

The impact of the Russian attacks on the Ukrainian energy sector

November 2022

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This report is published as part of a research project financed by the Leviatan company.



The impact of the Russian attacks on the Ukrainian energy sector

Russia has launched extensive missile and drone strikes on Ukraine's critical infrastructure, especially energy, since 10 October. The study conducted by New Strategy Center experts examines the impact of this campaign on Ukraine's energy potential - now that winter is approaching - the multiplying effect of these bombing campaigns, and Russia's objectives. At the same time, our paper also highlights the related effects on the Republic of Moldova, a country particularly affected by the energy crisis orchestrated by Russia.

I. Ukrainian energy sector capacities

Ukraine has tremendous energy potential, even in the current war with Russia. Ukraine's energy capacities before the Russian invasion that began on 24 February 2022 were able to cover both the needs of the domestic market and export electricity outside the country. According to data published by the Ministry of Energy in Kyiv, the Ukrainian power system produced a total of 156 575.7 GWh in 2021. 55.1% was produced by the four nuclear power plants: the Zaporozhye nuclear power plant, the Pivdennukraine nuclear power plant, the Rivne nuclear power plant, and the Hmel'nitsk nuclear power plant. 23.8% (37224.9 GWh) was produced by thermal power plants. There are also three thermal power plants in Ukraine, which produced 5.5% (8609.1 GWh) of total consumption. Seven hydropower plants produced 5.8% (9155.4 GWh). Storage hydro produced around 0.8% (1290.4 GWh). Alternative sources such as wind and solar produced 8% (12519.7 GWh) and generators - 1% (1570.8 GWh).¹

The production capacity of renewable energy has significantly reduced as a result of the war. According to Ukrainian Energy Minister Gherman Galuschenko, Ukraine has lost about 90% of its installed wind power and 40-50% of its solar power, as installations are either on temporarily occupied territory or have been destroyed. The Zaporozhye plant, Europe's largest, was seized by the Russians in the first weeks of the war but is still staffed by Ukrainian personnel. According to the report for 2021, the plant produced 35457.5 GWh, accounting for 22.6% of Ukraine's total energy output.² The stability of the entire Ukrainian energy sector depends on the operational status and availability of Ukrainian nuclear power plants. Due to its size, the Zaporozhye nuclear power plant is the most important component of this nuclear chain, supplying electricity to the Zaporozhye, Mykolaiv, Kherson, and Odessa Oblasts. Located only 200 km from Crimea, the Zaporozhye plant has thus become a focal point for Russia, due to its vast energy potential.³ On the 3rd of October, the Energodar authorities announced that they had begun integrating the nuclear power plant under the jurisdiction of the Russian nuclear power plant operator Rosenergoatom.⁴

¹Report on the activity of electricity companies for 2021, link:

http://web.archive.org/web/20220117105306/http://mpe.kmu.gov.ua/minugol/control/uk/publish/article?art_id=245619746&cat_id=245183225

² Galushchenko. New Fukushima. Nuclear power plant terror, link: https://www.youtube.com/watch?v=jWC_keQAtyM

³ Problems of integrating the nuclear power plant under the jurisdiction of the Russian operator. Novaya Gazeta, link: https://www.ng.ru/ng_energija/2022-11-07/15_8583_problem.html

⁴ The Zaporozhye authorities have started to integrate the nuclear power plant under the jurisdiction of the Russian nuclear power plant operator Rosenergoatom. Vedmosti, link: <https://www.vedmosti.ru/politics/news/2022/11/02/948506-zaporozhskoi-oblasti-perehoda-zaes-pod-yurisdiksiyu-rosenergoatoma>

Ukraine's connection to the European ENTSO-E electricity system this year, following its disconnection from the Russian system, was done to assist Ukraine in keeping its infrastructure operational during the war. The effect on the ground beat all initial expectations: due to the drop in national demand, Ukraine has become a net exporter of energy to Europe.⁵

Ukraine has the third largest estimated gas reserves on the European continent, after Russia and Norway.⁶ It inherited an impressive energy infrastructure from the Soviet Union, as Ukraine was always the most important access point for Russian gas to Europe, notably through the "Druzhba" pipeline. After the fall of the Soviet Union, Ukraine maintained close ties with Russia in the energy market, receiving gas at below-market prices for a long time. This arrangement, with a strong political undercurrent, lasted until 2004, when the first pro-European demonstrations began in Ukraine, culminating in the "Orange Revolution".⁷ The first gas disagreement between the two neighbours took place in early 2009, signalling the impending demise of the so-called "obedience bonus". After 2014, following the annexation of Crimea and the war in Donbas, Ukraine gradually managed to decouple from Russian gas imports.⁸ Ukraine has significant energy potential, both in terms of energy supply and storage. For example, if Ukraine's entire energy storage infrastructure were operational, it could add another third of the European Union's (EU) current storage capacity of 100 billion cubic metres (bcm).⁹

In this context, Russia's actions to undermine Ukraine's strategic relevance as a transit country should be mentioned. The most noticeable actions in this regard are the construction of the Nord Stream 1 and 2 and TurkStream gas pipelines. Thus, the two routes, which were operational or, at the very least, in the project stage long before the invasion, bypass Ukraine as a transit country by using the Baltic Sea, the Black Sea, and the Balkans respectively. Thus, Russia's reasons for building Nord Stream 2 and increasing cooperation with Turkey are primarily political in nature, with the aim of destroying the transit monopoly of Eastern European countries, which provides those countries with considerable income. By combining the capacities of Nord Stream 1 and 2 with TurkStream, Russia would, in theory, have a capacity of 205.9 bcm of gas that bypasses Ukraine.¹⁰ At the moment, in the context of Russia's invasion of Ukraine, Vladimir Putin has been promoting to European countries the idea of delivering gas again via Nord Stream and TurkStream to avoid any energy crisis this winter. Of course, this, Putin said, is entirely up to Europe¹¹, but accepting these conditions would implicitly mean a diplomatic and economic abandonment of Ukraine and an acceptance of Russian aggression.

