

Ukraine energy storage market analysis

Photo: Oleksandr Gimanol/AFP/Getty Images

Brief by Ben Cahill and Leslie Palti-Guzman

The aim of the bipartisan and international CSIS Ukraine Economic Reconstruction Commission is to produce a policy framework that will help attract private sector investments to support Ukraine's future economic reconstruction. To support the commission, CSIS will convene a series of working groups to examine a range of issue-specific areas that are critical for reconstructing and modernization of the Ukrainian economy, including in agriculture, energy, and transportation and logistics, as well as addressing the impact of corruption on private sector investment.

In a postwar period, Ukraine will gravitate toward the European Union and its energy system. As Ukraine rebuilds and adapts to a new geopolitical reality, achieving energy security will be instrumental to put the country back on its feet, and Ukraine will require assistance from international donors. To facilitate the financing of new energy infrastructure, Kyiv will position its gas resources and infrastructure as a potential asset for Europe's energy security and energy transition.

This brief examines the role of natural gas in Ukraine's energy future. It begins with an overview of gas in the country's energy system and economy. The brief then outlines the importance of natural gas infrastructure among other reconstruction priorities and examines the role of Ukraine's gas resources and infrastructure in a lower-carbon Europe.

Ukraine has a diverse set of energy sources, with nuclear energy playing a prominent role (see Figure 1). Fossil fuels remain Ukraine's largest source of primary energy, with coal and natural gas accounting for the largest shares. Due to its substantial hydrocarbon resources and its nuclear energy industry, Ukraine was able to meet about two-thirds of its energy needs through domestic production before Russia began its unprovoked war in February 2022.

Before the war, nuclear energy typically provided more than half of Ukraine's electricity generation. The generation mix has fluctuated as Ukraine copes with extensive, targeted Russian attacks on its energy infrastructure that have knocked out some 50 percent of the country's generation capacity. Ukraine's Zaporizhzhia nuclear power plant is now offline, with all six of its reactors in shutdown mode, as the facility remains occupied by Russian troops and at risk of shelling and damage.

Renewable energy (including wind, solar, hydro, and biomass) grew from under 2 percent of Ukraine's generation capacity to around 11 percent by 2020. In 2021, Ukraine set a target to expand the share of renewables to 25 percent of total generation capacity by 2035. Various factors will make it hard to reach these

targets, but renewable energy deployment will be a key priority in postwar reconstruction efforts.

Natural gas plays a relatively small role in power generation. Natural gas makes up only 7 percent of Ukraine's electricity generation, but this share could grow after 2030 to back up intermittent renewable energy and offset the shrinking share of coal generation. Energy efficiency will be a key area of focus postwar to reduce gas consumption in residential use.

By contrast, gas plays a critical role in household and district heating. About 80 percent of Ukrainian households rely on centralized gas supply and more than half use centralized water supplies that are heated by gas. Households, district heating for household and non-household use, and industry account for roughly equal shares of Ukraine's gas consumption (see Figure 4). This widespread reliance on gas for heating creates vulnerabilities. Attacks on natural gas infrastructure such as pipelines could create a humanitarian risk in the cold winter months.

Ukraine is one of the largest gas resource holders in Europe, with 38.5 trillion cubic feet (tcf) in proven reserves as of the end of 2020. Its gas reserves, according to BP's Statistical Review of World Energy, grew by an annual average of 3.9 percent between 2009 and 2019, compared with reserve declines in most of Europe. Domestic gas resources have been sufficient to meet about 70 percent of Ukraine's gas demand in recent years.

State-owned gas company Naftogaz has historically dominated the domestic gas sector. Since 2016, it has typically accounted for about 70 percent of Ukraine's gas production. In 2022 its subsidiary UkrGasVydobuvannya produced 13.7 billion cubic meters (bcm), alongside 5 bcm from private companies and 1.1 bcm from Ukrnafta. Naftogaz is Ukraine's largest company and employs more than 50,000 people. In the first half of 2022, it provided 53.5 billion hryvnia (US\$1.8 billion) to the state budget in royalties, income tax, and other taxes--equivalent to 20 percent of the state budget.

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Web: <https://kary.com.pl/contact-us/>

Email: energystorage2000@gmail.com

WhatsApp: 8613816583346

