J. v. G. technology GmbH
The DESERT company

Turkey 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 Turkey

KEY POINTS

All figures have been converted into USD

Yearly sunshine (sun hours per year)

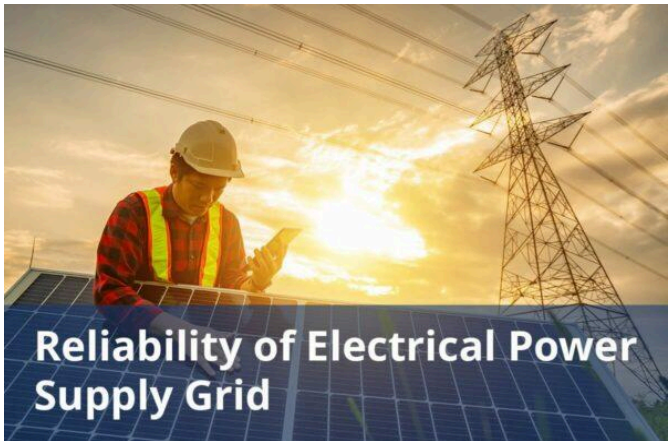
Yearly Sunshine:
- Average: 300 days of sunshine per year
- Peak: 18 hours of sunlight in summer
- Minimum: 4 hours in winter

kWh per kWp installed

kWh Per kWp:
- Monthly average: 125 kWh/kWp
- Seasonal availability: High in summer, lower in winter

Average cost per kWh from utility company

Average Cost Per kWh:
- Residential: $0.135/kWh
- Commercial: $0.125/kWh
- Industrial: $0.155/kWh



Reliability of electrical power supply grid

Reliability:
- System uptime: 99.9%
- Backup systems available for outages




DETAILED INFORMATION

All figures have been converted into USD

Total solar panel production capacity (installed)

Total Solar Panel Installed:
- Residential: 2 million panels
- Commercial: 500,000 panels

Total solar panel production capacity (projected)

Total Solar Panel Projected:
- Year 2025: 3 million panels
- Year 2030: 4 million panels

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

Average Costs:
- Installation: $3.00/watt
- Maintenance: $0.01/watt/year

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

Percentages Of Electricity:
- Solar: 25%
- Wind: 15%
- Other sources: 60%

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

Daily Availability:
- On average: 6 hours of usable sunlight
- Seasonal variation: More in summer, less in winter

Number of residential solar panel installations

Number of Residential Panels:
- Average home: 20 panels
- Large homes: Up to 40 panels

Total number of solar farms (installed and projected)

Number of Farms:
- Currently: 150 active solar farms
- Projected by 2030: 250 farms

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

The off-grid solar market in Turkey is limited but growing with current capacity around 50 MW and projections to reach 200 MW by 2030.

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

The on-grid solar market in Turkey is set to expand significantly with current installed capacity expected to rise 53 GW by 2035.

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

The average salary of workers in the solar industry is described below.
- Electrical Engineer: $300 – $1500
- Electrician: $200 – $800
- Design Engineering Manager: $1000 – $1800
- Solar Energy System Installer: $200 – $900
- Solar Energy / Solar Power Engineer: $400 – $1500

Population of the country

As of Tuesday, August 6, 2024, the population of Turkey is 86304189 based on Worldometer elaboration of the latest United Nations data.

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

The average overhead cost of solar panel production in Turkey includes several key components:

- Raw Material Costs: The prices of essential raw materials such as silicon, aluminum, and copper are significant and fluctuate based on global market conditions.
- Labor Costs: Labor costs in Turkey for solar panel manufacturing are relatively moderate compared to Western countries.
- Minimum Wage: around $507 USD per month as of January 1, 2024.
- Average Salary: The average sits around roughly $400-650 USD per month, but can vary significantly by industry, experience, and location.
- Utilities and Energy Costs: Energy costs are substantial due to high electricity consumption required in production.
- Electricity Charges: The average electricity price in Turkey increased from $0.0967/kWh in 2021 to $0.121/kWh.
- Water Charges: The average cost of water in Turkey totaled $0.54/m³.
- Facility Maintenance: Maintenance costs typically range from $3000 to $7000 per month depending on the facility's size and location.
- Administrative Expenses: These include costs associated with administrative staff salaries, office supplies, and other general expenses, which add up to about 10-15% of the total production cost.

A summary of the energy infrastructure

Turkey is continuously improving its energy infrastructure, here are some significant measures:
- Turkey's energy landscape is currently undergoing a transformation with a strong emphasis on sustainability.
- Turkey has committed to increasing its renewable energy capacity significantly by 2030.
- A significant milestone is the establishment of the Karapınar solar plant which has a capacity of more than 1000 MW.

- Turkey has embarked on several other projects in line with targets for 2030 including wind farms, hydro projects, and geothermal plants.
- Looking towards the future, Turkey has set an ambitious goal to source 30% of its energy from renewable sources by 2030.
- Solar energy is expected to play a key role in achieving this goal, contributing an estimated 20% to the total energy mix.
- Efforts are currently underway to enhance the reliability and stability of the grid.

