

Shortages looming: How the annexation of Ukraine's oblasts affects electricity generation

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The Russian-occupied part of Ukraine contains about 25% (about 15.5 GW) of the country's installed power plant capacity. Of particular significance are: the Zaporizhia Nuclear Power Plant (ZNPP) – the largest facility of its kind in Europe (6 GW of installed capacity) – and the Zaporizhia Thermal Power Plant (ZTPP; 3.6 GW). Although there are three other nuclear power plants in Ukraine, the ZNPP accounted for 43.5% of the country's total reactor capacity. The last of its units was shut down on 11 September for safety reasons (due to repeated shelling) and the ZTPP stopped operating as early as May due to a shortage of coal. There are also numerous other power plants in the Russian military-controlled territories of Ukraine, including the Luhansk Thermal Power Plant (1.45 GW), the Kachivska Hydroelectric Power Plant (335 MW) and three wind power plants owned by DTEK: Botievska, Orlivska and Prymorska (with a total capacity of 500 MW). In addition, on the front line is the Vuhlehirsk Combined Heat and Power Plant (3.6 GW), located in the Donetsk region.

Commentary

- Loss of control over power plants could lead to severe power shortages. Despite the reduction in economic activity caused by Russian aggression, electricity consumption in Ukraine is currently only about 35% lower than in the same period before the war, and in the coming weeks the heating season will begin and demand for electricity will increase dramatically. The situation may be further aggravated by a possible gas deficit (Ukraine has accumulated about 14 billion cubic metres, one of the lowest ever), when consumers start using electric heaters for room heating on a large scale. In addition, the number of conventional power plant units in need of emergency overhaul is growing rapidly – twice as many of them are now scheduled to fail as in the same period in 2021, which could further reduce electricity production. Thus, with Russia's continued threat of missile fire on energy infrastructure, the risk of a power shortage in Ukraine will increase during the autumn and winter months.
- With possible electricity shortages, there is a risk that electricity exports to the EU and Moldova will be interrupted. Since March, Ukraine's grids have been connected to the Continental Europe Synchronous Area (CESA), and on 30 June Ukraine began making energy deliveries initially to Romania and later to Slovakia, while exports to Poland are expected to begin in October. As of 25 September, revenues from the sale amounted to €4.4 billion (about \$120 million); the government estimates that Ukraine's export

potential is 2.5 GW, which would generate revenues of €70 billion per year (about \$2 billion). While the money gained from exports is very important for Kyiv (especially against the backdrop of problems with balancing the budget), the priority will be to meet the needs of the domestic market.

- It is unclear what further plans Russia has for the ZNPP. Ukrainian personnel continue to work there, but representatives of Russia's Rosatom corporation are also present, allegedly in an "advisory" role. The facility remains connected to the Ukrainian network, making it difficult to connect it quickly to the Russian one, which operates on a different frequency. At the moment, it is difficult to assess whether the ZNPP will be integrated into Rosatom's structure, or whether there are plans to create another company to operate it.
- Economically – unlike in the electricity production sector – the areas occupied by Russia were relatively insignificant. Prior to the invasion of 24 February, the Ukrainian-controlled portion of Luhansk Oblast generated 1% of total GDP, and Kherson Oblast generated 1.6% of GDP. Zaporizhzhia Oblast was more important (4.4% of GDP); whose capital and main industrial centre remains under Kyiv's control. By 2022, the Donetsk region accounted for 5.6% of the country's GDP, but parts of it (including Kramatorsk and Sloviansk) are also not occupied.