Ukraine Facility Platform

CHC
Center for Human Capital

Analytical Report

Risks of the heating season 2025–2026

Contents

I.
EXECUTIVE SUMMARY

The primary risk for successfully enduring another wartime autumn-winter period remains the intensity of Russian attacks on Ukraine's energy system. However, a range of administrative decisions can mitigate, rather than amplify, the impact of these attacks on the availability of electricity and heat, necessary for citizens and economic activity.

This report not only analyzes Russia's objectives and tactics but also provides constructive policy recommendations for enhancing the resilience of Ukraine's energy sector. Energy planning must shift toward **a long-term horizon of 5 to 15 years.** During this period Ukraine definitely will remain under the threat of Russian attacks throughout this period.

It is essential to develop strategies that go beyond crisis response and instead progressively strengthen the energy system, providing stability for communities, businesses, and the economy as a whole, and are delivering step-by-step results every year.

Russia has been systematically targeting the Ukrainian energy system since October 2022, aiming to paralyze it and destroy its recovery reserves. Throughout the war, Russia has adjusted its attack strategy – from widespread bombings of major power plants and grid infrastructure to a "scorched earth" tactic. So now the enemy is concentrating main strikes on all energy facilities in specific regions trying to isolate them from the national grid.

The state's ability to improve energy system resilience through new power plants construction and rapid regional restoration – faster than Russia can adapt its tactics – will enable the energy sector to function more effectively, even during wartime.

Over the past three years, the government has strengthened air defense and constructed engineering protection at energy sites, accelerating repair efforts. However, Russia's large-scale strikes in Autumn 2025 have already shown that these steps remain insufficient to minimize their impact on the power grid.

The government's energy resilience strategy is reactive, responding to recurring threats each year rather than anticipating them.

At first glance, this might seem reasonable under wartime conditions, but analysis of its consequences reveals systemic problems:

1. Short-sighted tactics: "Survive winter to winter"

Each year the state prepares only for the upcoming winter using peace-time planning algorithms. The short-sightedness of this approach lies in the fact that such planning does not allow the country to prepare its energy sector for the upcoming heating seasons, as it lacks an objective assessment of risks. As a result, no strategy has been developed to break the cycle of winter damage and summer repair. Nor is there a transition toward a decentralized energy model.

2. State energy policy remains oriented toward peacetime consumption trends

The state continues to rely on pre-war trends of declining electricity and natural gas consumption, maintaining fuel and energy reserves "just to meet demand". However, power system vulnerable to massive attacks reacts sharply to any change in consumption behavior and, at certain times, requires greater use of fuel. Short-sighted approaches to reserve formation may lead to fuel and energy shortages in January 2025 and February 2026.

3. Lack of conditions for developing decentralized generation in the regions and incentives for private investment

Decentralized generation is one of the key elements of the power system's resilience during wartime – on par with air defense and the physical protection of energy facilities. The state has not yet developed a strategic approach to building new capacities around Ukrainian communities or created conditions that would attract private investment to this sector. Due to the debt crisis on the energy market, lack of trust in state and local authorities, absence of investment guarantees and distorted market regulation, businesses are not investing in strengthening the resilience of the power system. Instead they focus solely on constructing new facilities for their own needs.

As a result, short-term approaches during the autumn-winter period amplify risks, which grow in intensity alongside Russian attacks.

The main risk factors that will affect the state of the energy sector this winter are:

- Deficit of generating capacities caused by Russian attacks and the absence of new power plants in the system;
- Shortage of coal, needed for power generation and natural gas for the energy sector and industry;
- Lack of financial resources in energy companies for repairs and replenishment of equipment reserves;
- Lack of private investment in the development of decentralized generation;
- Weakened electricity and gas grid infrastructure in specific regions.

The most dramatic scenario for this winter:

Certain frontline and border regions could face localized electricity and gas blackouts, while significant consumption restrictions may be imposed nationwide due to generation deficit, caused by Russian attacks. A deficit of natural gas for industry and power plants is also possible. The situation may worsen toward the end of the heating season (January 2025 - February 2026), when energy reserves are depleted, and cold weather persists.

It bears repeating: the main threat to the energy system remains Russian strikes. However, shifting toward medium-term planning in responding to these risks can substantially reduce their impact in the coming years.

Key recommendations:

1. Transition to robust medium-term planning for the protection of the energy system, based on lessons learned from previous periods.
2. Revise the approach to forming energy reserves, factoring in heightened risks and the need to sustain economic activity during wartime.
3. Prioritize replacement of damaged generation capacities with new decentralized facilities.
4. Ensure technical readiness of the Ukrainian communities to cooperate with private businesses on long-term energy projects.
5. Prioritize financial support from banks and international financial institutions for projects initiated by businesses and communities.
6. Complete the integration of Ukrainian and European energy markets.

HOW THIS REPORT WAS PREPARED

This report analyzes the risk factors that will affect the 2025-2026 autumn-winter season. It was prepared by experts of the Ukraine Facility Platform (UAFP) – Oleksandr Vizir, Roman Vybranovsky, Mariia Tsaturian and Olha Chajka.

The purpose of this document is to analyze the factors that could contribute to negative scenarios during the

upcoming winter and to help communities and businesses prepare for potential consequences. Under martial law and given the heightened restrictions on publicly available information from official sources, producing an objective analysis of the energy sector has become increasingly challenging.

