1 Context of the market study and introductory remarks

Russia's unprovoked large-scale invasion in 2022 has affected all aspects of life in Ukraine. It has had a devastating effect on the economy and society. Targeted attacks on energy infrastructure have resulted in extensive damage, but Ukraine has managed to maintain a functioning electricity system. It has also succeeded in achieving closer integration with the EU electricity system. The resilience of Ukraine's electricity sector demonstrates its potential. When the war ends, it will face challenges linked to becoming more efficient and more competitive. This report aims to facilitate the sector's success in undergoing that transition.

Since the introduction of martial law on 24 February 2022, Ukraine's electricity sector has operated under special regulatory arrangements. The pre-war market model has remained largely in place but with significant adjustments. The Ministry of Energy has been granted extensive decision-making powers over the operations of companies in the sector. As of the beginning of 2023, attacks on Ukrainian infrastructure continue. The electricity sector has been a major target of attacks and has suffered immense damage. Under these adverse conditions, it has also proven its resilience.

Emergency measures to deal with the immediate effects of the war are not the focus of this study. These are vital to keep the power system functioning under extraordinary circumstances but are of a temporary nature and of lesser relevance to the longer-term development of the electricity sector. The expectation is that Ukraine's post-war regulatory system for the electricity sector will closely resemble the pre-war system described in this study. Market studies normally rely on extensive factual input from market participants, and on their views on the state of competition. For this study, the collection of information from market participants has been severely restricted by the war. Replies to an extensive questionnaire received shortly before Russia's war of aggression could not be verified and may be outdated, reducing their utility. Market participants and public authorities have been under immense pressure, given their responsibility to keep the electricity system intact. Contact with stakeholders has been limited since the start of the war, and circumstances have not permitted in-depth discussions or the distribution of additional questionnaires.

Further, martial law has led to the imposition of restrictions on the publishing and sharing of information on sensitive parts of Ukraine's economy, including the electricity sector. Even in absence of such restrictions, the impact of the war cannot be assessed at a granular level due to the dramatic and ongoing damage it has caused. As a result, the study has had to rely largely on publicly available information, some of which is not fully up to date. Inevitably, this has some negative implications for the robustness of the analysis. Nevertheless, the study should give an adequate description of the main features of Ukraine's electricity sector and the framework within which it operates.

The aim of this competition market study is to identify potential competition issues in the electricity sector and to provide recommendations to make the sector more competitive. These recommendations will provide a basis for measures by which Ukrainian authorities can overcome obstacles to effective competition, allowing Ukraine to reap fully the rewards of a liberalised electricity sector.

Most changes in the electricity sector during the war have been driven by factors beyond competition, and are mostly of a temporary nature, but some developments are noteworthy.

As a direct consequence of the war, electricity demand in Ukraine has dropped by around one-third. Business and industrial consumption has fallen due to sharply reduced economic activity, and demand by households has declined as almost 8.2 million people have been forced to flee the country (UNHCR, 2023[1]).

Initially, lower demand led to significant price declines in short-term wholesale markets, threatening electricity producers' financial viability. This prompted the introduction of price floors. Later, prices recovered as generation capacity became increasingly constrained due to physical damage to power plants and the network.

In March 2022, the Cabinet of Ministers of Ukraine introduced a moratorium on disconnecting households from electricity supply and other utility services due to non-payment of electricity bills.[1] The moratorium also applies to non-households in militarily active areas and in occupied territories.

In addition, in the event of termination of the supply of electricity by the previous supplier, consumers whose original suppliers have been designated "default market participants" or which lose supply licences have been transferred to one of the country's universal service suppliers.[2] This ensures that consumers are not left without electricity in the event of termination of their contract by the previous supplier.

Another major development with the potential to transform Ukraine's electricity sector has been its synchronisation with the Continental European Transmission System. Synchronisation ensures that electricity networks function at the same frequency. It increases the stability of connected networks and allows deeper integration of electricity markets. Ukraine has been seeking to synchronise its electricity network with the European system since the 1990s. The Burshtyn Energy Island (BEI), a small part of Ukraine's power system that accounts for around 4% of total production and consumption, has been synchronised with the European system since 1 July 2003. Ukraine applied for synchronisation of its entire system in 2006 (Ukrenergo, 2023[2]). In an emergency procedure, the Ukrainian power system was synchronised with the Continental European Power System on 16 March 2022 (ENTSO-E, 2022[3]). At the same time, the two separate Ukrainian power trade zones, the BEI and the Integrated Power System (IPS), were merged so that Ukraine now has a single power trade zone.

Box 1.1. Damage to Ukraine's electricity infrastructure

The Kyiv School of Economics estimates that Ukraine's infrastructure had suffered USD 137.8 billion (at replacement cost) of documented damage as of December 2022, including USD 6.8 billion of damage to energy infrastructure. As information about the country's temporarily occupied territories is scarce, the actual figure is likely higher.

