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South Korea 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 South Korea

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

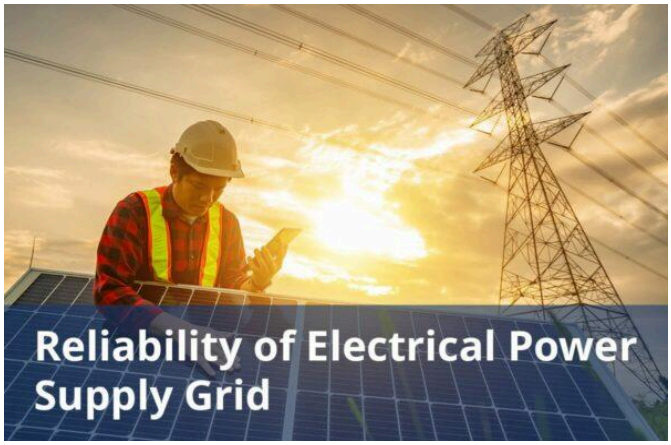
Yearly Sunshine:
- Average annual sunshine hours: 1600 hours
- Monthly average: 133.33 hours
- Daily average: 4.44 hours

kWh per kWp installed

kWh per kWp:
- Average kWh per kWp: 1200 kWh
- Performance ratio: 0.75

Average cost per kWh from utility company

Average Cost per kWh:
- Residential price: $0.12/kWh
- Commercial price: $0.10/kWh
- Industrial price: $0.08/kWh



Reliability of electrical power supply grid

Reliability:
- Grid reliability index: 0.95
- Uptime percentage: 99.5%




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total Solar Panels Installed:
- Number of panels: 500,000
- Total capacity: 1.5 GW

Total solar panel production capacity (projected)

Total Solar Panels Projected:
- Estimated installations in next 5 years: 1,000,000 panels

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

Average Costs:
- Installation cost per watt: $2.50/W
- Maintenance cost per year: $30/panel

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

Percentages of Electricity from Solar:
- Residential: 20%
- Commercial: 25%
- Industrial: 15%

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

Daily Availability:
- Hours of operation: 8 hours
- Efficiency during peak hours: 90%

Number of residential solar panel installations

Number of Residential Panels:
- Total: 300,000
- Average per household: 20 panels

Total number of solar farms (installed and projected)

Number of Solar Farms:
- Total solar farms: 50
- Average capacity per farm: 30 MW

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

Current Demand:
South Korea’s solar market is dominated by grid-connected systems, owing to its well-established electrical grid infrastructure.
In contrast, the off-grid solar sector is relatively small, with only a few thousand installations as of 2024, primarily serving rural and remote areas where grid access is limited.

However, the off-grid solar market holds promising potential for growth, driven by:

- Government initiatives supporting renewable energy adoption
- Increasing demand for sustainable energy solutions in remote areas

In 2023, South Korea's renewable energy sector experienced a notable 10% growth in solar PV installations, encompassing both grid-connected and off-grid systems.

This upward trend is expected to continue, with off-grid solar playing a vital role in expanding energy access and reducing carbon footprint in remote areas.

Projected Demand:

The off-grid solar market in South Korea is projected to grow steadily over the next decade.

While specific numbers are not available, the overall demand for off-grid solar solutions is expected to increase as part of South Korea's broader push towards renewable energy.

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

Current Demand:

Residential On-Grid Solar Market:

South Korea's residential on-grid solar market has experienced remarkable growth, fueled by government incentives and declining solar photovoltaic (PV) costs.

By the end of 2022, the country had surpassed 1.4 gigawatts (GW) of residential solar installations, demonstrating the success of policies aimed at promoting solar adoption.

Key drivers of this growth include:

- Subsidies: Financial support for households to install solar PV systems

- Tax incentives: Reduced tax liabilities for residents investing in solar energy
- Renewable Energy Certificates (RECs): Tradeable certificates that encourage solar adoption and offset emissions

These initiatives have made solar energy more accessible and affordable for South Korean households, contributing to the country's transition towards a more sustainable and renewable energy mix.

Commercial and Utility On-Grid Solar Market:

South Korea's commercial and utility-scale solar markets are thriving, bolstered by supportive policies such as the Renewable Portfolio Standard (RPS).