Our analysis is based on in-depth interviews with industry professionals, experts working in energy companies, and independent energy analysts, as well as on open-source data and insights gained from three previous heating seasons during the full-scale war.

The Ukraine Facility Platform adheres strictly to Ukrainian legislation concerning restrictions on disclosing sensitive information about the energy sector during wartime. This report does not contain data that could facilitate further terrorist attacks on energy facilities or precise numerical indicators that could be used to adjust enemy actions.

We deliberately focus in this report on negative scenarios, as positive developments will be publicly communicated through official channels. This does not imply that negative outcomes are inevitable. Rather, we believe that discussing potential risks will help shape realistic public expectations and enable Ukrainian communities to be better prepared for the challenges of another wartime winter.

II.
STATE OF THE ENERGY SYSTEM AND SPECIFICS OF WINTER PREPARATION

2.1. Condition of the energy system and impact of Russian attacks

Ukraine's energy sector is preparing for its fourth heating season (2025 - 2026) under conditions of full-scale war with Russia. Energy facilities remain a priority target for Russian missile and drone strikes, as the aggressor continues to pursue its strategic goal of "switching off" Ukraine's power system. This is evidenced by systematic attacks on energy infrastructure across frontline and border regions – particularly in Chernihiv, Sumy, Kharkiv, Dnipropetrovsk, Zaporizhzhia, Odesa, and Mykolaiv regions, as well as in Poltava and Kyiv regions.

In October 2025, Ukrainian thermal and hydro- power plants across the country were hit by three massive Russian attacks involving missiles and drones. The local generation in Kyiv was also damaged. In the same month, the Russians conducted at least seven large-scale assaults on gas production facilities in the eastern regions.

These are far from the first strikes on the energy sector. Over the course of the war, Ukraine's power system – with an installed capacity exceeding 50 GW – has endured more than 35 massive, combined attacks by Russia, resulting in the loss of 18 GW of capacity and roughly 30% of total consumption, according to the Ministry of Energy[1]. For comparison, on a cold day in February 2021, the power system could comfortably meet a demand of nearly 25 GW (according to NPC Ukrenergo[2]). During the war, however, meeting winter demand exceeding 15 GW has become a serious challenge.

The pace of restoring energy facilities after Russian attacks is currently slower than the enemy's ability to destroy them. Meanwhile, new generation capacities – which should be built in the regions to replace outdated and damaged thermal power plants – are being installed at a rate far below consumer needs: only about 1.5 GW of new capacities of various types have been added, while the system requires at least 3 GW of highly flexible generation alone.

Under these conditions, for the fourth consecutive winter, the stability of Ukraine's autumn-winter period (AWP) will depend on three key factors:

- The intensity of Russian strikes on energy facilities;
- Weather conditions;
- Management decisions by officials regarding timely repairs, restoration of energy equipment, and formation of fuel reserves (coal and natural gas).

2.2. Responding to the challenges: systemic flaws in the state's approach

The efficiency of the energy system is not only a matter of maintaining basic functionality and meeting the country's humanitarian needs. Ensuring that electricity demand from both industry and households is met at a market-based, competitive price is a fundamental precondition for stimulating economic growth.

Russian strikes remain one of the main reasons this goal has not yet been achieved. However, **the impact of Russian attacks on the energy system has persisted for the fourth consecutive year of war, while the state's strategic approach still fails to meet the scale of the challenge.**

1. Reliance on the "survive from winter to winter" strategy

The algorithms for winter preparation were developed for the energy sector during peacetime and remain codified in government resolutions[3]. This preparation process is still focused mainly on forming fuel reserves according to forecasted energy balances for the upcoming winter, as well as on scheduled equipment replacement and repair plans. The state's objective, therefore, remains short-term – to get through this winter, and then begin preparing for the next one in spring and summer.

Such a short-horizon approach means that, year after year, the energy sector faces the same recurring challenges: the consequences of Russian strikes, the system's dependence on temperature fluctuations, and the availability of fuel. This approach fails to answer the fundamental question: how can Ukraine prepare not only for this winter, but for all future heating seasons – given that the aggressor state is not going anywhere?

Strategic planning for the development and protection of the energy system, as well as for preparation for future heating seasons – taking into account the nature and tactics of Russia's massive attacks in 2022-2023 – could have significantly improved the situation.

2. State energy policy still relies on peacetime consumption trends

For several decades before the full-scale invasion, Ukraine had been steadily reducing its consumption of electricity and natural gas.

In the electricity sector, this decline was primarily driven by deindustrialization. As a result, during the years of independence up to 2021, the share of industry in total electricity consumption fell by nearly half – to 38%, according to the OECD[4] (Organisation for Economic Co-operation and Development). In contrast, the share of households increased fourfold over the same period – reaching 28% of total consumption.

Unlike electricity, the main factor behind the reduction in gas consumption was geopolitical. The gas wars with Russia in 2006 and 2009, the high cost of imported gas, and Ukraine's refusal to purchase gas from Gazprom in 2015 led to a sharp decrease in consumption – first by 50%, to around 50 billion cubic meters (bcm) per year, and by 2021 to just 28-30 bcm.

With the onset of Russia's full-scale invasion in 2022, Ukraine's power system immediately lost 30% of its electricity consumption, according to NPC Ukrenergo. Annual natural gas consumption fell to around 20 bcm, as reported by the International Energy Agency (IEA)[5]. This decline reflects the shutdown of industrial enterprises and businesses, as well as population displacement and migration caused by the war.

