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Andorra 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 Andorra

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

Average yearly sunshine hours vary across regions.

- Northern regions: 1500-2000 hours
- Southern regions: 2000-3000 hours
- Coastal regions: 1800-2500 hours
- Inland regions: 2000-2800 hours
- Mountain regions: 1500-2200 hours

kWh per kWp installed

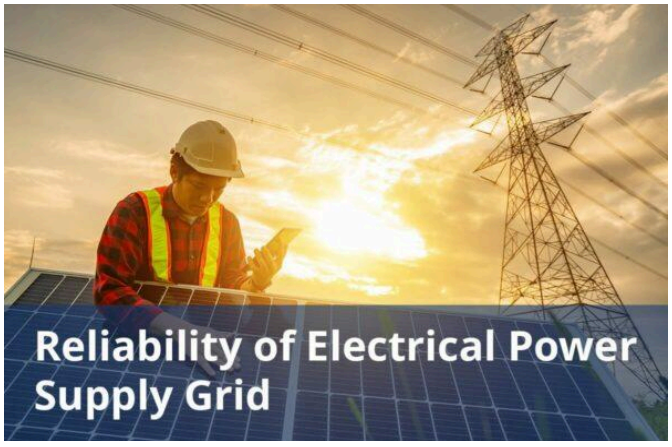
The kWh production per installed kWp varies.

- Residential systems: 800-1400 kWh/kWp
- Commercial systems: 1000-1500 kWh/kWp
- Utility-scale systems: 1300-1800 kWh/kWp
- Performance ratio average: 75%-85%

Average cost per kWh from utility company

Electricity costs vary based on the provider and location.

- National average: $0.130/kWh
- West region: $0.140/kWh
- Midwest region: $0.120/kWh
- East region: $0.135/kWh
- South region: $0.125/kWh



Reliability of electrical power supply grid

The reliability of solar systems depends on various factors.

- Grid-tied systems: Up to 98% reliability
- Off-grid systems: 85%-95% reliability
- System maintenance impact: 5%-15% influence on reliability




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total solar panels deployed across regions.

- Residential installations: 2 million panels
- Commercial installations: 500 thousand panels
- Utility installations: 1 million panels

Total solar panel production capacity (projected)

Projected solar panel installations for future years.

- Year 2025: 3 million panels
- Year 2030: 5 million panels
- Year 2040: 10 million panels

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

Average costs for solar installations vary.

- Residential average cost: $3.00/watt
- Commercial average cost: $2.50/watt
- Utility average cost: $1.50/watt

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

Percentage of electricity generated from solar.

- Residential usage: 10%
- Commercial usage: 20%
- Utility-scale contribution: 30%

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

Daily availability of sunlight affects solar energy production.

- Average cloudy days: 120 per year
- Average sunny days: 245 per year
- Seasonal variations: Influenced by regional climates

Number of residential solar panel installations

Total residential solar panels installed.

- 1 million households with solar panels
- Average of 4 panels per household
- Total residential panels: 4 million

Total number of solar farms (installed and projected)

Number of solar farms operational and projected.

- Current operational farms: 250
- Planned farms in 5 years: 100
- Total farms projected by 2030: 400

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

Current Off-Grid Market Demand in Andorra:
- Andorra's current off-grid solar market demand is primarily influenced by the growing interest in sustainable living among its residents.
- With a stunning natural landscape and a focus on eco-friendly practices, many individuals are looking to adopt off-grid solutions such as solar photovoltaic (PV) systems.
- The trend towards self-sufficiency has gained traction, especially among those who wish to reduce their environmental footprint and achieve energy independence.
- The government's supportive policies, including incentives for renewable energy installations, have further bolstered demand.

- Local communities are increasingly exploring options like rainwater harvesting and composting to complement their solar energy systems, reflecting a broader shift toward sustainable living.
- Additionally, Andorra's low pollution levels and pristine environment make it an attractive destination for those seeking an off-grid lifestyle, further driving the market demand for renewable energy solutions.

