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Denmark 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 Denmark

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

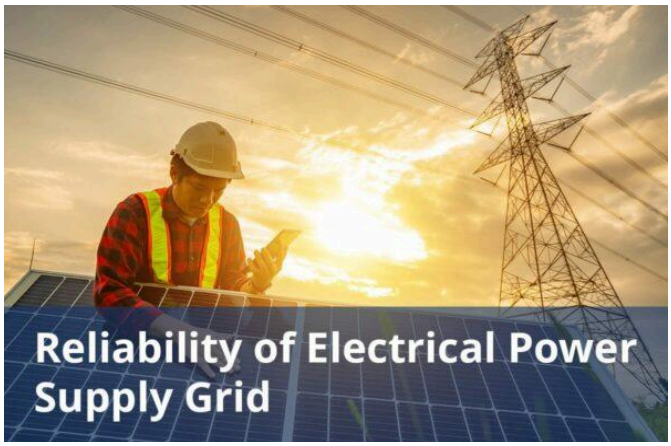
Average yearly sunshine hours:
- In summer months: 300 hours
- In winter months: 150 hours
- Average throughout the year: 2100 hours

kWh per kWp installed

Average kWh produced per kWp per year:
- In optimal conditions: 1200 kWh/kWp
- In suboptimal conditions: 800 kWh/kWp

Average cost per kWh from utility company

Residential Electricity Prices:
- For 0-100 kWh: $0.135/kWh
- For 100-600 kWh: $0.135/kWh
- For 600-1000 kWh: $0.1945/kWh
- For consumption above 1000 kWh: $0.2196/kWh



Reliability of electrical power supply grid

Reliability of solar energy:
- Energy availability: 90%
- Performance ratio: 80%




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total solar panels installed:
- Residential systems: 125000 panels
- Commercial systems: 50000 panels

Total solar panel production capacity (projected)

Projected increase in solar panels:
- By 2030: 300000 panels
- By 2040: 500000 panels

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

Average costs for solar installations:
- Average installation cost per watt: $3.00/W
- Average maintenance cost per year: $100

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

Percentages of electricity generation:
- From solar: 25%
- From wind: 30%
- From fossil fuels: 45%

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

Daily solar energy availability:
- Average energy generation on a sunny day: 5 kWh
- Average energy generation on a cloudy day: 2 kWh

Number of residential solar panel installations

Number of residential solar panels:
- Average number per house: 20 panels
- Total residential installations: 10000

Total number of solar farms (installed and projected)

Number of solar farms:
- Total number in operation: 15 farms
- Average size of each farm: 5 MW

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

Denmark has primarily focused on grid-connected solar systems, but there is growing interest in off-grid solutions, especially in rural and isolated areas.

One example is the off-grid Danish Island of Livø, which was not connected to the mainland grid.

The island has achieved a secure power supply with hybrid solar and wind power systems and aims to reach 100% renewable energy self-sufficiency.

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

Major drivers of solar PV expansion in Denmark have included large utility-scale solar parks.

However, the new grid connection scheme implemented in January 2023 has made solar PV development less attractive for developers, leading to a significant projected decrease in installation rates.

In 2022, approximately 1600 MW of new installations were added, but this fell to around 878 MW in 2023, representing a 45% decrease.

Despite these regulatory changes, growing interest in corporate power purchase agreements (PPAs) may help sustain some level of demand for solar installations.

Looking ahead, Denmark is expected to emerge as a highly attractive and promising solar energy market starting in 2025, with solar power capacity projected to increase from 3140 MW in 2022 to 12646 MW by 2028, driven by ambitious political climate goals and supportive market dynamics.

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

The average monthly salary in Denmark is approximately $6980.

- Solar Engineer: the average monthly salary is approximately $8536.

- Solar Energy Installation Manager: the average monthly salary is approximately $8158.

- Solar Energy Systems Engineer: the average monthly salary is approximately $5500.

- Solar Photovoltaic Installer: the average monthly salary is approximately $3685.

Population of the country

The current population of Denmark is 5982204.

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

Estimate for Factory Rent:

As of 2023, the average annual rent for warehouses was approximately $148.25 per square meter at the national level, compared to $177.90 per square meter in the Copenhagen Region.

Industrial Electricity Rates:

The electricity cost for business users as of December 2023 was approximately 0.243 $/kWh.

This price includes the cost of power, distribution, transmission, and all related taxes and fees.

Water Costs:

The average water tariff for business users is approximately 9.92 $/m3.

This price includes both the drinking water and wastewater components.

Salaries and Wages:

Worker of solar industry in Denmark earn between $3685 and $8536 monthly, depending on the position.

Rent for Office Space:

In 2023, the monthly rent for prime office spaces in Copenhagen was approximately 23.22 $/m2.

Insurance:

The average spending per capita in the non-life insurance market in Denmark is estimated to be $1482 in 2024.

A summary of the energy infrastructure

Denmark has made significant advancements in its energy infrastructure, particularly in the realm of renewable energy, with a commitment to reducing carbon emissions and transitioning to sustainable energy sources.