However, even a lower level of electricity consumption than in peacetime has become a major challenge for Ukraine during the war. Following Russian attacks on power plants, the energy system – due to a deficit of generation capacity – has become highly sensitive to any fluctuations in electricity demand. Traditionally, consumption rises sharply at the approach of winter as temperatures drop. For example, by the second half of October 2025, with the onset of colder weather, electricity consumption in Ukraine reached levels typical for January-February. The reason is that households increasingly rely on electric heating appliances, as district heating in many cities had not yet started in an effort to save natural gas.

As for natural gas reserves, for the second consecutive year, the state's strategy has been to avoid importing gas during the summer months[6] – a period when prices on international markets are traditionally lower than during the heating season. Instead, the government relied on boosting domestic gas production[7]. This approach, however, failed to account for potential Russian strikes on gas production facilities, transportation infrastructure, and underground storage sites. As a result, Ukraine will be forced this winter to import larger volumes of gas at higher prices, since many gas production sites sustained significant damage during Russian attacks in October 2025.

Such a planning strategy poses the risk of an energy resource deficit, which may become acute in the second half

of the heating season – January 2025 to February 2026. In the medium and long term, persistent energy shortages will limit Ukraine's ability to build new industrial capacity and support economic growth.

3. The problem of debt accumulation in the electricity market remains unaddressed by the state and deters private investors

Debts among all participants in Ukraine's electricity market exceed €1.5 billion. The state has so far failed to resolve the issue of arrears in the balancing market segment. Moreover, there are still no legislative changes allowing energy companies to disconnect enterprises that systematically fail to pay for electricity consumed – including state-owned coal mining enterprises and water utilities.

The crisis in the energy market is further aggravated by several factors: the absence of mechanisms for insuring wartime risks, as well as a lack of trust in local authorities and communities, which urgently need new generation capacities to strengthen their energy resilience.

As a result, private businesses are reluctant to invest in the construction of new generation facilities, as they remain uncertain whether:

- **Their assets will be protected from political interference;**
- **They will be able to recover investments and earn revenue on the electricity market;**
- **They will receive compensation if their assets are destroyed as a result of Russian attacks.**

4. Lack of a strategic approach to creating incentives for the development of decentralized generation in the energy sector

The construction of decentralized generation – small- and medium-scale power plants distributed across the country – remains largely a declarative goal of the government. The state has not yet developed a coherent vision for how such a generation should be built, nor has it created the necessary conditions or incentives to attract private investment into this process.

At present, communities, businesses, and international donors remain focused primarily on urgent needs rather than on launching new investment projects. As a result, according to official data, 660 MW[8] of renewable ("green") generation was built in 2022–2023, and an additional 600 MW[9] of various types of generation capacity was commissioned in the first half of 2025. At the end of September 2025, Ukrenergo reported the addition of another 286 MW[10] of new generation to the system.

However, there is no official data on how much of this new capacity consists of highly flexible (maneuverable) generation, which is crucial for balancing the power system during peak loads. The demand for such capacities during periods of low temperatures (below - 7 to -10°C) may reach 2.5 - 3 GW.

2.3. How these factors affect readiness for the 2025–2026 heating season

Negative consequences

The factors described above continue to affect preparations for the 2025-2026 heating season, just as they did in previous years. The key consequences are a deficit of generation capacity needed to balance the power system due to Russian strikes on thermal and hydroelectric power plants, as well as shortages of fuel and energy reserves.

Ukraine will enter the winter with 13.2 bcm[11] of natural gas stored in its underground gas storage facilities (UGS) – slightly more than last autumn's 12.2 bcm, but still below the target level of 14.7-15 bcm, which was achieved[12], for example, in December 2023.

The trend remains clear: Ukraine continues to accumulate gas reserves "just enough" to meet seasonal needs, leaving no safety cushion in case of emergencies – particularly intensified Russian attacks on gas infrastructure.

A similar situation is observed with coal stockpiles at thermal power plants (TPPs) and combined heat and power plants (CHPs). The minimum sufficient level for stable winter operation is at least 3 million tons. According to the government[13], this threshold was reached in October 2024. However, this autumn, according to industry representatives interviewed by UAFP, Ukraine is entering the heating season with only about 2 million tons of coal, which would be enough to sustain power generation for just two cold winter months.

Positive trends

The positive trends reflect the high level of adaptation of the energy sector to wartime conditions, as well as the professionalism of energy specialists preparing for the winter season based on experience gained in previous years. This year, state nuclear power plants operator Energoatom completed its seasonal maintenance campaign before the onset of cold weather and prepared nuclear power units for winter operation. Progress has also been made in restoring infrastructure facilities and power plants damaged by Russian attacks. According to UAFP, by early October 2025, approximately 2.5 GW of generation capacity previously affected by missile and drone attacks had been restored and brought back online.

The high-voltage transmission system has over 40,000 MVA of transformer capacity, which is sufficient to deliver electricity across the country during the winter period (excluding potential attacks). Equipment reserves have been built up, and construction of the second phase of passive anti-drone protection at high-voltage substations is underway.

III.

RISKS FOR THE 2025–2026 AUTUMN-WINTER SEASON AND POTENTIAL NEGATIVE CONSEQUENCES

A retrospective analysis and the consequences of Russian strikes in September-October 2025 make it possible to identify six key risks, the materialisation of which will affect the passage of the heating season:

Risks of the 2025–2026 heating season that could lead to worst-case scenarios

The situation in the power system will become more severe the more of these risks materialise. In addition, each of risks No. 2–6 multiplies the negative impact of Russian attacks on the energy system.