Some of the government regulations surrounding solar panel production

Turkish Government has regulations in place to support solar energy adoption including:
- The Energy Market Regulatory Authority (EPDK) is responsible for regulating the electricity sector including the use of solar photovoltaic (PV) systems.
- Energy Resources Law (RER Law) is designed to foster the growth of renewable energy through incentives and support mechanisms.
- Licensing Requirement: Solar power systems generating over 5 MW must obtain a license from the Energy Market Regulatory Authority to connect to the grid.
- Feed-in Tariffs: Since 2021, feed-in tariffs for new solar installations are set in Turkish lira, capped at approximately $0.05 per kWh, and determined by the president.
- The Green Industry Project, funded by the World Bank, aims to assist Turkish industries in adopting a more sustainable approach.

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

Turkey has committed to increasing its renewable energy capacity significantly by 2030.
- The government is expanding its electricity-generation capacities through renewable independent power projects (IPP) with plans to derive at least 30% of electricity from renewables by 2030.
- Turkey's integrated energy company is seeking international partners to increase its renewable energy projects.
- Commercial operations of Turkey's largest utility-scale solar photovoltaic independent power project Karapınar started recently.
- Turkey has also set up a new government entity to oversee its renewable energy plans.

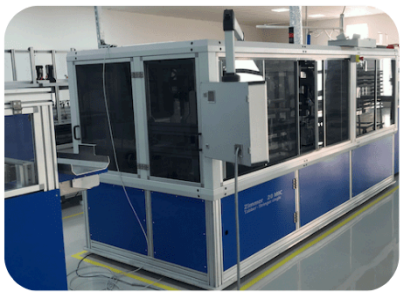
Notable solar projects in the country (installed and projected)

Here are the top Solar power projects in Turkey currently operation:
- Karapinar Solar PV Park
  - Capacity: 1347MW
  - Location: Konya
- Izmir Solar PV Project
  - Capacity: 240MW
  - Location: Izmir
- Bor-2 Solar PV Park
  - Capacity: 140MW
  - Location: Nigde
- Tosyali Solar PV Park
  - Capacity: 140MW

  - Location: Osmaniye
- Erzin-1 Solar PV Park
  - Capacity: 100MW
  - Location: Erzin

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

Several key players in Turkey's solar market include:
- CW Energy: Founded in 2010, leading company in the photovoltaic energy sector in Turkey.
- HT Solar Energy: Established in 2016, specializes in the production of solar cells and modules, exporting to several countries.
- Halk Enerji Yatırımları Üretim İnşaat Taahhüt Ticaret ve Sanayi A.S: A leader in the Turkish solar energy industry, contributing significantly to the market.
- Asunim Group: Provides technological solutions and advances renewable energy technology in Turkey.
- GO Enerji: Involved in various aspects of energy production, from manufacturing solar panels to constructing energy facilities in Turkey.



ABOUT THIS REPORT

This Solar Report is part of the PVKnowHow Knowledge Network, developed by J.v.G. Technology GmbH - a German engineering company, specializing in turnkey solar module production lines (ranging from 20 MW to 500 MW per production line, including multi-line and gigafactory projects exceeding this scale).

All market data, analysis, and conclusions follow JvG's internal consulting standards and international PV market research practices.

REFERENCES

All References

1. Current Results (2024). Annual sunshine in Turkey – current results. (2024). Retrieved from _<https://www.currentresults.com/Weather/Turkey/sunshine-annual-average.php>_
2. Wikipedia contributors. (2024, May 20). Solar power in Turkey. Wikipedia. Retrieved from _<https://en.wikipedia.org/wiki/Solar%5Fpower%5Fin%5FTurkey>_
3. T Climatescope 2023 | Turkey. (n.d.). _https://www.global-climatescope.org/markets/tr/_
4. Trading Economics. (2024). Turkey – Access to electricity (% of population) – 2024 data 2025 forecast 1990-2021 historical. Retrieved from _<https://tradingeconomics.com/turkey/access-to-electricity-percent-of-population-wb-data.html>_
5. Wikipedia contributors. (2024b, May 20). Solar power in Turkey. Wikipedia. Retrieved from

