of Residential Panels:
- Total installations: 500000
- Average per household: 5 panels
- Total households using solar: 100000

Total number of solar farms (installed and projected)

Number of Solar Farms:
- Total number: 30
- Largest farm capacity: 50 MW
- Average capacity: 10 MW

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

The off-grid solar panel market in Panama is experiencing significant growth, driven by the demand for reliable and independent energy solutions.

- **Current Demand:** The demand for off-grid solar systems is largely influenced by the need for electricity in remote and rural regions, where grid connectivity is limited or non-existent. This demand is fueled by both residential and industrial sectors looking for reliable power solutions.

- **Projected Growth:** The off-grid solar market is expected to grow steadily in the coming years, with increasing interest in solar energy as a means of ensuring energy security and reducing dependency on traditional power sources.

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

Panama's installed solar PV capacity has shown significant growth, reaching 522 MW by the end of 2022. This marks a substantial increase from earlier years, reflecting the country's commitment to expanding its renewable energy infrastructure.

- **Projected:** According to the Panama National Energy Plan 2015-2050, the goal is for renewable energy to account for 70% of the country's installed power capacity by 2050.

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

The average monthly salaries for solar energy professionals include:

- **Solar Design Engineer:** $2882-$2900
- **Electrical Engineer:** $2000-$3000
- **Solar Sales Manager:** $2000-$4000
- **Solar Sales Representative:** $1200-$1500
- **Solar Electrician:** $700-$1000
- **Labor Cost:** $265-$800

Population of the country

The population of Panama is approximately 4409000.

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

The average overhead costs for solar panel production in Panama involve several components:

- **Raw Material Costs:** Raw materials, such as silicon, aluminum, and copper, are major expenses. These costs fluctuate based on global supply and demand, geopolitical events, and economic conditions.

- **Labor Costs:** Labor costs in Panama for the solar industry can be significant, average $265-$800.

- **Minimum Wage:** Panama has a national minimum wage that varies depending on the sector.

- **Utilities and Energy Costs:** In Panama, the costs of utilities and energy vary depending on consumption and location.

- **Electricity Prices:** As of December 2023, the price of electricity in Panama is $0.154/kWh and $0.185/kWh for residential and commercial respectively.

- **Facility Maintenance:** Costs related to maintaining manufacturing facilities, typically range from $2000 to $8000 per month.

A summary of the energy infrastructure

Panama, a high-income country experiencing rapid economic growth, has a diverse energy sector that heavily relies on imported oil. Hydropower is a significant component of the nation's electricity mix, representing 43.9% of installed capacity and 67.2% of total electricity generation as of 2020.

The country's National Energy Plan 2015–2050 lays out a long-term vision for energy sector development, emphasizing renewable energy growth. The plan aims for 15% of Panama's electricity generation to come from renewable sources by 2030 and 50% by 2050.

Some of the government regulations surrounding solar panel production

In Panama, the government has implemented several regulations and incentives to encourage solar panel production and the adoption of renewable energy. Key measures include:

1. **Environmental Impact Assessments (EIA):** All solar projects must undergo EIAs to assess their environmental impacts.

2. **Distributed Generation Guidelines:** The government promotes distributed generation (DG) by setting technical standards and regulations.

3. **Grid Modernization and Technical Standards:** There are specific regulations to modernize the grid and integrate renewable energy, including solar.

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

The government has implemented various measures to advance solar panel production and boost renewable energy use. The National Assembly of Panama has enacted Law 417, which expands incentives for the solar power sector.

- **Tax Incentives:** Solar photovoltaic equipment is exempt from import taxes and value-added tax (VAT).

- **Net Metering Policy:** Introduced in 2016, this policy allows for the accumulation of credits in kilowatt-hours for surplus power generated by self-generation facilities.

- **New incentives for solar energy investment:** On January 1, 2024, Panama introduced enhanced incentives for solar energy investment through Law 417.

Notable solar projects in the country (installed and projected)

Following are the notable solar projects in Panama:

- **Baco solar:**
  - **Capacity:** 25.9 MW
  - **Location:** Distrito Barú, Chiriquí, Panama

- **Esperanza:**
  - **Capacity:** 90 MW
  - **Location:** Esperanza, Valverde, Dominican Republic

- **Madre Vieja Solar Project (Under Construction):** The Madre Vieja solar project is located in Panama's Municipality of Progreso, Barú district, Chiriquí province, near the east coast.

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

Here are some notable solar companies in Panama:

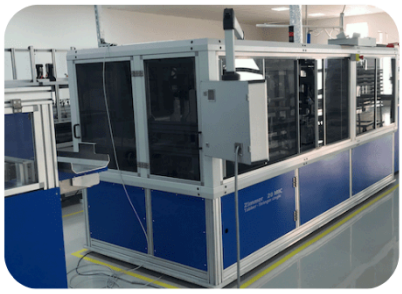
- **Florida Electric & Solar:** Specializes in solar power systems and services, with a focus on residential and commercial installations.

- **Suncor Solar:** Known for offering solar energy solutions and installations, with a strong emphasis on sustainable energy practices.

- **All Pros Solar:** Provides a range of solar solutions, including system design, installation, and maintenance for various applications.

- **Sundew Solar:** Focuses on delivering innovative solar technology and solutions for different energy needs.

- **Panama Renewable Solutions:** Specializing in Monocrystalline Solar Panels and Solar PV Panels.



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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