Risk 1: Large-scale Russian attacks on power plants, gas infrastructure, and electricity networks

Russian attacks on energy infrastructure remain **the primary threat for the upcoming winter season. Accordingly, this report provides a detailed assessment of their potential impact and broader systemic implications.**

The overarching objective of Russia's attacks on the energy sector remains unchanged – to cause a prolonged blackout of Ukraine's power system. However, the tactics of Russian attacks have evolved over the course of the war.

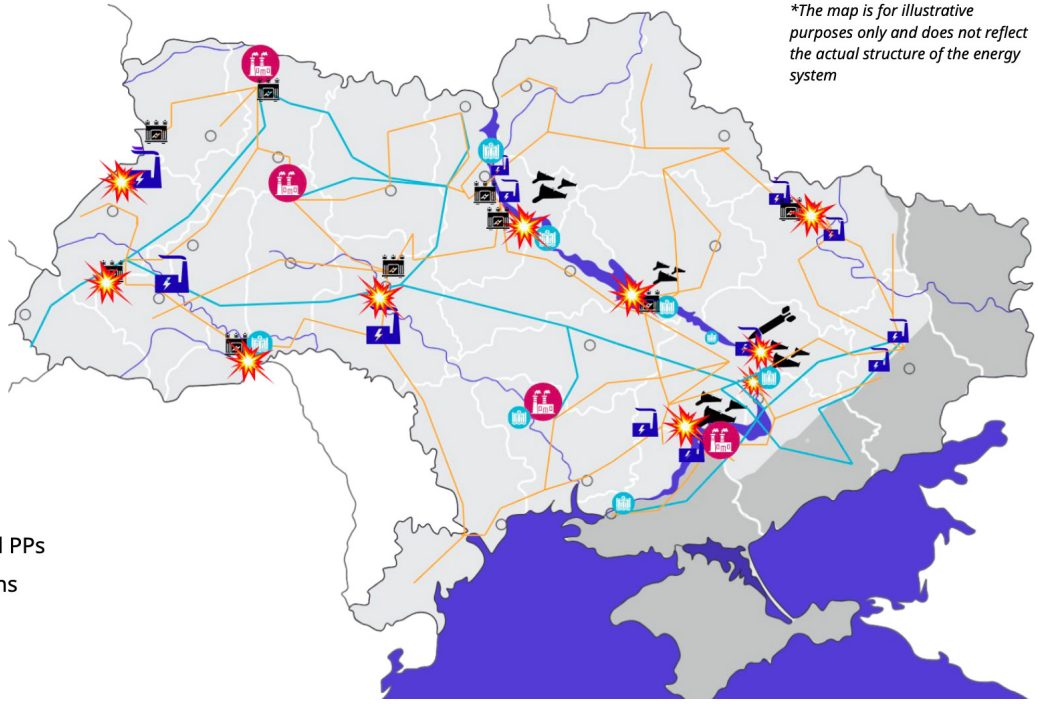
During the **2022–2023** heating season, Russia employed a "carpet bombing" tactic targeting all key high-voltage substations, major thermal power plants (TPPs), combined heat and power plants (CHPs), and hydropower plants (HPPs).

From **March 2023**, the tactics shifted: Russia concentrated massive drone attacks on energy facilities in specific regions, destroying both power stations and transmission infrastructure. The goal was to "cut off" frontline regions from the national grid and trigger local blackouts.

In **2024**, Russia combined strikes on regional infrastructure with large-scale attacks on TPPs, CHPs, HPPs, as well as key high-voltage substations critical for evacuating power from nuclear plants.

Attack tactics in previous periods

Russian attacks on power plants across the country and substations around nuclear plants



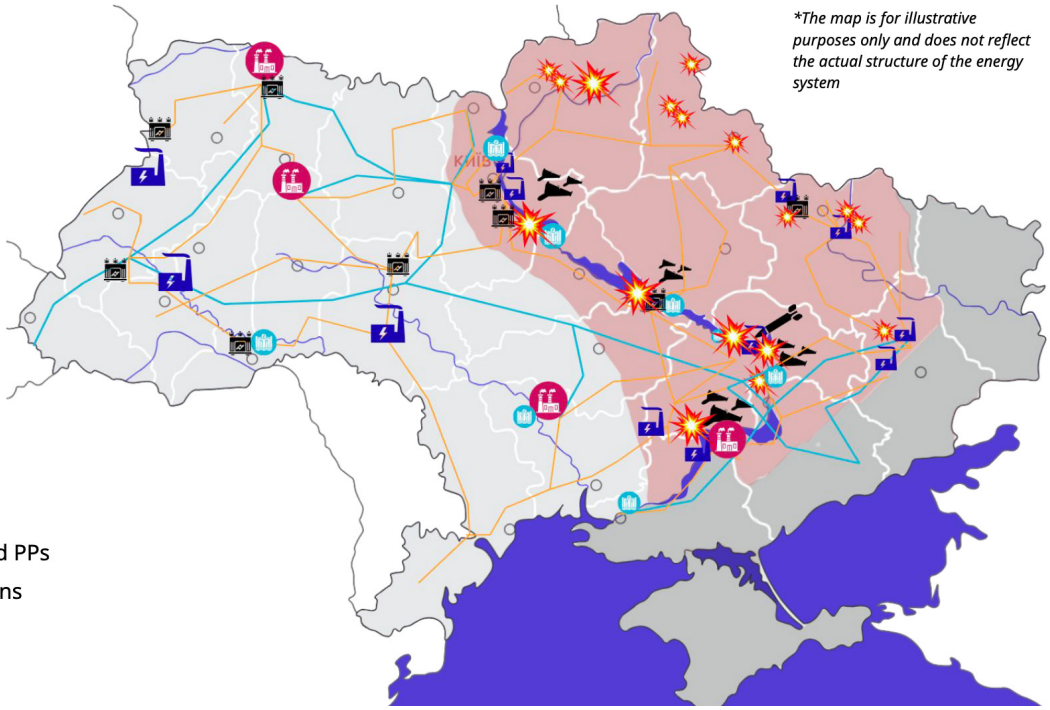
**The map is for illustrative purposes only and does not reflect the actual structure of the energy system*

