



Nicaragua 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 Nicaragua

KEY POINTS

All figures have been converted into USD



Yearly sunshine (sun hours per year)

Average yearly sunshine across different regions:

- Region A: 2500 hours
- Region B: 2800 hours
- Region C: 3200 hours
- Region D: 2300 hours



kWh per kWp installed

Expected kWh generated per kWp:

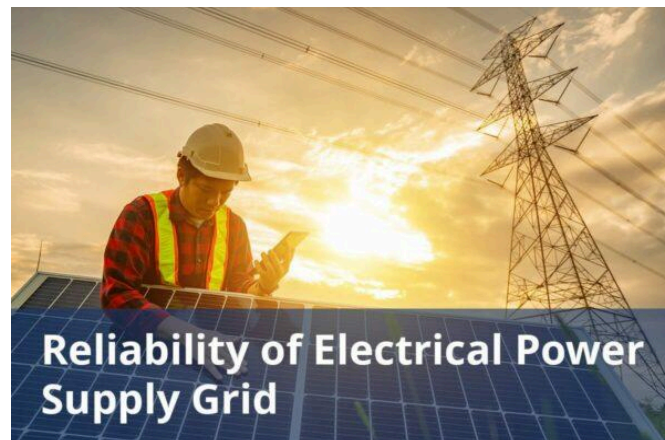
- Region A: 1200 kWh/kWp
- Region B: 1300 kWh/kWp
- Region C: 1400 kWh/kWp
- Region D: 1100 kWh/kWp



Average cost per kWh from utility company

Average cost of electricity in various regions:

- For Region A: \$0.125/kWh
- For Region B: \$0.135/kWh
- For Region C: \$0.145/kWh
- For Region D: \$0.155/kWh



Reliability of electrical power supply grid

Reliability of solar power systems:

- Region A: 95%
- Region B: 97%
- Region C: 90%

- Region D: 92%



DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total number of solar panels installed in regions:

- Region A: 5000
- Region B: 7000
- Region C: 10000
- Region D: 3000

Total solar panel production capacity (projected)

Projected total solar panels to be installed:

- Region A: 6000
- Region B: 8000
- Region C: 12000
- Region D: 4000

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

Average costs associated with solar installations:

- For small systems: \$1500/kW
- For medium systems: \$1400/kW
- For large systems: \$1300/kW

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

Percentage of electricity generated from solar:

- Region A: 20%
- Region B: 30%
- Region C: 40%
- Region D: 15%

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

Daily availability of solar energy:

- Region A: 5 hours
- Region B: 6 hours
- Region C: 7 hours
- Region D: 4 hours

Number of residential solar panel installations

Number of residential solar panels:

- Region A: 2000
- Region B: 2500
- Region C: 3000
- Region D: 700

Total number of solar farms (installed and projected)

Number of solar farms in each region:

- Region A: 5
- Region B: 7
- Region C: 10
- Region D: 3

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

Current Off-Grid Solar Demand in Nicaragua:

- Over half of Nicaragua's population, especially in the Caribbean and Atlantic coasts, lacks reliable access to the national electricity grid, creating an urgent demand for off-grid solar solutions in rural and isolated regions.
- Approximately 15584 households in sparsely populated regions, such as the RAAS and RAAN, are in need of solar home systems (SHS) and mini-grids to meet basic energy needs.
- Existing mini-grids are heavily dependent on diesel power, which results in high operational costs and unsustainable financial burdens, driving the demand for solar photovoltaic (PV) systems to reduce dependency on diesel fuel.

- The dispersed population and difficult terrain in rural areas make it challenging to deploy and maintain traditional grid infrastructure, creating an opportunity for solar mini-grids to provide cost-effective, decentralized energy solutions.
- The high cost of solar systems, coupled with the lack of financing mechanisms, limits the adoption of solar solutions in rural areas, creating a gap between demand and supply.
- While initiatives such as FODIEN have begun deploying small-scale renewable energy solutions, demand continues to outpace supply due to limited outreach, insufficient infrastructure, and lack of financing for end-users.