Meanwhile, Russia is largely stuck with the TurkStream variant, as the Nord Stream 1 and 2 pipelines have been damaged by an underwater explosion in the Baltic Sea. Although the results of the investigation have not yet been revealed, authorities in the area say the damage was caused by a deliberate act, which is why countries such as Germany, Sweden, Denmark, and

⁵ Timchenko, Maxim. "Ukraine is ready to support the reinvention of European energy security". Euractiv, link: <https://www.euractiv.com/section/energy/opinion/ukraine-is-ready-to-support-the-reinvention-of-european-energy-security/>

⁶ Ibid.

⁷ Di Fraia, Paola. "The Ukrainian conflict and the long story of energy pipelines". Aspenia Online, link: <https://aspeniaonline.it/the-ukrainian-conflict-and-the-long-story-of-energy-pipelines/>

⁸ Ukraine has stopped importing gas from Russia. Ukurier, link <https://ukurier.gov.ua/uk/news/ukrayina-vidmovilasya-vid-rosijskogo-gazu/>

⁹ Amelin, Anatoliy. Andrian Prokip, Andreas Umland. "The Forgotten Potential of Ukraine's Energy Reserves". Harvard International Review. 2020, link: <https://hir.harvard.edu/ukraine-energy-reserves/>

¹⁰ Günther, Maik. "Gas flows and gas prices in europe: what is the impact of Nord Stream 2?". Ilmenauer Beiträge zur Wirtschaftsinformatik (2019), p. 2.

¹¹ "Ukraine war: Putin tells Europe he's 'ready' to resume gas supplies". Euronews, link: <https://www.euronews.com/2022/10/12/president-putin-tells-europe-hes-ready-to-resume-gas-supplies>

Norway have stepped up coastal monitoring.¹² It is still difficult to prove the level of Russian involvement in the incident, but it should not be overlooked that Russia has unique European deep-sea subversive capabilities grouped under the Russian Naval Forces' Main Directorate of Deep Sea Research, based in Olenya Guba Bay on the Kola Peninsula.¹³

With Ukraine engaged in an armed conflict with Russia, we need to look less at Ukraine's hypothetical potential and more at its current capabilities. Although Ukraine's energy infrastructure is still largely functional and has a variety of energy sources, from gas to coal, the problem is that the areas with the largest energy reserves are directly in or near the conflict zone. Thus, as Fig. 1 shows, the most relevant areas for gas production and extraction are in Kharkiv (currently a warzone) and Poltava regions, in proximity to the conflict. Ukraine also has significant coal resources, but these are largely no longer in the possession of the Ukrainian authorities. Coal is mainly found in Donetsk and Luhansk, which have been under separatist control since 2015, with many mines affected by shelling.¹⁴ This has been and is a problem for Ukraine, as most Ukrainian thermal power plants operate predominantly on coal.¹⁵

In terms of electricity generation, before the war 45% of energy was provided by fossil fuels and 50% by nuclear power plants.¹⁶ At the moment, Ukraine's main nuclear power plant, Zaporozhye, which accounts for half of the electricity produced by nuclear power plants and a fifth of the total electricity produced in Ukraine, is under the control of the Russian military and no longer produces electricity for Ukraine.¹⁷ Thus, a large part of Ukraine's energy production is affected, which also affects the country's export capacity. There is also the continuing danger of a nuclear accident, with tragic regional and European consequences, given that the plant has not been fired upon once.

¹² "The German Navy participates in monitoring off the coast of Norway". Deutsche Welle, link: <https://www.dw.com/ru/voennomorskie-sily-germanii-ucastvuut-v-monitoringe-u-pobereza-norvegii/a-63635103>

¹³ "Russian Threat To Undersea Cables & Pipelines Explained", link: https://www.youtube.com/watch?v=2H_tFKT9EXU

¹⁴ "Ukraine energy profile". International Energy Agency. 2020, p. 15, link: <https://iea.blob.core.windows.net/assets/ac51678f-5069-4495-9551-87040cb0c99d/UkraineEnergyProfile.pdf>

¹⁵ Ibid, p. 18.

¹⁶ "Ukraine Electricity". Worldometers, link: <https://www.worldometers.info/electricity/ukraine-electricity/>

¹⁷ "Mapping Ukraine's Zaporizhzhia nuclear power plant". Al Jazeera, link: <https://www.aljazeera.com/news/2022/9/4/infographic-ukraines-zaporizhzhia-nuclear-power-plant>