- Nuclear PP
- Hydro PP
- Thermal and Combined PPs
- High-voltage substations
- Enemy attacks

From late August-early September **2025**, Russia continued targeting energy infrastructure in the frontline and adjacent regions. In the first half of October, Russia carried out seven attacks on gas production facilities in the eastern and north-eastern regions. On 10 October, Russia launched the first large-scale attack on power plants in the central, eastern, south-eastern and northern regions. Combined missile-and-drone attacks targeted TPPs in the Dnipro region, major CHPs in Kyiv, and hydropower plants of the Dnipro cascade. A second large-scale attack on thermal and hydropower plants followed on 21 October. On 30 October, Russia launched a third attack, striking generation and transmission infrastructure in western regions.

Attack tactics 2025–2026

Attacks in September–October 2025: strikes on generation facilities and on high voltage infrastructure in certain regions



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Consequences of Russia's current energy-terror tactics

The destruction of power plants, high-voltage substations of the transmission system, and regional electricity distribution infrastructure in specific regions has already caused a significant capacity deficit on the Left Bank of the country, including parts of central, as well as northern, eastern and south-eastern regions. Following the 10 October 2025 attack, the transmission system operator Ukrenergo has applied power outages in Kyiv, Kyiv region, Kharkiv region, Sumy region, Poltava region, Zaporizhzhia region, Dnipropetrovsk region, and Donetsk region. In the Chernihiv region, where the energy infrastructure suffered continuous drone attacks throughout August-September, scheduled consumption restrictions (hourly outage schedules) are in place.

Electricity supply on the Left Bank is further constrained by limited thermal and hydropower generation, as well as the absence of the Zaporizhzhia NPP from the power system. Before its occupation and shutdown, the plant provided a substantial share of supply to eastern and south-eastern regions. With continued attacks on energy infrastructure and power plants on the Left Bank, the risk of a persistent capacity deficit in these areas remains high.

As of 15 October, the capacity deficit caused by large-scale attacks was aggravated by a sharp increase in electricity demand across the country. Following the 21 October attack, scheduled consumption restrictions of up to two outage cycles per day were introduced in central, northern, eastern and south-eastern regions – indicating system-wide deficits of at least 1.5-2 GW at certain hours and outage durations of at least eight hours per day.

These attacks are already undermining the balancing of the entire power system and weakening its resilience. While eastern regions face deficits due to attacks, consumption on the Right Bank – where nuclear plants are located – remains largely unrestricted. A structural bottleneck arises in transmitting electricity west-to-east, as Ukraine's transmission network was designed for a system with major generation capacity located in the east, with no requirement to transfer large volumes of electricity from western regions.

Further large-scale attacks on the energy system – including on facilities on the Right Bank – may deepen the nationwide capacity deficit, resulting in significantly longer scheduled consumption restrictions.

Since September, Russia has concentrated large-scale attacks on energy and gas infrastructure in border and frontline regions. The risk of local blackouts cannot be ruled out.

The most difficult situation in October 2025 is observed in Chernihiv region, Sumy region, and the city of Kyiv. Alongside CHPs and 330–750 kV grid infrastructure, 110 kV and 35 kV substations, operated by regional electricity distribution operators, as well as gas distribution stations, have come under targeted attacks. These facilities are critical for delivering electricity and gas directly to consumers.

Whereas earlier Russia primarily used drones, it is now deploying the full range of available weapons – including missiles, artillery, and glide bombs (KABs). The geography of attacks has also broadened: whereas in previous years distribution infrastructure was targeted mainly within 10-20 km of the frontline, this year attacks have expanded into adjacent regions.

The objective of this tactic is to isolate specific regions from the power system and hinder their re-energisation via backup schemes by destroying the ability to transmit electricity and gas along alternative routes.

Russia has used this tactic before – for example, in Kharkiv region during the 2024-2025 heating season and in Odesa region during the 2022-2023 heating season.

Another feature of this year's attacks is **a focus on destroying cogeneration facilities** (CHPs) in frontline and north-eastern regions and in Kyiv. Unlike electricity or gas, thermal energy cannot be transferred from other regions, as each city has its own closed district-heating system. The objective is to severely disrupt or prevent the launch of centralised heating systems in affected areas.