The country has invested heavily in wind and solar power, making it one of the top countries in Europe for renewable energy usage:

- Wind power accounted for more than half of the renewable energy production in Denmark in 2023.

- Solar power production increased by almost a third from 2022 to 2023.

As of 2022, Denmark ranks third in the EU for solar power capacity per capita, with an impressive 675 watts per capita.

This marks a significant increase from 426 watts per capita in the previous year, showcasing rapid growth in solar installations.

Overall, renewables accounted for 83% of the power mix in 2022.

Denmark has a well-developed electricity transmission system and is enhancing interconnections with neighboring countries like Germany and the Netherlands to meet its renewable energy goals.

Energinet, the Danish transmission system operator, is investing DKK 41 billion from 2023 to 2026 to expand and strengthen the Danish electricity transmission grid.

This includes establishing 3300 km of new underground cables or overhead lines and expanding 70 high-voltage substations to handle more renewable energy from wind and solar.

An additional 100 major expansion and reinvestment projects are planned, with potentially another 100 large-scale projects to follow.

Some of the government regulations surrounding solar panel production

Denmark has established a comprehensive regulatory framework surrounding solar panel production, aimed at promoting the growth of solar energy while addressing concerns from various stakeholders in the market.

The Danish government has developed a new strategy to enhance solar power deployment as part of its green transition.

This strategy focuses on streamlining the legal and administrative processes for solar projects to facilitate faster development and financing.

The strategy identifies five key areas:

- Fast-tracking the green transition.

- Encouraging solar panels in rural areas.

- Promoting solar panels on rooftops.

- Supporting solar installations on public buildings.

- Encouraging small energy cooperatives.

The Danish transmission system operator, Energinet, has established technical regulations for photovoltaic (PV) power plants, particularly those with a capacity above 11 kW.

These regulations outline the technical requirements for connecting solar power systems to the public electricity supply grid.

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

The Danish government is investing $45.35 billion from 2023 to 2026 to expand and strengthen the Danish electricity transmission grid, which is crucial for integrating more renewable energy from wind and solar.

Denmark aims to quadruple its power generation from wind and solar by 2030, requiring a massive grid expansion to handle the new capacity.

The government has set a target of 13 GW of offshore wind capacity by 2030, up from 2.3 GW in 2023, as part of its goal to supply 100% of its power consumption with renewables by 2027.

Historically, solar PV installations in Denmark have relied on various financial support mechanisms, including subsidies and tax incentives.

While these have helped spur initial growth, current policies focus on allowing the market to operate on commercial terms without new subsidies for new installations.

The Danish Energy Agency administers several schemes to promote local acceptance of renewable energy projects, including compensation for property value loss and bonuses for neighbors of renewable energy installations.

Notable solar projects in the country (installed and projected)

Installed Solar Farms:

- Kassø Solar Park (300 MW): Located in Southern Denmark near Kassø, it is currently the largest solar park in Denmark. Owned by European Energy, construction began in 2021 and it was commissioned in July 2022.

- Vandel III Solar Park (155 MW): One of the largest solar parks in Scandinavia, located on the former Vandel airport in Jutland, owned by Infranode and BeGreen. It covers 180 hectares and produces 160000 MWh annually.

- Bur/Gedmose Solar Park (207 MW): Located near Holstebro in West Denmark, owned by Bestseller, was the first subsidy-free solar park in the country when commissioned in October 2021.

Projected Solar Farms:

- Doral Denmark Solar Power Project: 360 MW, expected online by 2025

- Aabenraa Kasso Solar PV Park: 300 MW, located in South Denmark, expected online in 2024

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

European Energy:

- Headquarters: Copenhagen, Denmark

- Website: europeanenergy.com

- Details: A leading company in the development of renewable energy projects, including solar and wind farms.

BeGreen:

- Headquarters: Vejle, Denmark

- Website: begreen.dk

- Details: Focuses on developing and operating solar parks in Denmark.

Obton:

- Headquarters: Copenhagen, Denmark

- Website: obton.com

- Details: An investment partner specializing in solar parks.

Nordic Solar Energy:

- Headquarters: Copenhagen, Denmark

- Website: nordicsolar.eu

- Details: A leading renewable energy company that specializes in developing and managing solar power projects across the Nordic region.

Makeen Energy:

- Headquarters: Aarhus, Denmark

- Website: makeenenergy.com

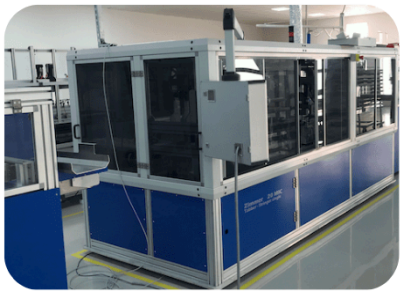
- Details: A global provider of advanced energy solutions, delivering a comprehensive portfolio of technologies and services.

Danish Renewables:

- Headquarters: Lyngby, Denmark

- Website: danishrenewables.com

- Details: Has 16 years of experience in developing wind and solar projects.



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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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