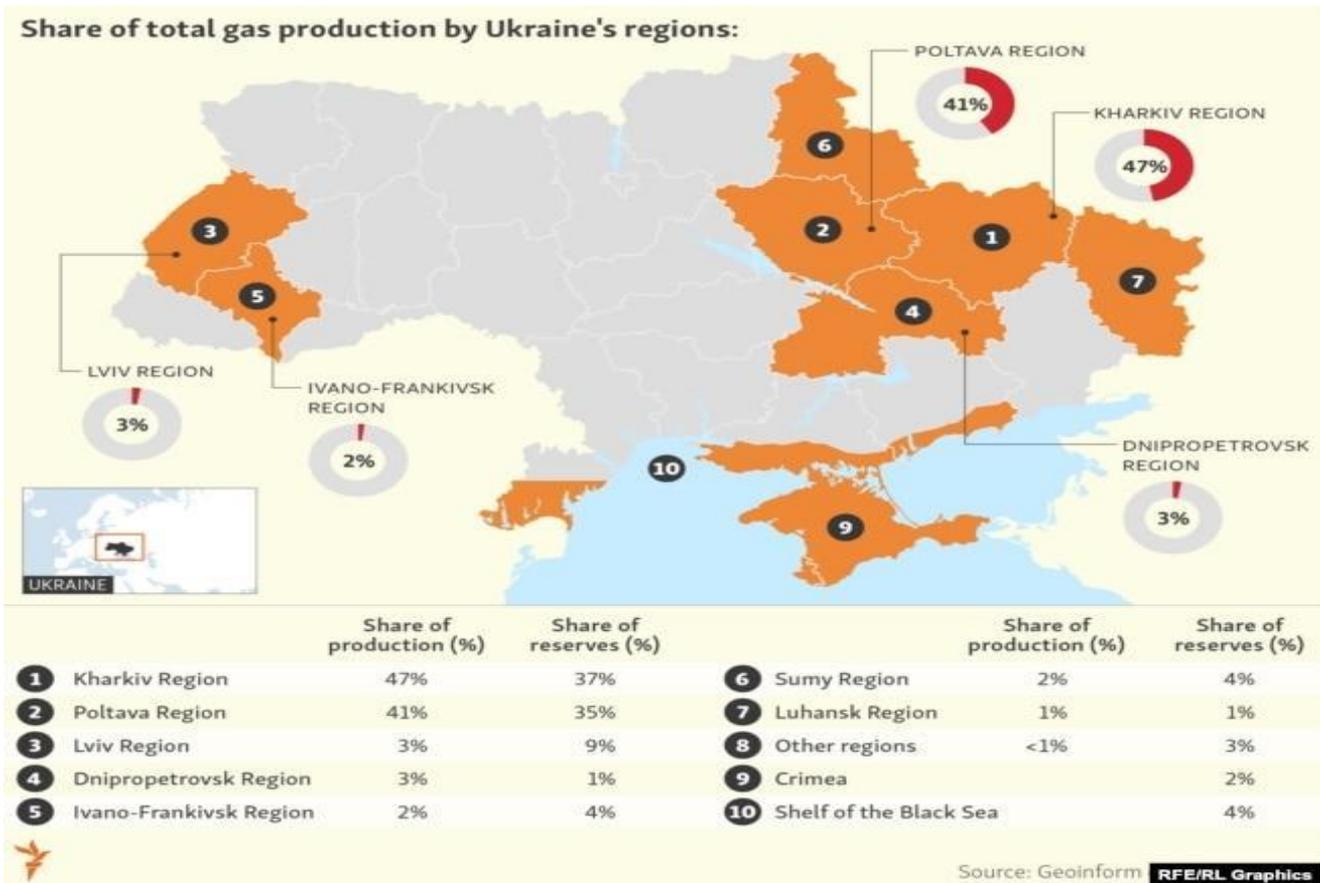


Fig. 1. Regions in Ukraine with gas resources and their share in the country's total production and reserves (2019). Source: <https://www.rferl.org/a/ukraine-foreign-investment-imports/30165068.html>

Ukraine continued to export electricity to neighbouring countries such as Poland, Romania, and the Republic of Moldova until the massive Russian bombing of its critical infrastructure on the 10th and 11th October. Ukraine planned to increase interconnection capacity with the European ENTSO-E grid and further include exports to countries such as Slovakia and Hungary.¹⁸ This would also have been possible because demand for electricity has fallen in Ukraine as a result of the war, and the price of energy produced in the country is three times lower than the average price in the EU, which would have helped some EU countries better withstand energy pressures during winter.¹⁹ Ukraine's energy minister informed the EU's European Council in the summer of 2022 that his country could replace up to 6 bcm of gas imported from Russia if it could reach its maximum export capacity of 1.5-1.7 GW, and that it had 12 bcm of gas in its storage stocks, the largest in Europe, available to be delivered to the EU member states' reserves.²⁰ As such, Ukraine could have been an important contributor to easing Russia's energy pressure on the EU and would have helped substantially to increase the energy resilience of EU states. Russia's massive bombardment of Ukraine's energy infrastructure, however, is bringing all these plans to a halt.

Ukraine has the potential to be an important pillar in European energy and a pivot in overcoming this energy crisis, which was caused by the Russian Federation. The Kyiv authorities have called on Western partners to send much more anti-aircraft systems to protect the energy infrastructure targeted by Russian attacks. Germany, France, the United States, Spain, and the

¹⁸ Sabadus, Aura. "Ukraine defies Russia and launches electricity exports to EU neighbors". Atlantic Council. July 2022, link: <https://www.atlanticcouncil.org/blogs/ukrainealert/ukraine-defies-russia-and-launches-electricity-exports-to-eu-neighbors/>

¹⁹ Ibid.

²⁰ "Ukraine's electricity exports could replace up to 5-6 bcm of Russian gas". EC Energy News. July 2022, link: <https://ceenergynews.com/ukraine-russia-crisis/ukraines-electricity-exports-could-replace-up-to-5-6-bcm-of-russian-gas/>

United Kingdom have announced that they will send such systems to increase the capacity and effectiveness of Ukraine's defences.²¹

II. Attacks on Ukraine's energy sector and their aftermath

On the 10th of October this year, Moscow launched a significant number of missiles, specifically targeting critical energy and communications infrastructure. According to Ukraine's State Emergency Service, a total of 84 cruise missiles were launched at Ukraine that day, along with 24 attack drones. Power supply facilities in eight regions and the city of Kyiv were mainly affected, where more than 30 fires broke out.²²

On the same day, ahead of a meeting of the Russian Security Council, President Vladimir Putin said that, according to the proposals of the Ministry of Defence and in accordance with the General Staff's plan, it had been decided to attack Ukraine with long-range missiles in response to "terrorist acts" committed against Russia, referring to the attack on the Kerch bridge linking Russia to the annexed Crimean Peninsula on 8 October. Vladimir Putin promised a "harsh response" from Moscow if the attacks continue.²³

Ukrainian Energy Minister Gherman Galushchenko said that on the 10th of October, Russia launched the most extensive attack on Ukraine's energy system since the invasion began. The minister said that the aim of the Russian forces was to make it difficult to resume the supply of electricity from other sources, as installations throughout the power system had been damaged.²⁴ On the same day, Ukraine's electricity grid operator Ukrenergo called on citizens to reduce their electricity use.²⁵

The October 10th events were a clear sign of Russia's escalating approach to hostilities with Ukraine. At the same time, the massive bombing of critical infrastructure targets, especially energy, shows how the new commander of Russian troops on the Ukrainian front, General Sergey Surovikin, wants to leave his mark on military operations.