Risk 2: Gas shortages for the energy sector and industry, and pressure challenges in the gas transmission system

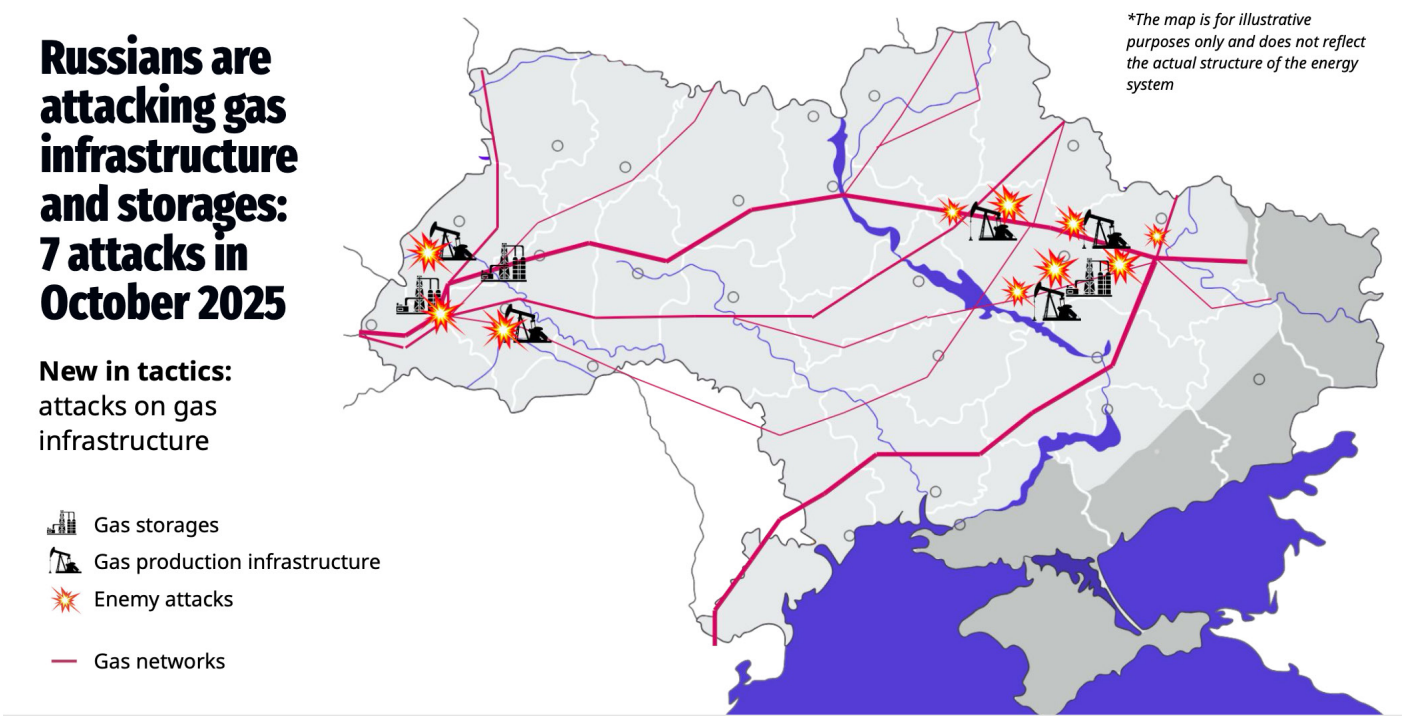
This year, gas infrastructure has also become a distinct target of Russian attacks. In addition to underground gas storage facilities (UGS), which have been attacked by Russian missiles and drones since 2024, strikes this year have focused on gas production infrastructure: wells, gas treatment units, and booster compressor stations – essential for stable production and delivery into the transmission system.

The pattern of attacks indicates an intention to destroy Ukraine's ability to produce gas. According to government data[14], in March 2025 Russian attacks destroyed 50% of gas production infrastructure, part of which was restored by early autumn. However, in October 2025, according to the Ministry of Energy[15], Russia carried out seven large-scale attacks on gas production facilities in eastern regions. According to Bloomberg[16], as a result of these attacks approximately 60% of gas production infrastructure has been destroyed or damaged.

Meanwhile, even before the start of the heating season, Ukraine has already been burning scarce natural gas to generate electricity at TPPs. According to UAFP sources, current consumption exceeds 50 million cubic metres per day, compared with the typical 30 million for this period.

The objective of these attacks is to complicate balancing of the gas transmission system this winter. According to the IEA[17], nearly 30% of winter gas consumption is covered by domestic production and imports, while the rest comes from UGS. Withdrawal capacity is limited to nearly 10% of storage volume per day. Russian attacks on UGS could significantly reduce withdrawal capacity, while strikes on transmission infrastructure could create bottlenecks in transporting gas from western to eastern regions. Damage to gas production facilities has already led, according to the Ministry of Energy, to the need to increase gas imports for this winter.

Storing gas "right at the threshold of needs" without carry-over reserves, using storage in autumn that will be needed in the coldest months, damage to production facilities, and insufficient imports may challenge system pressure in January 2025 - February 2026 – creating shortages for both power plants and industry. There are also existing constraints in dehydration and gas-treatment infrastructure damaged in spring.



Risk 3: Inadequacy of physical protection of energy facilities in the face of wartime challenges

Ukraine's thermal and hydroelectric power plants, as well as booster compressor stations at gas production sites and underground storage facilities, remain among the most vulnerable targets for Russian missile and drone strikes. Due to the large size and stationary nature of these facilities, the only effective form of protection available to them is air defense systems (ADS). However, historical data shows that even air defenses cannot provide full protection: according to RDNA data[18], between October 2022 and March 2023, around 60% of power plants and 45% of transmission system facilities were damaged.