Ukraine's electricity infrastructure suffered considerable damage during the first weeks and months of Russia's war of aggression. During aerial bombing on 3 March 2022, seven thermal and hydro power plants sustained damage, and the Okhtyrka combined heat and power (CHP) plant was destroyed. Three more CHP plants, sited respectively in Kremenchuk, Chernihiv and Severodonetsk, were substantially damaged. Russian troops also targeted and damaged more than 50 parts of the electricity grids in regions including Kyiv, Chernihiv, Sumy, Mykolaiv, Kharkiv and Kherson. At the time of writing, the Zaporizhzhia nuclear power plant, which provides around 25% of Ukraine's electricity, remains occupied by Russian troops.

Most of Ukraine's solar and wind power plants are located in areas in which intense military action has taken place. Around 60% of installed solar power capacity and 38 of the country's 42 windfarms are in the region between Odesa and Luhansk. By May 2022, the estimated insured losses from windfarms had reached at least USD 800 million.

On 10 October 2022, Russian forces intensified targeted attacks on energy infrastructure. On that day, 30% of Ukraine's energy infrastructure was damaged, leading to emergency power outages all over the country.

The heaviest shelling of Ukraine's energy system since the beginning of the war took place on 15 November 2022, when Russian forces fired 100 missiles at critical infrastructure facilities. By that time, around 50% of Ukraine's energy infrastructure had already been destroyed.

As attacks continued, electricity outages became more widespread and prolonged. Prime Minister Denys Shmyhal stated that as of 23 November 2022, "there is not a single thermal [or] hydroelectric power plant in Ukraine that has not been fired upon by the enemy". Despite the multiple adversities, a total system failure was prevented thanks to the determined efforts of repair crews from Ukrenergo (the Transmission System Operator) and other electricity companies.

By end of December 2022, Ukraine's international partners had committed support worth almost USD 1.5 billion to the country's energy sector, including equipment for repairs, according to a statement made by the prime minister. Since Russian forces have frequently attacked high-voltage transformer substations to cut off power plants from consumers, transformers are one of the most needed types of equipment.

Despite constant repairs, significant shortages of electricity have necessitated the introduction of consumption limits in all parts of Ukraine. Planned stabilisation schedules for shutdowns are in use, but

the risk of emergency shutdowns remains high. For example, cold weather on 10 January 2023 led to significantly increased electricity consumption, which prompted an emergency power shutdown in some parts of the country.

Sources: Kyiv School of Economics (2023[4]), The total amount of damage caused to Ukraine's infrastructure due to the war has increased to almost USD 138, https://kse.ua/about-the-school/news/the-total-amount-of-damage-caused-to-ukraine-s-infrastructure-due-to-the-war-has-increased-to-almost-138-billion/; Pryshlyak (2022[5]), The occupiers have already damaged about 50% of the Ukrainian energy infrastructure – Zelenskyi, https://www.unian.ua/economics/energetics/okupanti-poshkodili-vzhe-blizko-50-ukrajinskoji-energetichnoji-infrastrukturi-zelenskiy-12050670.html; Kovalenko (2022[6]), More than 8 000 generators are brought to Ukraine every day – Shmyhal – UNIAN, https://www.unian.ua/economics/energetics/shchodnya-v-ukrajinu-zavozyat-ponad-8-tisyach-generatoriv-shmigal-12051636.html; Sayenko (2022[7]), Ukrenergo told how Ukraine's energy system survived yesterday's attack, https://www.unian.ua/economics/energetics/v-ukrenergo-rozpovili-yak-energosistema-ukrajini-perezhila-vchorashnyu-ataku-12081552.html; Albul (2023[8]), Electricity capacity shortage has increased in Ukraine, https://lb.ua/society/2023/01October 542048_ukraini_zris_defitsit_potuzhnosti.html; Global Reinsurance (Global Reinsurance, 2022[9]), Renewables face billions of dollars in Ukraine losses – PCS, https://www.globalreinsurance.com/home/renewables-face-billions-of-dollars-in-ukraine-losses-pcs/1441292.article; (Korogodskyi, 2022[10]), Almost USD 1.5 billion: Shmygal talked about international aid to Ukraine in the energy sector, https://lb.ua/economics/2022/12/25/540343_mayzhe_15_mlrd_shmigal_rozpoviv_pro.html.

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Notes

[1] CMU Resolution No. 206, "Some issues of payment of housing and communal services during martial law", 5 March 2022, https://zakon.rada.gov.ua/laws/show/206-2022-%D0%BF#Text.

[2] Order of Ministry of Energy No.148, "On the settlement of issues related to the supply of electricity to consumers and settlements between participants of the retail electricity market during the period of martial law in Ukraine", 13 April 2022, https://zakon.rada.gov.ua/laws/show/z0441-22#Text.