²¹"US pushes allies to assemble patchwork air defenses for Ukraine". France24, link: <https://www.france24.com/en/live-news/20221014-us-pushes-allies-to-assemble-patchwork-air-defenses-for-ukraine>

²² "The 84 missiles that were fired at Ukraine hit infrastructure in 8 regions, officials". CNN, link: https://edition.cnn.com/europe/live-news/russia-ukraine-war-news-10-10-22/h_4e5b4500eedf032467ce75d4fca4a228

²³ "Putin comments on massive strikes on targets in Ukraine". Interfax, link: <https://www.interfax.ru/russia/867132>

²⁴ "Today's attack on the power system was the largest in the entire war - Herman Galushchenko". Ministry of Energy of Ukraine, link: <https://mev.gov.ua/novyna/sohodnishnya-ataka-na-enerhosystemu-bula-naymasshtabnishoyu-za-vsyu-viynu-herman>

²⁵ "Rolling blackouts start in Kyiv as Ukrainians urged to save power". Financial Times, link: <https://www.ft.com/content/57fdfbbo-647d-4a22-995f-b33c67d83ofd>

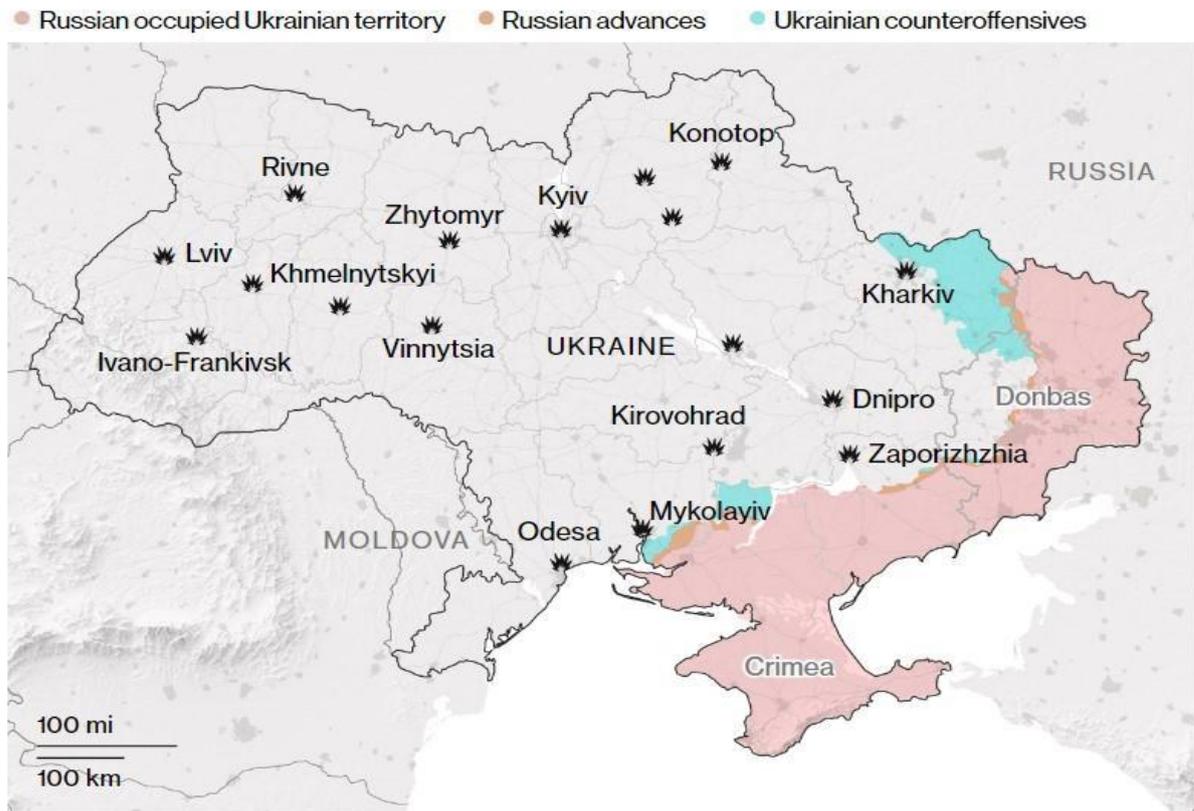


Fig. 2. Russian bombing targets on 10 October. Source: <https://www.bloomberg.com/graphics/2022-ukraine-russia-us-nato-conflict/?leadSource=verify%2owall>; Institute for the Study of War & American Enterprise Institute's Critical Threats Project

The fact that Moscow is now focusing on destabilising Ukraine's energy infrastructure before the onset of winter shows that it is trying to demoralise the population by worsening living conditions and instilling an acute sense of insecurity by resuming bombardments of cities far from the front line, primarily the capital Kyiv. Another intended effect is to damage Ukraine's economy by depriving it of the resources generated by exporting electricity to Europe. For example, even after the shutdown of the Zaporozhye nuclear power plant, captured by Russian forces for more than 7 months, Ukraine fulfilled its obligations to its European partners regarding the export of electricity, and the population complied with the authorities' demands to save electricity.²⁶ The immediate effect of the massive Russian bombing on the 10th and 11th of October, which damaged thermal power plants as well as power generation stations and distribution nodes, is the blockage of electricity exports from the 11th of October 2022 in order to stabilise its own power system. The Ukrainian energy minister said that Ukraine's electricity exports had not only an internal benefit, but also an external one, as it helped Europe reduce its consumption of Russian energy resources. This is another reason why Russia has started to systematically destroy the Ukrainian energy system, disrupting Ukraine's electricity exports, and negatively affecting Ukraine's revenues.²⁷ This decision to temporarily halt energy exports will affect countries that used to receive electricity from Ukraine, such as the Republic of Moldova, which imports 30% of its electricity from Ukraine.²⁸

²⁶ "Ukraine seizes electricity exports". Epravda, link: <https://www.epravda.com.ua/news/2022/10/10/692443/>

²⁷ "Ukraine stops exporting electricity due to Russian missile attacks on energy facilities". Ministry of Energy of Ukraine, link: <https://mev.gov.ua/novyna/ukrayina-prypynyaye-eksport-elektroenerhiyi-cherez-rosiyski-raketni-obstrily-enerhetychnykh>

²⁸ Vițu Valeria. "Moldova receives all of its electricity from the Cuciurgan power plant on the left bank of the Dniester". RFI.ro. 11th of October 2022, link: <https://www.rfi.ro/economie-149541-rmoldova-primeste-integral-energie-electrica-de-la-centrala-de-la-cuciurgan-din>

With the October bombings, Russia's "special operation" entered a new phase, focused on destroying Ukraine's critical infrastructure. On the 11th of October, the first power plant to be attacked, first by Iranian drones and then by missiles, was the severely damaged Ladyzhyn thermal power plant in the Vinnytsia region.



