

Ukraine as a Potential Energy Partner

Perspectives for Germany and Europe



How the country is securing its energy infrastructure despite the war and the role it can play for Europe

Ukraine possesses one of the most developed gas networks in the world and significant potential in renewable energy. The Russian invasion has caused massive damage to this infrastructure, while simultaneously highlighting the country's strategic importance for Europe's energy security. For Germany and Europe, this presents an opportunity to establish Ukraine as a long-term energy partner and advance the joint transition to a climate-friendly energy supply.

Energy Infrastructure: Current Situation in Ukraine

Since the outbreak of the war, power plants and electricity transmission lines have repeatedly been targeted by Russian attacks. Particularly critical are strikes on nuclear power plants, which are essential for supplying electricity to households and businesses. Estimates indicate that Ukraine has lost around 50 percent of its electricity generation capacity, affecting especially hydroelectric plants and approximately 95 percent of thermal power plants. The Zaporizhzhia nuclear power plant has supplied almost no electricity since September 2022.

The consequences are massive power outages, especially during winter. Rebuilding the energy infrastructure alone is estimated at approximately USD 50.5 billion (as of May 2024).

At the same time, modernization offers opportunities: Ukraine's grid is planned to increase its throughput from the current 2.48 GWh to 6 GWh by 2032. This would not only secure domestic demand but also enable electricity exports to the European Union—contributing to diversification of European energy supply and reducing dependence on fossil fuel imports.

Energy Policy in Germany – An Accelerated Transition

Even before Russia stopped gas deliveries in August 2022, Germany began rethinking its energy policy. The halt accelerated the shift away from nuclear and fossil fuels. The focus is now increasingly on renewable energy and energy efficiency.

For German companies, energy cooperation with Ukraine opens up opportunities in three core areas:

- **Key technologies:** hydrogen, battery storage, and power-to-X (conversion of electricity into other energy carriers such as hydrogen or synthetic fuels).
- **Integration of renewable energy:** expansion of wind, solar, and biomass projects
- **Smart grids:** for stabilizing and flexibly managing energy supply.

Platforms and Initiatives for Investment

The Ukrainian energy sector presents multiple investment opportunities. Rebuilding energy infrastructure addresses not only immediate crisis needs but also lays the foundation for long-term sector transformation and closer integration with the European market. Several initiatives already promote cooperation in the energy sector:

- The **Ukraine Energy Support Fund** provides resources for repairs, spare parts, and rebuilding critical energy facilities. Germany supports the fund with over EUR 231 million.
- The **German-Ukrainian Energy Partnership** provides a platform for decentralizing Ukraine's energy system. Its focus areas include accelerating the energy transition, decarbonization, emergency support in the energy sector, and integration into the European transmission network.

Ukraine’s Energy Potential

An analysis of Ukraine’s energy profile highlights why the country can make a significant contribution to European energy security:

- **Natural Gas:** Ukraine’s reserves are estimated at more than one trillion cubic meters, exceeded in Europe only by Norway. Historically underdeveloped due to reliance on Russian gas, domestic production has gained strategic importance since the war. Investments in extraction and infrastructure carry risks but offer significant potential.
- **Coal:** Reserves amount to approximately 34 billion tons, the second largest in Europe. Much of this lies in Russian-annexed or heavily contested areas. At the same time, Ukraine aims to reduce greenhouse gas emissions by 65 percent from 1990 levels by 2030 and to close all coal-fired power plants by 2035.
- **Uranium:** Ukraine operates four uranium mines, which have been expanded in recent years. The goal is to meet domestic demand fully from local production by 2035, representing around 2 percent of global uranium output. In the future, fuel rods and thorium resources are also expected to be developed, the latter as an alternative fuel for future nuclear power plants.

- **Biomass:** Biomass is primarily produced from agricultural waste. By 2029, over four terawatt-hours of electricity are expected from biomass. Biometane is particularly promising, potentially covering one third of the population by 2030.