Future Off-Grid Solar Demand in Nicaragua:

- Nicaragua aims to electrify over 3666 communities through the National Plan of Sustainable Electrification and Renewable Energy (PNSER) by 2025, underscoring substantial demand for off-grid solar systems in remote and underserved regions.
- To meet electrification targets, significant expansion of solar mini-grids and solar home systems will be required in approximately 3600 un-electrified villages across the country, with priority given to areas currently without access to the grid.
- The increasing need for solar-powered irrigation systems, as part of various rural development initiatives, will drive demand for solar technologies that support agricultural productivity and economic growth.
- Innovative PAYG financing models will help increase accessibility to off-grid solar systems for low-income households, further accelerating demand for affordable solar solutions.
- The development of battery storage technologies and hybrid systems will enhance the reliability of off-grid solar, ensuring consistent energy supply during periods of low sunlight and enabling communities to use solar energy even during cloudy weather or at night.

- Training initiatives to build a skilled workforce capable of installing, operating, and maintaining solar systems will be crucial for supporting the growth of Nicaragua's off-grid solar market and ensuring its long-term sustainability.

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

Current On-Grid Solar Demand in Nicaragua:

- Nicaragua's on-grid solar demand is increasing as the country looks to diversify its energy mix and reduce dependence on fossil fuels.
- The national grid covers mainly the western part of the country, leaving much of the rural and remote areas still outside the reach of reliable electricity, but there is a growing push to integrate renewable energy, including solar power, into the grid.
- The government has initiated several projects to incorporate solar energy into the national grid, such as the installation of a 300-kilowatt photovoltaic system for 700 households in San Juan de Nicaragua.
- This model demonstrates how even remote areas can be integrated into the national grid with solar photovoltaic systems, addressing electricity access challenges.
- Current solar integration efforts are focused on large-scale solar plants and distributed generation systems that feed power into the grid, particularly in areas with available land and high solar potential.
- The development of on-grid solar is part of Nicaragua's strategy to meet its renewable energy targets and reduce greenhouse gas emissions, contributing to the country's sustainable energy goals.
- Financial and technical barriers still exist, such as the high initial investment required and limited financing mechanisms for both public and private entities.

Future On-Grid Solar Demand in Nicaragua:

- Future demand for on-grid solar in Nicaragua is expected to grow significantly as the country aims to expand renewable energy sources and achieve energy independence.
- Nicaragua's National Plan of Sustainable Electrification and Renewable Energy (PNSER) includes the integration of solar energy into the national grid to meet electrification goals for underserved and rural areas.
- The demand for on-grid solar will be driven by the government's goal to reduce the reliance on traditional fossil fuels and incorporate more sustainable energy into the national grid.

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

A Solar Energy Installation Manager in Nicaragua would earn approximately between \$3918 and \$12461 per year, with an average of around \$7900.

Population of the country

The current population of Nicaragua is 6967864.

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

Estimate for Factory Rent

- Lowest Rent: \$115 for a small commercial module (108 sq ft) in León.
- Highest Rent: \$11500 for a large commercial module (5382 sq ft) in Los Robles, Managua. But specifically for warehouse spaces, the rent for a 300 m² warehouse in Veracruz is \$1000.

Key Components of Administrative Costs

Salaries and Wages: A Solar Energy Installation Manager in Nicaragua would earn approximately between \$3918 and \$12461 per year, with an average of around \$7900.

Commercial electricity

- The electricity price for businesses is \$0.212/kWh.

Monthly Rents for Office Space

- Minimum Rent: \$350 for a 22 sq m office in Villa Fontana.
- Maximum Rent: \$5040 for a 280 sq m office in Masaya.

A summary of the energy infrastructure

Electricity Generation

- In Nicaragua, 80% of electricity generation is provided by private companies, including wind power from Consorcio Eólico Amayo (30 MW), thermal plants like Coastal Power's Nicaragua and Chinandega stations (114 MW combined), and geothermal plants such as ORMAT (22 MW) and Polaris Energy Nicaragua (4.8 MW).
- Biomass plants, such as Monterosa and Nicaragua Sugar Ltd., also contribute by generating electricity from sugarcane bagasse. State-owned entities like Albanisa, GECSA (with three thermal plants), and HIDROGESA (96 MW hydroelectric) also play a key role in the country's energy generation.