Fig. 3, Source: <https://i-ua.tv/news/66105-rosiiany-atakuvaly-raketamy-zaporizhzhia>; <https://presspoint.in.ua/2022/10/12/na-ladyzhynskoi-tes-postrazhdalo-shestero-liudej/>

Another wave of attacks on the 17-18th of October severely damaged several power plants in Kyiv, Dnepr, Kharkiv, Krivoi Rog, and Zhitomir.²⁹ The shelling continued over the next few days, causing huge damage to the infrastructure that the services were trying to repair in order to get electricity back into Ukrainian homes. According to Dmitriy Sakharuk, executive director of Ukrainian energy operator DTEK, the extent of the damage to the Ukrainian power system and the duration of the outages are difficult to estimate, as are the timeframes for repairing all installations, some of which are no longer operational. Thus, as of the 30th of October, the stock of equipment for repairs has been exhausted. The energy sector faced a new problem due to the increase in prices for the necessary equipment. In addition to planned and pre-announced blackouts with a fixed duration, power outages due to breakdowns will occur in the coming period and their duration will depend on the stock and availability of parts needed for repairs.³⁰ Although shellings are still underway on a smaller scale, previous waves have succeeded in reaching their goal and bringing cold into people's homes. For good reason, Ukrainian officials avoid specifying more details on how badly the Russian-targeted areas have been affected, but it can be assessed that the negative impact on Ukraine's energy sector has been particularly severe, with the effects to be seen especially in the coming cold months. It is worth noting that even in the regions recently liberated from Ukrainian troops the situation is dramatic, as Russian forces are destroying elements of the energy infrastructure in retreat. In Kherson, for example, the population is facing great difficulties in terms of energy and heat supply.³¹ In a speech, President Zelensky said: "Before leaving Kherson, the occupiers destroyed all critical infrastructure: communications, water, heat, electricity".³²

As a result of the shelling, President Volodymyr Zelensky said that 30% of Ukraine's power plants were "destroyed" between the 10th and the 18th of October, "causing massive blackouts

²⁹ Attacks carried out by Russian forces on 18 October, link: <https://t.me/truexanewsua/63158>

³⁰ The situation of the Ukrainian energy system after a new wave of attacks, link: https://mobile.facebook.com/DTEKcompany/videos/498964015622833/?_rdc=1&_rdr&refsrc=deprecated&_se_imp=2qCVZjJdyx4UDw2XO

³¹ Without electricity, water and with poor signal, but free: the current situation in Herson. Informer, link: <https://informator.ua/uk/bez-svitla-vodi-i-z-poganim-zv-yazkom-ale-vilni-shcho-zaraz-vidbuvayetsya-v-hersoni>

³² https://t.me/V_Zelenskiy_official/3972

across the country".³³ The Russian military has been bombing mainly dams and power plants during this period,³⁴ targeting regions closer to the front line, such as Dnepropetrovsk, but also those in the far west of Ukraine, such as the Lvov region.³⁵

The cynicism with which Russia treats these attacks is not disguised by public statements made in Moscow. A former pro-Russian member of Ukraine's Verkhovna Rada, now in Russia, said that Ukraine is seriously affected by the attacks, which will damage more than 60% of the energy system if they continue at a similar intensity and Ukraine's economy will be "killed". According to estimates by Russian experts, one day of attack on the Ukrainian energy system, causes losses of about 100 billion Ukrainian hryvnias (\$2.7 billion).³⁶ The negative effects on Ukraine's economy are acknowledged by officials in Kyiv, who note that this wave of bombing has caused a sharp decline in GDP, which fell by 39% in October compared to the same month in 2021, as opposed to September, when that month's GDP was 35% lower than the same period last year. "If the attacks continue, this will lead to an even more significant drop in GDP," the Ukrainian official said.³⁷

The latest wave of bombings on Ukrainian infrastructure has shown Russia's determination to continue this campaign, which is mainly directed against energy infrastructure. According to Ukrainian sources, the most extensive bombing of Ukrainian infrastructure was launched on the 15th of November.³⁸ More than one hundred missiles were fired at 11 different Ukrainian regions (among which are Poltava, Krivoy Rog, Kyiv or Zhitomir), destroying 15 power installations.³⁹ These bombings triggered a domino effect in Republic of Moldova, disconnecting and disrupting power supplies in several cities, including the capital.⁴⁰

³³ https://twitter.com/ZelenskyyUa/status/1582285715970613248?ref_src=twsrc%5Etfw%67Ctwcamp%5Etweetembed%67Ctwterm%5E1582285715970613248%67Ctwgr%5Ef302cc1780d1ba5c0999a6a07d4d058b8ddfe574%67Ctwcon%5Esi_&ref_url=https%3A%62F%62Fwww.g4media.ro%62Fzelenski-30-din-centralele-electrice-din-ucraina-au-fost-distruse-de-la-10-octombrie-provocand-pene-masive-de-curent-in-intreaga-tara-atacurile-cu-drone-o-dova.html

³⁴ Lu, Christina. "Putin Targets Ukrainian Infrastructure". Foreign Policy, link: <https://foreignpolicy.com/2022/10/11/russia-ukraine-strikes-civilian-infrastructure/>

³⁵ Terajima, Asami. "Ukraine war latest: Russia again strikes Ukraine's energy system". Kyiv Independent. October 2022, link: <https://kyivindependent.com/national/ukraine-war-latest-russia-again-strikes-ukraines-energy-system>

³⁶ "In Kyiv, they announced damage to 30% of the country's energy facilities". Nezavisimaya Gazeta, link: https://www.ng.ru/cis/2022-10-12/1_8563_ukraine.html

³⁷ If the attacks on the energy sector continue, this will lead to an even more significant decline in GDP. Yulia Sviridenko at the US media briefing, link: <https://www.kmu.gov.ua/news/prodovzhennya-atak-na-energetichnu-infrastrukturu-mozhe-sprichiniti-bilshe-padannya-vvp-yuliya-sviridenko-pid-chas-brifingu-z-amerikanskimi-media>

³⁸ "Ukraine needs urgent help to counter Putin's energy infrastructure attacks". Atlantic Council, link:

<https://www.atlanticcouncil.org/blogs/ukrainealert/ukraine-needs-urgent-help-to-counter-putins-energy-infrastructure-attacks/>

³⁹ "Russia rains down 100 missiles on Ukraine in largest ever attack on energy infrastructure". Intellinews, link: <https://intellinews.com/russia-rains-down-100-missiles-on-ukraine-in-largest-ever-attack-on-energy-infrastructure-262481/>