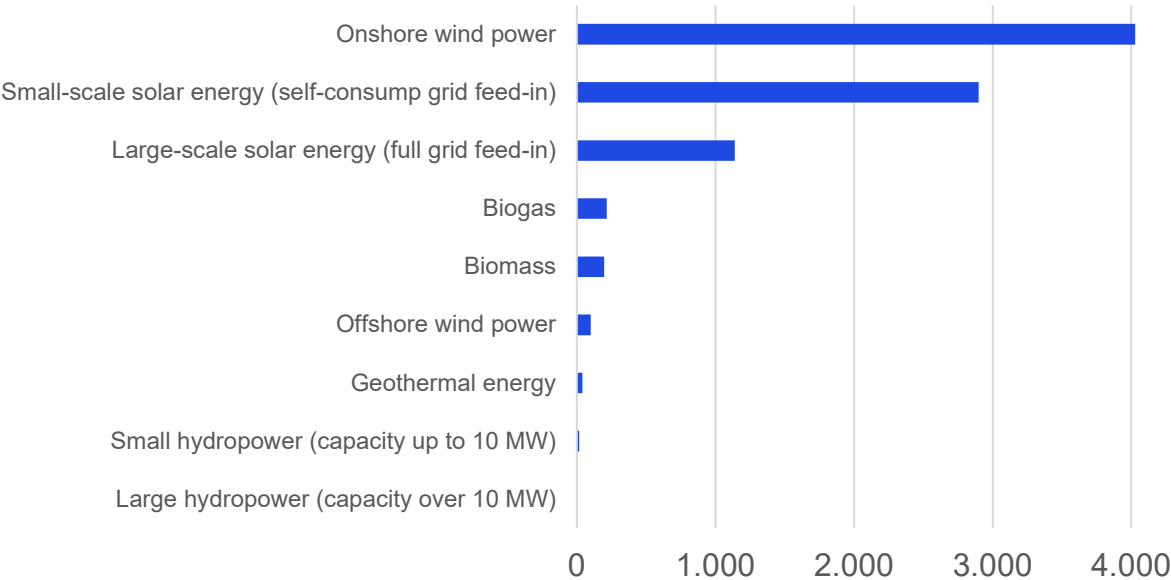
Renewable Energy – Ukraine’s Greatest Strength:

The country has substantial potential in solar, wind, hydro, and biomass energy. The technical potential of solar and onshore wind energy is two to four times domestic demand. Currently, only part of this potential is usable due to the war, but long-term expansion prospects remain significant. The planned expansion of renewables under the 2050 energy strategy aims not only to meet domestic demand but also to export renewable electricity to the EU.

Green Hydrogen and Its Strategic Importance

A key element of the energy strategy is green hydrogen. Ukraine offers ideal conditions for cost-effective production, with technical potential estimated at 18 to 38 million tons annually, of which at least 7.2 million tons are expected to be realized by 2050. Existing gas infrastructure can also be used for hydrogen: up to 33 million tons could be transported annually to the EU. Storage facilities near the border have a capacity of 1.2 million tons. Investment costs for hydrogen production are estimated at USD 85–90 billion, exceeding the cost of rebuilding the entire energy sector.

Planned expansion of renewable energy in Ukraine
(Increase in capacity between 2025 and 2030, in megawatts)



Source: Nationaler Plan für Erneuerbare Energien der Ukraine bis 2030

For Germany, this offers the possibility to cover a significant portion of its import needs with Ukrainian hydrogen.

European Integration

Since January 2024, Ukraine is a full member of the European Network of Transmission System Operators for Electricity (ENTSO-E), completing technical integration of the Ukrainian grid with Europe. Simultaneously, the European Hydrogen Backbone (EHB) is expanding infrastructure for hydrogen imports. Ukraine is expected to play a key role in supplying large volumes of green hydrogen to Europe, particularly to Germany.

Conclusion: Ukraine as an Investment Target

Ukraine is not yet a strategic energy source for Germany, but the foundations have been laid. German companies can explore a wide range of investment opportunities from grid modernization and decentralized supply systems to hydrogen and renewable energy projects. In the long term, Ukraine could become a reliable partner, sustainably enhancing Germany's and Europe's energy security.

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