

**THE INTRODUCTION OF SOLAR ENERGY USE BY PRIVATE  
ENTERPRISES IN MODERN UKRAINE**

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The efficient use and supply of energy is a key prerequisite for the sustainable functioning of any modern economy. The spread of alternative energy sources is driven by environmental, economic, and social factors. For Ukraine, following the start of the full-scale invasion in 2022, this issue has become especially critical, as missile attacks have targeted power facilities, disrupting not only infrastructure but also small and medium-sized enterprises (SMEs) whose operations depend on stable

electricity (Slidenko & Herasymenko, 2023). Consequently, businesses are seeking alternative energy sources for both production and self-consumption.

Solar energy in Ukraine remains at an early stage of development but possesses significant potential. The average annual solar insolation ranges from about 1,070 kWh/m<sup>2</sup> in the north to 1,400 kWh/m<sup>2</sup> in the south – values comparable to or exceeding those in some EU countries (Iwaszczuk et al., 2023). Photovoltaic (PV) modules convert solar radiation directly into electricity, and modern markets offer several types – monocrystalline, polycrystalline, and thin-film. Monocrystalline panels are the most efficient, while polycrystalline and thin-film remain popular for their affordability.

From 2018 to 2020, total installed PV capacity in Ukraine increased nearly five-fold. Before the full-scale invasion, the figure reached 6 GW, and by early 2024 it grew to 8.7 GW. Ukrainian investors contributed roughly USD 150 million to the solar sector in 2023 (Ukraine Solar Market Expanded..., 2025). The Solar Energy Association of Ukraine (SEAU) reported that around 800–850 MW of new capacity was added in early 2024, mainly through business and household projects for self-consumption (Sotnyk et al., 2023).

The motivation to adopt solar technologies stems not only from economic benefits but also from environmental responsibility. Ukraine's reliance on fossil fuels results in high greenhouse gas emissions and air pollution. After joining the Paris Climate Agreement in 2015, the country committed to lowering emissions and promoting green technologies across all sectors of society (Trypolska, 2025).

Price competitiveness is another key incentive. According to international analyses, by 2020 solar power became the cheapest source of electricity, with panel prices dropping more than 80 per cent since 2010 (Sotnyk et al., 2023). Solar systems provide production autonomy, reduce dependence on centralized grids, and allow independent management of energy resources, enhancing stability for enterprises (Iwaszczuk et al., 2023).

Legal reforms have also encouraged solar adoption. The introduction of a Green Transition framework now permits companies to sell surplus energy to the grid

rather than using it solely for internal needs. This policy change has enabled entrepreneurs to generate additional income and stimulated further investment in renewable energy (Trypolska, 2025).

As awareness of renewable benefits grows, Ukrainian enterprises are increasingly investing in solar technologies. Recent surveys show that the share of companies financing renewable energy projects tripled within a year, from 6 per cent in 2023 to 20 per cent in 2024 (Sotnyk et al., 2023). Energy storage systems, paired with solar installations, are now seen as vital for operational efficiency and resilience.

Therefore, solar energy has become a strategic instrument for Ukraine's SMEs, strengthening energy security, reducing costs, and promoting environmental sustainability. The expansion of green technologies supports both economic stability and the country's transition toward an independent, climate-neutral energy future.

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