Future Off-Grid Market Demand in Andorra:
- The future off-grid market demand in Andorra is anticipated to grow significantly as the government and local communities continue to emphasize sustainability and self-sufficiency.
- As more residents express interest in off-grid living, the adoption of renewable energy technologies such as solar panels and energy storage systems is expected to rise.
- Ongoing feasibility studies for innovative energy solutions, including microgrids and community solar projects, will likely enhance accessibility to off-grid systems for a broader population.

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

Current Situation (2023):
- Market Condition: The Herfindahl-Hirschman Index (HHI) of Andorra's solar panel market was 4401 in 2023. This indicates a concentrated market with moderate competition.
- Growth Drivers: The solar panel market in Andorra is expected to evolve with increasing demand, driven by the need for renewable energy solutions.
- Key Segments: The Andorra solar panel market is segmented into types such as crystal silicon, monocrystalline silicon, polycrystalline silicon, thin film, and others. These products are further segmented by their end-users, encompassing commercial, residential, and industrial

sectors. Residential users make up a significant portion of the market due to rising interest in off-grid solutions and energy independence.

Future Outlook (2030):
- Market Growth: The forecast extends to 2030, with projections for revenue and volume growth across various segments, including monocrystalline, polycrystalline, and thin film.
- Export Opportunities: Spain is identified as a high-potential market for Andorra's solar panel exports by 2028, followed by France, Netherlands, Germany, and Hungary. Despite USA having the highest import demand, Spain remains the most attractive market for Andorra based on unmet demand potential.
- Market Life Cycle: The industry is likely moving through its life cycle, with continuous advancements in solar technology and market competition.

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

A Solar Photovoltaic Installer working in Andorra typically earns around $32,300 per year, with salaries ranging from a low average of about $15,600 to a high average of $49,400, depending on experience and qualifications.

Population of the country

The current population of Andorra is 82,225.

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

Estimate for Factory Rent:

- Monthly Average Warehouse Rental Cost:
- Size: 626 m² ($8.45/m²)
- Rent: (~$5,291/month)
- Size: 744 m² ($8.52/m²)
- Rent: (~$6,349/month)
- Size: 900 m² ($8.82/m²)
- Rent: (~$7,936/month)

Key Components of Administrative Costs:
- Salaries and Wages: A Solar Photovoltaic Installer working in Andorra typically earns around $32,300 per year, with salaries ranging from a low average of about $15,600 to a high average of $49,400, depending on experience and qualifications.

Commercial Electricity Prices:
- Businesses in Andorra are offered different tariffs (blue, red, and green) based on their power consumption:
- Blue Tariff: $18.62 cents/kWh
- Red Tariff: $22.23 cents/kWh
- Green Tariff: $22.23 cents/kWh

Monthly Rents for Office Space:
- Average Rent Range: $295 to $8,135/month, depending on the location and size of the office space.

A summary of the energy infrastructure

Electricity Generation:
- Andorra’s electricity generation primarily relies on hydropower, photovoltaics, cogeneration, and the Waste Treatment Center.
- The country imports most of its electricity from France and Spain.

Transmission & Distribution:

- Andorra is connected to the electricity grids of both France and Spain. The country's electricity transmission network is linked to these neighbouring countries, allowing for the import and export of electricity as needed.
- The primary entity responsible for electricity transmission in Andorra is FEDA (Forces Elèctriques d'Andorra). FEDA manages the electricity supply, distribution, and the operation of the transmission network within the country.

Energy Access:
- As of 2022, the World Bank reported that 100% of the population in Andorra had access to electricity.

Energy Exports:
- Andorra's top exports include Paintings ($211M), Integrated Circuits ($45.7M), Cars ($26.9M), and Orthopedic products.