In March 2025, a massive strike involving over 60 missiles and nearly 200 drones destroyed half of Ukraine's gas production capacity, while the October attacks later that year halted extraction in Poltava region[19].

High-voltage substations, despite the installation of protective shelters for critical equipment such as autotransformers, also remain highly vulnerable to drone attacks. Mass drone raids – typically 30-40 drones targeting a single facility – or guided bomb (KAB) strikes cause extensive damage to other essential components needed for substation operation, including circuit breakers, disconnectors, insulators, and relay protection systems.

Risk 4: Insufficient gas and coal reserves and complicated import logistics could lead to shortages in January 2025 - February 2026

Ukraine will enter the heating season with 13.2 bcm of gas in storage, as reported by Naftogaz of Ukraine[20] at the end of October. Of this volume, 4.6 bcm represents imported gas, according to the Ministry of Energy's August update[21].

After massive Russian strikes on domestic gas production facilities in October, the ministry announced plans to increase gas imports by approximately 30%. Assuming this refers to a 30% increase over the initially planned imports, this means an additional 1.38 bcm, bringing total imports to around 5.98 bcm.

The futures price for January 2026 at the TTF gas hub[22] is approximately $370-400 per 1000 cubic meters of natural gas. For comparison, at the beginning of 2025, gas prices ranged between $460-650 per 1000 cubic meters, based on Intercontinental Exchange (ICE) data[23]. Therefore, the additional 1.38 bcm of imported gas could cost Ukraine between $510-550 million.

At the same time, Ukraine is working to diversify its gas supply routes and reduce transportation costs, including through imports from Mediterranean and Adriatic countries, according to the Ministry of Energy. The most desirable solution for Ukraine would be to secure medium-term contracts, which would help ensure price stability and reliable supply.
Furthermore, coal reserves at thermal power plants (TPPs) and combined heat and power plants (CHPs) currently stand at only 2 million tons, compared to the 3 million tons required for stable winter operation.

This shortfall poses a risk to thermal generation during January - February 2025-2026, when air temperatures are typically lowest. The situation is further complicated by ongoing Russian attacks on coal mining enterprises in the Dnipropetrovsk region and on Ukrzaliznytsia infrastructure, which may also disrupt the delivery of imported thermal coal to power plants.

Risk 5: Russian disinformation campaign – "There's no electricity because it was all sold abroad"

Russian information and psychological operations (IPSO) have become one of the significant factors undermining Ukraine's resilience during the heating season. A key example[24], widely circulated since 2022 in media and social networks, is the false narrative claiming that power outages are not caused by Russian attacks, but rather by Ukrainian authorities and energy companies allegedly selling electricity abroad during domestic shortages.

Such disinformation campaigns exploit the existing crisis of public trust and are deliberately designed to demoralize Ukrainian society and fuel social discontent. By shifting blame away from Russian aggression, these operations aim to weaken social cohesion and erode confidence in national institutions during critical winter periods.

Risk 6: The debt crisis in the electricity market weakens energy companies' ability to prepare for winter and deters private investment in the sector

The debt crisis in Ukraine's electricity market, amounting to over €1.5 billion, significantly affects the ability of energy companies to prepare for the winter, particularly in terms of procuring and maintaining critical equipment reserves.

The transmission system operator, NPC Ukrenergo, currently holds the largest stockpile of such equipment. Despite being in a technical default and lacking new financial support tranches from international financial institutions (IFIs), the company has managed to maintain its warehouses thanks to previously secured international financing. However, there is no publicly available data on whether generation companies or electricity and gas distribution operators have replenished their own equipment reserves.

Furthermore, the accumulation of debt across the electricity market reduces the sector's investment attractiveness, discouraging private investors from engaging in system-wide projects. As a result, businesses tend to invest only in small-scale generation projects designed to cover their own energy needs, rather than contributing to broader energy system resilience.

IV.
SCENARIO FOR THE 2025-2026 HEATING SEASON

Taking all risks into account, the most adverse scenario for getting through the 2025–2026 heating season could look as follows:

Russia continues, on a daily basis, to concentrate its main strikes on energy infrastructure primarily in frontline and border regions. Energy professionals describe this as a "scorched-earth tactic," in which absolutely all types of energy facilities within specific regions become targets. At the same time, Russia carries out massive combined attacks on gas production assets as well as on thermal and hydro- power plants. Drawing on the experience of previous wartime heating seasons, repeat strikes against facilities already damaged in October cannot be ruled out, nor can renewed mass attacks on power plants and high-voltage substations in the western and southwestern regions.

In particular, in January 2025 - February 2026 – when electricity and gas consumption traditionally rises amid low air temperatures – the tactic of striking gas infrastructure may continue, including attacks on gas production sites, equipment at underground gas storage (UGS) facilities, high-voltage substations around nuclear power plants, and on thermal and hydro- power plants. In previous years, attacks on TPPs and HPPs aimed to destroy the balancing capacities the system needs to pass the morning and evening demand peaks reliably. Shelling of high-voltage substations that evacuate power from nuclear plants is intended to reduce system stability and trigger emergency shutdowns at NPPs.

Such a scenario would mean a persistent capacity deficit on the Left Bank of Ukraine – in the eastern, northern, and southeastern regions – and, with further damage to power plants in other parts of the country, an insufficient supply of electricity nationwide. Based on data from previous seasons, the capacity shortfall in the system caused by Russian attacks could reach 3.5-4 GW at certain times, even if technical imports from the EU remain possible.