The RPS requires a significant percentage of the country's electricity supply to come from renewable sources, driving demand for large-scale solar projects.

Notably, utility-scale installations have become increasingly common, with many projects exceeding hundreds of megawatts in capacity.

As of 2022, South Korea's total installed solar capacity surpassed an impressive 25 gigawatts (GW), with utility-scale installations playing a substantial role in achieving this milestone.

Projected Demand:

Residential Market Projections:

By 2030, it is projected that residential solar installations will more than double, potentially reaching over 3 GW as part of South Korea's efforts to increase renewable energy adoption.

Commercial and Utility Market Projections:

South Korea's commercial and utility-scale solar markets are poised for substantial expansion, with forecasts suggesting that total solar capacity will reach 40 gigawatts (GW) by 2030.

This growth will be driven by:

- Ongoing investment in large-scale solar projects
- Advancements in solar technology, leading to increased efficiency and reduced costs

Government policies will also play a crucial role in fueling this growth, including:
- New long-term fixed price schemes, providing stability and predictability for investors
- Adjustments to the Renewable Portfolio Standard (RPS) program, enhancing the market's appeal to investors and developers

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

Worker of solar industry earn as follow:
- Average annual salary for a Solar Photovoltaic Installer: 19784.88 USD
- Lowest average salary: 9673.95 USD
- Highest average salary: 30931.13 USD

Population of the country

The current population of the Republic of Korea is 51742869.

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

Estimate for Factory Rent:
The average rent for multi-owned commercial buildings in South Korea varies by province.
As of the first quarter of 2023:
- Average rent in South Korea: 19.296 USD per square meter
- Average rent in Seoul: 33.912 USD per square meter

- Average rent in Jeju: 8.64 USD per square meter

Industrial Electricity Rates:

The electricity price for businesses is USD 0.126 per kWh in South Korea.

This includes all components of the electricity bill such as the cost of power, distribution, and taxes.

Water Costs:

Water rates for industrial use are typically charged per cubic meter (m^3).

Average water rate: 0.53 USD per cubic meter (m^3)

A summary of the energy infrastructure

Electricity Generation:

South Korea's current installed capacity is estimated at approximately 104 GW, with a utilization rate close to full capacity due to high demand.

The country's energy mix comprises 42.2% nuclear power, 30.7% natural gas, 17.8% coal, 6.7% renewable energy (including hydro, solar, and wind), and 2.6% oil.

Transmission & Distribution:

South Korea's transmission infrastructure is highly developed, consisting of a national grid system that efficiently distributes electricity across the country.

The grid operates predominantly at 345 kV and 765 kV levels, with extensive coverage extending to all regions, including remote islands.

The grid is interconnected through multiple backbone systems, ensuring robustness and reliability.

Plans include further expansions and upgrades to accommodate increasing energy demands and enhance grid resilience.

Energy Access:

As of 2023, South Korea boasts nearly universal electricity access, with over 99.9% of its population having reliable access to electricity.
This high level of access is consistent across both urban and rural areas, reflecting the country's advanced infrastructure and comprehensive electrification efforts.

Some of the government regulations surrounding solar panel production

South Korea has enacted various legislation relating to renewable energy.
This includes the Renewable Energy Act, Carbon Neutrality Act and the GHG Allocation Act.
The Renewable Portfolio Standard (RPS) and the Korean Emissions Trading Scheme (K-ETS) instead serve as the two main regulatory frameworks supporting such legislation.
The Ministry of Trade, Industry and Energy (MOTIE) and the Ministry of Environment (MOE) are the governmental authorities responsible for implementing energy related initiatives.

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

Following is the overview of solar energy support in South Korea:
Capital Subsidy (NRE Loan) Program:
- Tackles up-front cost barriers for NRE equipment/facilities.
- KEA evaluates proposals and provides funds to participating financial institutions.
- Participating banks offer up to 90% of the necessary funds at low interest rates.

- Includes grace period options (1-5 years) and amortization options (2-10 years).
- Can finance facilities, production funds, and working capital.
- 2024 budget reduced by 21% compared to 2023.