⁴⁰ "The import of electricity from Romania has resumed - data from "Moldelectrica"". Ziarul de Gardă, link: <https://www.zdg.md/stiri/stiri-economice/a-fost-reluat-importul-de-energie-electrica-din-romania-date-de-la-moldelectrica/>



Fig. 4. Areas hit by Russian missiles on the 15th of November (red-areas that were hit, green-areas where rockets were intercepted in time); Source: <https://suspilne.media/317352-zitomir-znestrumleno-v-kiievi-priloti-v-zitlovi-budinki-so-vidomo-pro-masovu-ataku-rf-po-ukraini/>

It is also the first time Poland has been a victim of this conflict. On the evening of the 15th of November, two Poles in a village 6 kilometres from the Ukrainian border were killed by rocket explosions. The Polish authorities have been careful not to exacerbate war tensions by declaring that there is no evidence of an intentional attack on Polish soil by Moscow. Instead, Poland's President, Andrzej Duda, has claimed that the missile was part of Ukraine's air defense against massive Russian bombardment waves and that it landed in Poland by accident. So far, Kyiv has denied this claim, claiming that it was not a Ukrainian missile and that they are not to blame.⁴¹ While Warsaw has not blamed Ukraine directly for the incident, arguing that it was an accident above all, this event could increase tensions within the alliance.

A similar incident to the one in Poland took place at the end of October in the Republic of Moldova, when a Russian missile shot down by Ukraine fell in the village of Naslavcea, with no casualties.⁴² Thus, Russian attacks on Ukrainian infrastructure can lead to escalation of the war, especially when places close to other countries' borders are targeted. Most likely these bombings will continue, which shows that Russia still has the necessary capabilities both from its own production and as a result of arms suppliers such as Iran, which delivers kamikaze drones.⁴³

⁴¹ "Russia-Ukraine war: Zelenskiy dismisses Nato's suggestion missile that hit Poland was Ukrainian – as it happened". The Guardian, link: <https://www.theguardian.com/world/live/2022/nov/16/russia-ukraine-war-live-news-emergency-g20-meeting-after-russian-made-missiles-land-in-poland#top-of-blog>

⁴² "A Russian missile, shot down by the Ukrainians, fell in Moldova". Deutsche Welle, link: <https://www.dw.com/ro/o-rachet%C4%83-ruseasc%C4%83-dobor%C3%A2t%C4%83-de-ucraineni-a-c%C4%83zut-%C3%AEn-moldova/a-63606512>

⁴³ "Iran Acknowledges Sending Drones To Russia For First Time". Radio Free Europe, link: <https://www.rferl.org/a/iran-drones-russia-ukraine-war/32116873.html>

III. The impact of Russian attacks on Ukraine's energy infrastructure in Moldova

The bombing campaign has made the Republic of Moldova's energy situation even more dire, as it is seriously affected by the energy crisis, the wave of price hikes, high inflation, and blackmail from the Russian gas supplier GAZPROM. Moldovan President Maia Sandu stressed that her country was going through "an unprecedented energy crisis".⁴⁴

Andrei Spînu, Moldovan Minister of Infrastructure and Regional Development, said on the 11th of October that as Ukraine stopped exporting electricity to Europe that day, the Republic of Moldova receives full electricity from MGRES (Cuciurgan Thermal Power Plant). According to Transnistrian separatist leader Vadim Krasnoselsky, on September 30th, Chişinău and Tiraspol signed a contract to supply 70% of Moldova's consumption. The next day, however, Gazprom cut gas supplies to Moldova by 30%, with the result that Tiraspol reduced its supplies substantially and provided only 27% of Moldova's contracted electricity consumption.⁴⁵

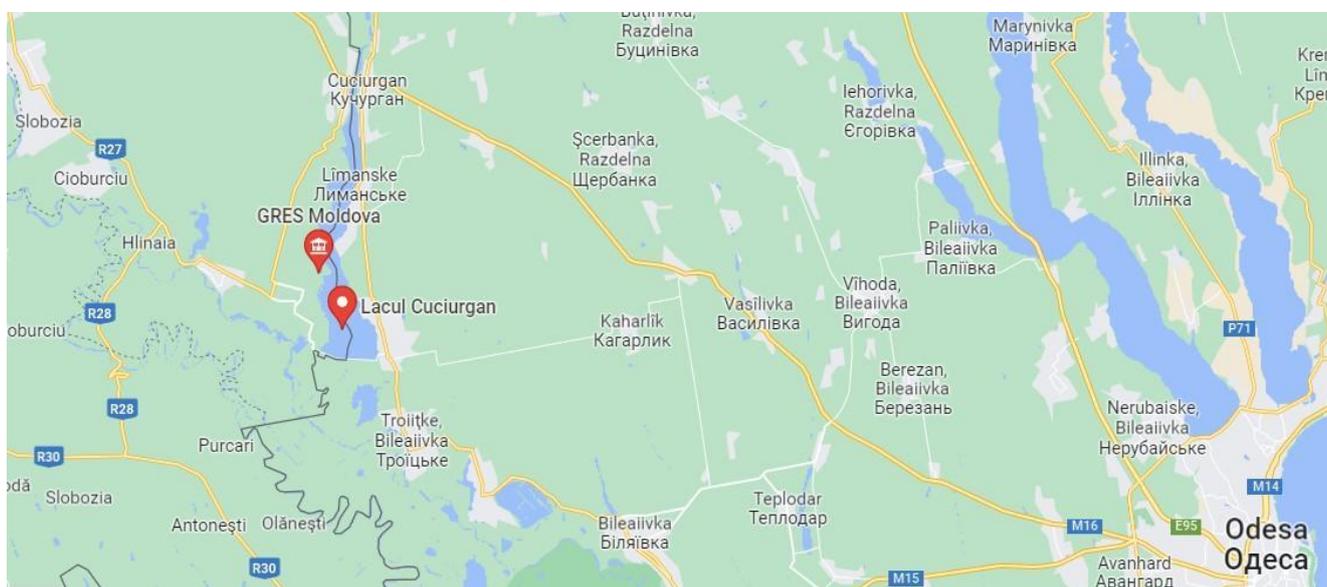


Fig. 5. Cuciurgan thermal power plant. Source: New Strategy Center; Google Maps.

