

17. Türkiye

Overview of solar PV development

At the end of December 2022, total installed power capacity in Türkiye reached 103,809 MW, out of which PV plants accounted for 9,425 MW. The amount of solar PV projects under completion are estimated to be 1-1.5 GW. This capacity can be considered in addition to the installed capacity in 2022. Solar power installed capacity increased by 1,610 MW, compared to the end of 2021. There are 11,427 power generation plants in Türkiye and the number of unlicensed and licensed small power producers (SPPs) reached 9,353 (TEİAŞ, 2022). With solar PV installations exceeding 9 GW in less than 10 years, the PV panel production market has also expanded. There are more than 30 solar module manufacturers in Türkiye which have a total module production capacity of over 12 GW per year. New module manufacturers are expected to add 10 GW of production capacity by the second half of 2023, bringing the total annual production capacity to 22 GW per year. Likewise, production in the sub-industry for module frames, glasses, junction boxes, and cells is also gradually developing. The number of companies operating in the field of solar energy is estimated to be around 1,000, including solar module, construction, cable,

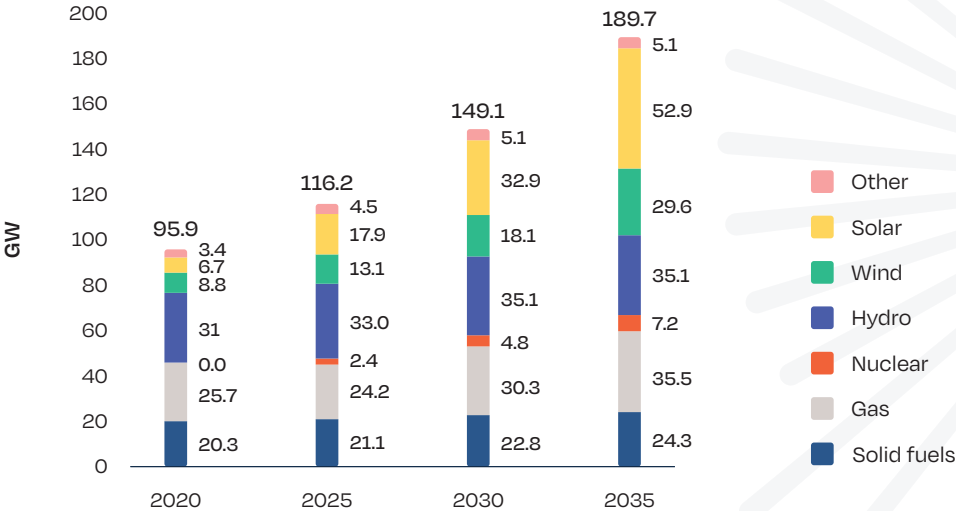
and inverter manufacturers, operation and maintenance companies, smart grid, e-mobility, blockchain applications, energy management and monitoring, energy storage solutions, energy efficiency, and consultancy services, etc. There are more than 250 Engineering, Procurement, and Construction (EPC) companies actively working in Türkiye, excluding the small companies providing services locally. As a consequence of these flourishing developments, the Turkish solar energy sector currently employs over 50,000 people.

National targets for solar PV

The share of variable renewable energy sources, such as solar and wind, in total electricity generation is expected to increase. This is considering Türkiye's current flexibility opportunities, and renewable energy potential. The Ministry of Energy and Natural Resources (ETKB) released the National Energy Plan of Türkiye, which covers the period from 2020 to 2035. According to the plan, the overall installed capacity of electricity will reach 189.7 GW, with solar, wind, and nuclear power projected to rise to 52.9 GW, 29.6 GW, and 7.2 GW respectively (Figure GW17).

74.3% of this installed capacity increase should come from renewable energy sources, most notably solar and wind power. To meet the need for flexibility,

FIGURE GW17 CUMULATIVE INSTALLED SOLAR CAPACITY AND GROWTH SCENARIOS UNTIL 2035, BY GÜNDER



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4 GW-scale markets / continued

battery capacity will reach 7.5 GW, electrolyser capacity will reach 5 GW, and demand-side participation will reach 1.7 GW, according to ETKB.

Drivers for solar growth

The allocation of new capacity for land and rooftop solar systems, along with the adoption of hybrid power plants, electric vehicle charging infrastructure, and storage technologies, has enhanced the installed capacity of solar. Regardless of the amount of wind and solar power capacity that can be put into operation in the upcoming period, it will be important to be able to manage the supply-demand margin, which may be reduced when the capacity factors of wind and solar power plants are low. In this framework, factors that can provide additional flexibility to the electricity system, such as battery storage and new base/flexible capacity, will be assessed from the perspective of energy supply security, the requirements of the electricity grid, costs, the growth rate of electricity demand, status of the generation portfolio, etc, and additional measures will be taken as needed.

Utility-scale vs. distributed & rooftop solar development and plans

The number of applications in the C&I rooftop PV market exceeded 2,000 projects last year, and reached an annually installed capacity of over 1,000 MW. According to the research conducted by industry

stakeholders, there is potential for at least 10 GW to be added in the coming years, specifically for unlicensed installations used for self-consumption purposes for businesses, with suitable roofs such as factories, hotels, and hospitals.

Challenges for the market

On February 6 and 20, 2023, two major earthquakes hit Türkiye. They were unprecedented in recent history in terms of magnitude and coverage, caused major devastation in a total of 11 provinces, and claimed the lives of more than 48,000 people. Over half a million buildings were damaged, and communication and energy infrastructure were hit as well, leading to significant financial losses. There are 45 MW of licensed PV systems, 924 MW of wind power, and 224 MW of biomass and waste heat plants in the earthquake zone. A total of 3.5 TWh per year of power was generated from these power plants, corresponding to 7.5% of the total solar, wind, biomass, and waste heat power generation in Türkiye. Therefore, following the earthquake, it should be the main goal to build habitable, eco-friendly, and sustainable settlements for all, and to install water and sanitation utilities in such settlements, based on the principles of energy efficiency, and protection of water sources and biodiversity.

Outlook for the years 2023-2027

Meeting net-zero emission targets requires a major transformation in all sectors, and a system approach that is different from any previous policy agenda. As a long-term policy proposal, everyone, especially the low-income population, should have access to adequate, safe, inclusive, economically affordable, sustainable, climate-resistant, and energy-efficient housing, with basic infrastructure services. Many R&D projects are realised with support from the main funding agency, the Scientific and Technological Research Council of Türkiye (TUBITAK). METU-GÜNAM is also one of the most comprehensive national research infrastructures, combining and developing technologies in different disciplines including PV cells and modules. Additionally, the GÜNDER Vocational Qualification Centre is testing and following certification activities for employment, aimed at promoting the proper growth of the solar industry. The centre also establishes minimum standards, as well as national and international qualifications, including for installations.

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Rooftop PV project for Çimtaş Çelik (ENKA), 5.7 MW, Bursa, Türkiye.

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