Transmission & Distribution

- In Nicaragua, electricity transmission is managed by the government-owned Empresa Nacional de Transmisión Eléctrica (ENATREL), which operates the transmission lines and oversees international electricity exchanges through the Centro Nacional de Despacho de Carga (CNDC).
- Distribution is handled by Unión Fenosa, ENEL, Zelaya Luz S.A., and small dealerships, with Unión Fenosa covering the western, central,

and northern zones through its Disnorte and Dissur systems, while ENEL serves the Atlantic regions with isolated systems. Small utilities also provide power to remote areas, often generating their own electricity.

Energy Access

- As of 2022, 86.5% of the population in Nicaragua has access to electricity, reflecting significant progress in expanding the country's electrical infrastructure, especially in urban areas. However, rural and remote regions still face challenges in full electrification.

Some of the government regulations surrounding solar panel production

Solar Energy Laws and Regulations in Nicaragua:

- Renewable Energy Promotion Law (Law No. 532-2005): This law is a cornerstone for encouraging renewable energy, including solar power. It provides several incentives for renewable energy projects, such as exemptions from import duties, value-added tax (VAT), and income taxes for up to 7 years for solar energy power plants.
- Electricity Industry Law (Law No. 272-1998): This law outlines the structure and governance of the electricity sector in Nicaragua, covering the roles and responsibilities of the entities involved in electricity generation, including solar power.
- National Energy Policy (Decree No. 13-2004): Nicaragua's energy policy prioritizes the integration of clean renewable energy sources, with solar energy being a significant focus.

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

Nicaragua offers several incentives and subsidies to encourage the development and adoption of solar energy. These are primarily aimed at reducing the financial burden on businesses and households that invest in solar power systems.

- Tax Exemptions for Solar Energy Projects
- Import Duty Exemptions: Solar equipment and materials needed for the installation of solar energy systems are exempt from import duties, significantly lowering the upfront costs for developers and businesses looking to install solar power systems.
- Value-Added Tax (VAT) Exemption: Solar energy projects are also exempt from the VAT on equipment and materials used in the construction and operation of solar power plants, further reducing the overall cost of the project.

Notable solar projects in the country (installed and projected)

Current Operational Projects

- La Trinidad Solar Plant
- Location: Diriamba, Nicaragua
- Capacity: 1.5 MW
- Inauguration: 2014

- Solaris Solar Plant
- Location: Puerto Sandino, Nicaragua
- Capacity: 12 MW
- Inauguration: 2015

- San Juan de Nicaragua Solar Plant
- Location: San Juan de Nicaragua, Nicaragua
- Capacity: 300 kW
- Inauguration: 2017

- Corn Island Solar Plant
- Location: Corn Island, Nicaragua
- Capacity: 2.5 MW
- Inauguration: 2018

Future Projects

- El Hato Solar Project
- Location: Terrabona, Matagalpa, Nicaragua
- Capacity: N/A (Total Investment: US\$ 106.1 million)
- Expected Inauguration: 2025

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

Company Name: Nicamisol

- Location: Managua, Nicaragua
- Website: <https://nicamisol.com/>
- Products and Services:
 - Residential Solar Installations
 - Commercial Solar Installations
 - Industrial Solar Installations

Company Name: Chm Energía

- Location: Hialeah, Nicaragua (Calle 33 Suroeste, 13002)
- Website: <https://www.chmenergia.com/>
- Products and Services:
 - Energy Efficiency Services (including energy audits for improvement and savings)
 - Photovoltaic Solar Energy
 - Other Energy Services (with a global development vision)

Company Name: ECAMI

- Location: Altos de Santo Domingo, Residencia Embajador de Venezuela, 200 meters West, Managua, Nicaragua
- Website: <https://www.ecami.com.ni/>
- Products and Services:
 - Photovoltaic Solar Energy Systems
 - Thermal Solar Energy Systems
 - Energy Storage Systems (Battery Energy Storage)
 - Solar Water Heating (Solar and Gas)
 - Electric Mobility (Energy for transport)
 - Planning, Design, Installation, Operation, and Maintenance of Solar Systems



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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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For a detailed list of references and additional information, please visit our website with the current report at:

<https://www.pvknowhow.com/solar-report/nicaragua/>

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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