To get Moldova out of this deadlock, the Romanian government has delivered fuel oil and begun to supply more and more electricity to the neighbouring country at subsidised prices via the state-owned company Transelectrica. Russia's energy pressure on Moldova, both directly and through Transnistria, has prompted Romania to emerge as a major player in its relations with Moldova, with both countries seeking to block Moscow's destabilisation plans by stepping up bilateral energy cooperation. Thus, thanks to Romania, the dependence on electricity from the Cuciurgan power plant in Transnistria has been greatly reduced. In November, Romania supplied the Republic of Moldova with 90% of its electricity requirements,⁴⁶ a significant increase considering that in October supplies covered 30% of those needs.⁴⁷ In addition to

⁴⁴ "Maia Sandu: Securing the country's electricity is a daily challenge / Gas tariffs have risen six times and are double Romania's". G4Media, link: <https://www.g4media.ro/maia-sandu-asigurarea-cu-energie-electrica-a-tarii-e-o-provocare-zilnica-tariful-la-gaze-a-crescut-de-sase-ori-si-e-dublu-fata-de-romania.html>

⁴⁵ "Separatists cut electricity! From Monday, Tiraspol will deliver only 27% of the electricity consumption contracted by the Republic of Moldova". Adevărul, link: <https://adevarul.ro/stiri-externe/republica-moldova/separatistii-taie-lumina-de-luni-tiraspolul-va-2214704.html>

⁴⁶ "Romania sells a record amount of electricity to Moldova, providing 90% of its current needs". Digi24, link: <https://www.digi24.ro/stiri-externe/romania-vinde-moldovei-o-cantitate-record-de-energie-electrica-asigurand-90-din-necesarul-actual-2139315>

⁴⁷ "The Republic of Moldova no longer receives energy from the Transnistrian region. Romania, the only source". Adevărul, link: <https://adevarul.ro/stiri-externe/republica-moldova/republica-moldova-nu-mai-primeste-energie-din-2217114.html>

electricity and fuel oil, Romania will also deliver 130,000 m³ of firewood. In addition, Romania is continuing to advocate at international level for financial support for its partners in Chişinău to overcome the energy crisis.⁴⁸

The Republic of Moldova already has 30 million m³ of gas in storage facilities in Romania and hopes to obtain support from Bucharest for the delivery of natural gas in case GAZPROM stops exporting gas,⁴⁹ which has been repeatedly indicated by the Russian company. For example, in October, GAZPROM threatened the authorities in Chişinău that it would stop supplying gas on 20 October, and the Moldovan company managed to pay the bill for September and a deposit for October.⁵⁰

The dependence on Russian gas and the aggressive behaviour of GAZPROM forced Moldova to look for alternative solutions and build regional cooperation. Thus, on the 15th of September 2022, in Odessa, the energy ministers of Ukraine, Romania and the Republic of Moldova announced that they had agreed to conclude a trilateral agreement to boost interconnection and increase bilateral electricity trade, thus also contributing to increasing Moldova's energy independence.⁵¹ However, the Russian bombings have made electricity supplies from Ukraine to Moldova impossible, at least in the short term. The authorities in Chisinau have also turned to other possible partners in the region, and on the 27th of October 2022, in the presence of the presidents of Bulgaria and Moldova, an agreement was signed for the supply of gas,⁵² thus adding a new possible source of supply.

It is becoming clear that Russia is using the energy crisis to destabilise the Republic of Moldova and put pressure on the pro-European government there. Since the summer of 2022, protests have been taking place in Chişinău, which have increased in intensity, reflecting the discontent of the population with the high energy prices, the deterioration of living standards (for example food prices in August 2022 were 40% higher than in August 2021), and the enormous inflation rate, which reached 34.3% in August.⁵³ The desperate situation in which the Republic of Moldova finds itself is illustrated by the statement made by the country's president, Maia Sandu, who declared in Bucharest on the 1st of November that "gas tariffs have increased six times and are double those of Romania. We risk running out of gas and energy this winter".⁵⁴ The calls from Chişinău have prompted the EU to get involved in helping Moldova. Ursula von der Leyen, president of the European Commission, visited Moldova on 10 November and, in a joint press conference with President Maia Sandu, announced €250 million in emergency aid and harshly

⁴⁸ "Aurescu: Romania provides the Republic of Moldova with more than 90% of its electricity needs. The situation is serious". Digi24, link: <https://www.digi24.ro/stiri/actualitate/aurescu-romania-asigura-republicii-moldova-peste-90-din-necesarul-de-consum-de-energie-electrica-situatia-este-grava-2142449>

⁴⁹ Necşuţu, Mădălin. "Exclusive: Moldova's Minister of Infrastructure announces that he will sign a contract with Romania for the supply of electricity. Chisinau hopes Romania will also help with gas." G4Media, link: <https://www.g4media.ro/exclusiv-ministrul-infrastructurii-din-republica-moldova-anunta-ca-va-semna-cu-romania-un-contract-pentru-livrare-de-energie-electrica-chisinaul-spera-ca-romania-va-ajuta-si-cu-gaz.html>

⁵⁰ "Moldovagaz" announces that it has transferred to "Gazprom" the payment for natural gas supplied in September and the advance for October". Ziarul de Gardă, link: <https://www.zdg.md/stiri/stiri-economice/moldovagaz-anunta-ca-a-transferat-catre-gazprom-plata-pentru-gazele-naturale-furnizate-in-luna-septembrie-si-avansul-pentru-luna-octombrie/>

⁵¹ "Romania, Ukraine and the Republic of Moldova agreed to increase bilateral energy trade". Investenergy.ro, link: <https://www.investenergy.ro/romania-ucraina-si-republica-moldova-au-convenit-cresterea-schimburilor-bilaterale-de-energie/>

⁵² "Moldova has signed a contract for access to natural gas with Bulgaria". Ziarul de Gardă, link: <https://www.zdg.md/stiri/video-r-moldova-a-semnat-un-contract-pentru-acces-la-gaze-naturale-cu-bulgaria/>

⁵³ "Inflation of 35%, a plummeting economy and interest rates of over 20%: a "perfect storm" is heading for Moldova as uncertainties mount and protests multiply". Ziarul Financiar, link: <https://www.zf.ro/business-international/inflatie-de-35-economie-in-picaj-si-dobanzi-de-peste-20-o-furtuna-21174616>