NRE Loan Program for Residents' Participation:
- Provides low-interest loans to residents in solar power generation.
- Up to 20 billion KRW can be loaned, covering up to 90% of project costs.
- Includes a 20-year grace period.

Green Guarantee Program:
- Supports companies with technological capabilities but insufficient credit/collateral.
- Korea Credit Guarantee Fund and Korea Technology Finance Corporation are participating in this program.

Notable solar projects in the country (installed and projected)

Installed Projects:

Saemangeum Solar Power Project:
- Location: Saemangeum, North Jeolla Province
- Capacity: 2.1 GW (world's largest floating solar power plant)
- Details: The project includes both floating and land-based solar farms, with a major portion on the Saemangeum Seawall.

Taean Solar Power Plant:
- Location: Taean County, South Chungcheong Province
- Capacity: 96 MW
- Details: Operated by Korea East-West Power, it is one of the largest solar farms on the Korean peninsula.

Shinan Solar Power Plant:
- Location: Shinan County, South Jeolla Province
- Capacity: 21 MW

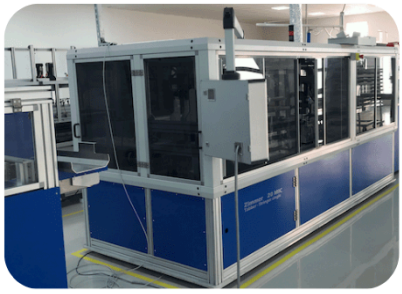
- Details: Part of the broader Shinan Renewable Energy Complex, contributing significantly to local renewable energy production.
Jeju Island Solar Projects:
- Location: Various sites on Jeju Island
- Capacity: Over 100 MW (combined from multiple smaller projects)
- Details: Jeju Island aims to become carbon-free by 2030, heavily investing in solar and other renewables.
Projected Projects:
Gyeonggi Green Energy Solar Project:
- Location: Gyeonggi Province
- Capacity: 200 MW
- Details: This upcoming project aims to harness solar energy to supply electricity to thousands of households.

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

1. Hanwha Q CELLS
- Website: https://www.q-cells.com
- Services: Manufacturing of photovoltaic (PV) solar cells, modules, and providing complete solar power solutions.
- Major Projects in South Korea: Hanwha Q CELLS has a significant presence in South Korea with numerous projects, including large-scale solar power plants.
2. OCI Solar Power
- Website: OCI Solar Power
- Services: Development, financing, construction, and operation of utility-scale solar power plants.
- Major Projects in South Korea: OCI has been involved in the Gunsan Solar Power Plant, one of the largest solar power plants in South Korea, and other projects aimed at increasing solar power capacity in the country.

3. KACO New Energy (A Siemens Company)
- Website: https://kaco-newenergy.com
- Services: Producing solar inverters, energy storage systems, and providing monitoring solutions.
- Major Projects in South Korea: KACO has supplied inverters for various solar power plants in South Korea, contributing to the nation's renewable energy infrastructure.
4. Shinsung E&G
- Website: http://www.shinsungeng.com
- Services: Manufacturing of solar modules, development of solar power systems, and EPC (Engineering, Procurement, and Construction) services.
- Major Projects in South Korea: Shinsung E&G has been involved in several solar farm projects, such as the 100 MW solar power plant in Haenam and other utility-scale installations.
5. Hyundai Energy Solutions
- Website: http://www.hhi-eco.com
- Services: Production of solar modules, development of solar power systems, and providing EPC services.
- Major Projects in South Korea: Hyundai Energy Solutions has developed numerous solar power projects, including the large-scale solar power plant in Seosan, South Chungcheong Province.
6. Doosan Heavy Industries & Construction
- Website: http://www.doosanheavy.com
- Services: Providing EPC services for solar power plants, manufacturing solar panels, and offering integrated solar solutions.
- Major Projects in South Korea: Doosan has been involved in the development of solar power plants in locations such as Jeju Island and other regions, supporting South Korea's renewable energy goals.
7. OCI Company Ltd.
- Website: http://www.oci.co.kr
- Services: Manufacturing of polysilicon used in solar panels, developing and operating solar power plants.

- Major Projects in South Korea: OCI has significant investments in solar power projects, including the 100 MW Gunsan solar power plant and other initiatives to increase solar energy capacity in South Korea.



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.
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