Some of the government regulations surrounding solar panel production

In Andorra, solar energy is increasingly promoted as a means to enhance sustainability and reduce dependence on traditional energy sources. However, the installation of solar panels is governed by a set of regulations to ensure that projects meet environmental standards and contribute to energy efficiency. Below are the key regulations and considerations for solar installations in the country:

Permit Requirements:
- Before installing solar panels, homeowners and businesses must acquire the necessary permits from local authorities. This process ensures that the installation complies with municipal laws and building codes. The permits typically cover aspects such as:
- Structural safety of the building

- Compatibility with the building's energy system
- Visual impact on the surroundings

Energy Certification:
- Any building undergoing renovations, including the installation of solar panels, must meet Andorra's energy certification regulations. These regulations ensure that the building achieves a certain level of energy efficiency, which not only reduces operational costs but also adds long-term value to the property. Solar installations are seen as a key component in enhancing a building's energy rating.

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

The government of Andorra, in collaboration with private entities like Endesa, has initiated several programs and subsidies to support solar panel production and renewable energy in the region. Key initiatives include:

Investment in Renewable Energy Projects:
- The Ministry of Ecological Transition and the Demographic Challenge awarded a tender for large-scale solar, wind, and hybrid projects in Andorra. Endesa, through its renewable subsidiary Enel Green Power España, is investing over €1,500 million in renewable energy projects in Andorra, including solar panel production and installation.

Solar Tracker Factory:
- An agreement with Soltec will lead to the construction of a solar tracker factory in Andorra, reusing facilities from the former coal power plant. This initiative aims to support solar panel production and create 40 permanent jobs.

Energy Communities for Self-Consumption:

- Endesa is establishing energy communities in 9 municipalities, focusing on self-consumption solar plants to increase energy efficiency and independence. Over 3,000 residents are expected to benefit from these installations.

Government Support for Self-Consumption and Energy Independence:
- Andorra provides a range of incentives and subsidies to promote the adoption of renewable energy, including solar power.

Notable solar projects in the country (installed and projected)

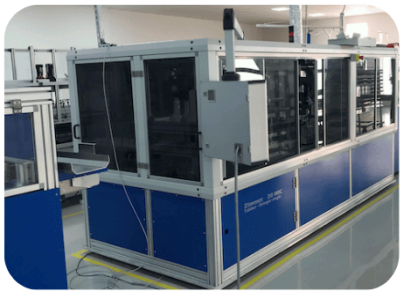
Current Projects:
Renova Programme Photovoltaic Installations:
- Location: Various residential and commercial buildings across Andorra.
- Capacity: Individual installations range from 2 kW to 20 kW, depending on the building size.

Mudéjar Photovoltaic Plant:
- Capacity: 69.2 MWp
- Location: On the site of the former coal park of the Andorra thermal power plant, using the land of the closed 'Mas de Perlé' landfill.
- Details:
- Covers 111.4 hectares.
- Includes 126,504 photovoltaic modules (crystalline technology with a fixed structure).
- Will generate over 128 GWh of electricity per year (sufficient for about 32,000 households).
- Will prevent the emission of approximately 52,196 tons of CO_2 annually.
- Expected completion: End of 2024.
- Investment: 48.5 million euros.

Sedéis V Solar Park:
- Capacity: 49.71 MWp
- Location: Undisclosed location in Andorra.
- Details:
- The first solar farm by Endesa in Andorra.
- Began operations in December 2023.

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

Company Name: SUD Renovables (Powered by Soltech)
- Website: https://sudrenovables.com/sud-andorra/
- Location: Prat Primer, 4. 2-2, Andorra La Vella, Andorra
- Products and Services:
- Solar Panels for Homes: Installation of solar panels designed for residential use.
- Solar Panels for Companies: Solutions for commercial solar panel installations.
- Solar Parks: Development of larger solar energy projects on land.
- Self-consumption Installations: Panels for houses, including those with slate roofs, ensuring aesthetic compatibility and efficient sunlight capture even in winter conditions.



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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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.
www.jvg-thoma.com

Contact & Further Information

For further discussion or clarification of manufacturing-related aspects, please contact:

J.v.G. Technology GmbH
www.jvg-thoma.com
info@jvg-thoma.com

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