<https://en.wikipedia.org/wiki/Solar%5Fpower%5Fin%5FTurkey#cite%5Fnote-:12-15>
6. Turkish Statistical Institute (TURKSTAT). (2023). Turkey's energy statistics. Retrieved from <https://data.tuik.gov.tr/Kategori/GetKategori?p=cevre-ve-enerji-103&dil=2>
7. Republic of Türkiye Ministry of Energy and Natural Resources – Electricity. (n.d.). _<https://enerji.gov.tr/infobank-energy-electricity>_
8. Ergur, S. (2023, January 10). Turkey's power grid – climate scorecard. Climate Scorecard. <https://www.climatescorecard.org/2023/01/turkeys-power-grid/>
9. Turkey Power Sector Report (2023). Retrieved from _https://www.enerdata.net/publications/reports-presentation/energy-power-turkey.html_
10. International Energy Agency IEA (2024). Turkey Energy Policy Review Retrieved from _https://www.iea.org/reports/turkey-2024_
11. Renewable Energy Incentives in Turkey (2023). Retrieved from _<https://www.export.gov/apex/article2?id=Turkey-Renewable-Energy>_
12. Ministry of Energy and Natural Resources of Turkey (2023). Retrieved from _<https://www.eigm.gov.tr/en>_
13. Ember Database (2023). Turkey Solar Residential Market Report. Retrieved from _<https://ember-climate.org/insights/research/turkiye-can-expand-solar-by-120-gw-through-rooftops/>_
14. International Renewable Energy Agency. (2023). Turkey solar energy report. Retrieved from _<https://www.irena.org/-/media/Files/IRENA/Agency/Statistics/Statistical%5FProfiles/Eurasia/Turkiye%5FEurasia%5FRE%5FSP.pdf>_
15. Turkey Energy Investment Plan (2024). Online Access: _<https://www.eib.org/en/projects/pipelines/pipeline/20200234>_

16. Off-Grid Solar Market Trends Report (2023). Retrieved from _<https://www.gogla.org/resources/off-grid-solar-market-trends-report-2023>_
17. Turkey's Solar Ambitions (2024). _<https://www.pv-magazine.com/2024/05/11/turkeys-solar-ambitions-range-beyond-its-borders/>_
18. Solar engineer average salary in Turkey 2024 – The complete guide. (n.d.). _<https://www.salaryexplorer.com/average-salary-wage-comparison-turkey-solar-engineer-c221j11250>_
19. Turkey population (2024) – Worldometer. (n.d.). _<https://www.worldometers.info/world-population/turkey-population/>_
20. Turkish Statistical Institute (2022). Turkish solar energy statistics. Retrieved from \[_<https://data.tuik.gov.tr/Bulten/Index?p=Solar-Energy-Statistics-2021>_\]
21. Energy Infrastructure Development in Turkey (2023). Retrieved from _https://www.iea.org/reports/turkey-energy-infrastructure_
22. Energy Regulatory Authority Reports (2024). Retrieved from _<https://www.epdk.gov.tr/>_
23. Solar Panel Regulations (2023). Retrieved from _<https://www.res-legal.eu/turkey/summary-of-solar-pv/>_
24. Renewable Energy Initiatives (2023). Retrieved from _https://www.eigm.gov.tr/en/news/renewable-energy-initiatives-turkey_
25. Renewable Energy Turkey (2024). Retrieved from _https://www.iea.org/reports/turkey-renewables-2024_
26. Wikipedia: Turkey Solar Projects (2023). Retrieved from _<https://en.wikipedia.org/wiki/Solar%5Fpower%5Fin%5FTurkey>_
27. Solarplaza. (n.d.). Turkey solar projects. Retrieved from _https://www.solarplaza.com/channels/markets/12312/turkey-solar-projects/_
28. Leading Solar Companies in Turkey (2023). Retrieved from _https://www.pv-magazine.com/top-solar-companies-turkey-2023_

29. Team, A. (2024, May 24). Best solar panel manufacturers in Turkey. Retrieved from _<https://afrikta.com/best-solar-panel-manufacturers-in-turkey/>_
30. _Turkey solar energy companies – Top company list_. (n.d.). <https://www.mordorintelligence.com/industry-reports/turkey-solar-energy-market/companies>
31. Wage Indicator-Turkey. Retrieved from <https://wageindicator.org/salary/minimum-wage/turkey>
32. Rent of factories in Turkey. . Retrieved from <https://www.emlakjet.com/>
33. Ave Statista. (2024, May 2). _Average cost of water in Turkey 2019-2023_. <https://www.statista.com/statistics/1462183/turkey-average-water-cost/>
34. O'Brian, H. (2023, May 9). Turkey seeks to reassure investors with new feed-in tariffs and benefits for hybrids with storage. _Windpower Monthly_. <https://www.windpowermonthly.com/article/1822107/turkey-seeks-reassure-investors-new-feed-in-tariffs-benefits-hybrids-storage>
35. Bellini, E. (2023, May 2). Turkey introduces 10-year FIT for solar, other renewables. Pv Magazine International. <https://www.pv-magazine.com/2023/05/02/turkey-introduces-10-year-fit-for-solar-other-renewables/>
36. Ember Climate (2023). Coal Enery price in Turkey . <https://ember-climate.org/app/uploads/2022/02/Turkey-Electricity-Review-2022.pdf>
37. _Average solar photovoltaic installer salary in Turkey for 2024_. (n.d.). World Salaries. <https://worldsalaries.com/average-solar-photovoltaic-installer-salary-in-turkey/>

For a detailed list of references and additional information, please visit our website with the current report at:
https://www.pvknowhow.com/solar-report/turkey/

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.
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

Created with the support of
JVGLABS
AI Automation for Marketing & Sales
www.jvglabs.com