⁵⁴ "Maia Sandu: Securing the country's electricity is a daily challenge / Gas tariffs have risen six times and are double Romania's". G4media, link: <https://www.g4media.ro/maia-sandu-asigurarea-cu-energie-electrica-a-tarii-e-o-provocare-zilnica-tariful-la-gaze-a-crescut-de-sase-ori-si-e-dublu-fata-de-romania.html>

criticised Moscow, pointing out that "Russia continues to wage a brutal war against our neighbour Ukraine, targeting essential infrastructure - electricity, heating, water - in despicable acts of cruelty and creating chaos on global energy markets by using energy as a weapon. This also threatens the Republic of Moldova". In these difficult circumstances, the Brussels official stressed that the European Union's solidarity with the Republic of Moldova is "unshakeable".⁵⁵



Fig. 6. Ursula von der Leyen with Maia Sandu during the official visit to Chişinău. Source: <https://reporter.md/ursula-von-der-leyen-vizita-oficiala-la-chisinau-moldova-este-parte-a-familiei-noastre-europene-si-familia-se-uneste-in-vremuri-grele/>

Investigations by independent publications have revealed that most of the protesters in the centre of Chişinău are paid by a Kremlin con, politician and businessman Ilan Şor.⁵⁶ Convicted in 2017 in the Republic of Moldova for what was then called in that country the "theft of the century", the disappearance of a billion dollars from three Moldovan banks in 2014, and fled the country for three years, Şor has maintained his influence in the Republic of Moldova through the party he founded - the Ilan Şor Party.⁵⁷ At the same time, the Washington Post has documented Ilan Şor's connection to Russian intelligence (FSB), acting as one of the Kremlin's key oligarchs.⁵⁸ In September this year, MPs from his party visited Moscow and met, among

⁵⁵ "Emergency EU aid of €250 million for Moldova to buy natural gas. Ursula von der Leyen visiting Chisinau: A small country with a big heart.". G4Media, link: <https://www.g4media.ro/ultima-ora-ajutor-ue-de-urgenta-pentru-moldova-de-250-milioane-de-euro-pentru-a-trece-pestea-criz-a-energetica-ursula-von-der-leyen-in-vizita-la-chisinau-o-tara-mica-cu-o-inima-mare.html>

⁵⁶ "Protesters in rent. ZdG undercover investigation: We infiltrated Şor's protesters and show you, from the inside, how people brought to Chisinau are paid and how the protest machine works. Ziarul de Gardă, link: <https://www.zdg.md/investigatii/ancheta/video-protestatari-in-chirie-investigatie-zdg-sub-acoperire-ne-am-infiltrat-printre-protestatarii-lui-sor-si-va-aratam-din-interior-cum-sunt-platiti-oamenii-adusi-organizat-la-chisinau-si-cum-fun>

⁵⁷ "How Ilan Şor, the new FSB man in Moldova, wants to destabilize the country". Radio Free Europe Romania, link: <https://romania.europalibera.org/a/ilan-shor-oligarh-rusia-republica-moldova/32115318.html>

⁵⁸ "Russia's security service works to subvert Moldova's pro-Western government". The Washington Post, link: <https://www.washingtonpost.com/world/2022/10/28/russia-fsb-moldova-manipulation/>

others, Leonid Slutsky, chairman of the State Duma's International Affairs Committee, who lauded Shor and his party as being "reliable partners of Russia"⁵⁹

Conclusions

Russia's significant bombing of Ukraine's energy infrastructure has several objectives, on a political, military, social and economic level. It is intended to generate social and economic problems that will affect the morale of the population and troops on the frontline. In this way, Moscow hopes to soften Ukraine's stance and persuade Zelensky to agree to a diplomatic compromise that will result in a 'freeze' on the war and the maintenance of the territories occupied by the Russian army. It is vital for Russia to maintain the land corridor between Donbas and Crimea and access to the Dnieper water sources, so necessary for Crimea, especially now that it has withdrawn from Kherson.

The cold in the homes of Ukrainians will generate a new influx of refugees to the EU, putting additional strain on the bloc's welfare system. At the same time, the Kremlin wants Ukraine to be deprived of the resources it gets from exporting energy to EU countries. Not only does Ukraine cease to be an energy exporter, but it may well have to be helped by the EU with electricity to get through the winter, putting pressure on Brussels to find additional solutions as the Union faces its own energy problems. With rising inflation and high energy utility prices in Europe, provoking new social problems that could weaken popular support in the EU for helping Ukraine is a major Russian objective. Disinformation campaigns are already heavily geared to this end, with narratives aimed ultimately at creating a state of *war fatigue* among European citizens, which would also be reflected upon the support for continuing war efforts and thus for sending aid to Ukraine.

The Russian bombing of Ukraine's critical infrastructure must therefore be seen in a wider context, as the consequences could be more far-reaching and go beyond the borders of the affected areas. This is why it is vital for the states of the democratic world to speed up the delivery of anti-aircraft and anti-missile systems first, so that the Russian raids lose their effectiveness, and this campaign of terror can be stopped. As it happened in the November 15th shelling across all of Ukraine, there is a risk of escalation if fragments of missiles or missiles may fall on NATO territory. Even in incidents that do not involve an attack, as happened in Poland, NATO should increasingly consider whether it would be useful to deploy anti-missiles capabilities in countries bordering Ukraine, such as Poland or Romania. A similar initiative took place before within NATO ten years ago, when Turkey asked the Allies for support. As such, NATO Patriot missile systems were moved to the Syrian border, assuring Turkey of NATO's help in protecting their territory.⁶⁰ Secondly, the EU and other states need to support Ukraine economically, to deliver generators, fuel, blankets, to lessen the social impact, and, especially as far as the European Union is concerned, to prepare to receive new refugees from Ukraine as weather conditions worsen and Russian bombing continues.

⁵⁹"How Ilan Shor, the new FSB man in Moldova, wants to destabilize the country". Radio Free Europe Romania, link: <https://romania.europalibera.org/a/ilan-shor-oligarh-rusia-republica-moldova/32115318.html>

⁶⁰ "NATO Approves Turkey's Request for Patriot Missiles". Radio Free Europe, link: <https://www.rferl.org/a/nato-turkey-patriot-missile-request/24788967.html>; NATO Support to Turkey. <https://shape.nato.int/ongoingoperations/nato-patriot-mission-in-turkey->

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