In January 2025 -February 2026, the situation could be further complicated by localized electrical and/or gas blackouts in the frontline and adjacent regions. The likelihood of such disruptions is high, as the gas transmission system's ability to deliver and distribute gas in certain oblasts may be reduced by ongoing Russian attacks on local infrastructure. This could be aggravated by gas shortages resulting from insufficient imports and limited technical capacity to extract and transport gas from storage facilities.

The destruction of power evacuation schemes from combined heat and power plants (CHPs), as well as damage to their gas supply systems in the northern, eastern, and southeastern regions, could significantly delay the start of the heating season in these areas – or even make centralized heating impossible for many consumers.

V.
RECOMMENDATIONS

Ukraine urgently needs to shift from restoring damaged Soviet-era energy infrastructure toward systemic, long-term energy sector planning. Such planning should focus on building a new architecture of decentralized generation, capable of ensuring the resilience and flexibility of the energy system, while also stimulating regional development.

Experts from the Ukraine Facility Platform (UAFP) have developed **the Collaborative Effort Toolkit** – a practical instrument that outlines a comprehensive framework for multi-stakeholder cooperation and an eight-step implementation plan for regional energy projects. This approach enables coordination among government institutions, local authorities, private businesses, and international partners, creating a shared roadmap for transforming Ukraine's energy system into one that is adaptive, secure, and economically sustainable in the long term.

Recommendation 1: Transition to medium-term planning for the protection of the energy system, incorporating lessons from previous periods

A short-term perspective prevents the state from adapting quickly to changes in Russia's tactics of attacking Ukraine's energy infrastructure. As a result, the most vulnerable elements of the energy system remain large thermal and hydro- power plants, which continue to suffer the greatest damage from missile and drone strikes.

The planning of energy infrastructure protection must take into account both the tactics used by the enemy in 2022-2023 and those observed in 2024-2025. The government should develop comprehensive solutions to protect against massive Russian attacks, targeting not only critical equipment at high-voltage substations, but also equipment at distribution network operators (DSOs). These solutions must also include a protection system for gas production and distribution infrastructure, which has become a primary target of Russian terrorist attacks this year.

Recommendation 2: Revise approaches to energy resource stockpiling by incorporating higher risk levels and the need for economic development under wartime conditions

The current approach to winter preparedness, still based on pre-war trends and short-term planning, results in fuel and energy shortages that the state must compensate for in winter through high-cost imports. Consequently, international financial assistance and loans from IFIs are spent on covering resource deficits rather than on development projects.

A risk-informed strategy for forming fuel and energy reserves – one that accounts for heating season vulnerabilities and international market conditions – would allow the state to redirect more donor resources toward energy sector development projects. It would also be appropriate to implement the provisions of Naftogaz of Ukraine's Ownership Policy, which empower the company to act as the central agent for natural gas stockpiling and domestic market coordination. Fulfilling this role would enable timely accumulation of gas reserves needed for the winter period and reduce price risks for domestic market participants.

Recommendation 3: Prioritize the replacement of damaged power plant capacities with new decentralized generation

Focusing state efforts primarily on rebuilding damaged energy facilities has led to a situation where funds from the Ukraine Energy Support Fund and the EU's Ukraine Facility are directed mainly toward restoration and repairs, rather than creating incentives to attract investment in regional energy resilience. As a result, private businesses invest in new energy technologies only to strengthen their own autonomy, which has limited systemic impact on the national power grid. Moreover, many companies tend to rely on a single technology, using it for certain hours of the day, instead of developing a diversified energy mix that could ensure full-day resilience and stability.

While Ukraine cannot abandon the restoration and repair of damaged thermal and hydroelectric power plants or critical network infrastructure – most of which were built during the Soviet era – the only viable path forward is to redefine priorities. The goal should be to reduce dependence on large-scale generation facilities for system balancing by building new, small- and medium-scale power plants around major cities and industrial regions.

To achieve this, the state's strategic approach must focus on establishing regulatory and legislative frameworks that incentivize private investment in new generation and encourage cooperation between businesses, local communities, government institutions, and international donors. This approach should also be integrated into national and regional grid development strategies to ensure long-term sustainability and flexibility of Ukraine's energy system.

Recommendation 4: Ensure local communities readiness for cooperation with private business and the implementation of joint energy projects

The Ukraine Facility Platform (UAFP) has conducted field missions in 18 local communities, each with a potential generation capacity of 50-200 MW. During these missions, data were collected on available resources, grid constraints, land plots, and local economic and environmental conditions. Based on this information, UAFP developed a technology catalogue and a typical hybrid energy system model – combining bioenergy, solar and wind power plants, energy storage systems, and gas-based generation – which can be scaled and replicated across other regions.

The state should establish stable mechanisms of partnership between municipalities, private businesses, and energy companies – for example, through public-private partnership (PPP) agreements, ESCO models, or municipal energy cooperatives. It would also be appropriate to introduce profit-sharing mechanisms between investors and communities, as well as create municipal energy funds to reinvest revenues locally.

Such measures would enable the development of a three-year roadmap for deploying at least 3 GW of new generation capacity in priority regions, strengthening both energy security and local economic resilience.

Recommendation 5: Prioritize financial support from banks and international financial institutions for long-term projects of businesses and communities

Ukraine needs a dedicated program aimed at developing financial instruments based on the resources of international financial institutions (EBRD, EIB, IFC), donor organizations, and the Ukraine Facility program. These instruments should include preferential lending, grants, risk insurance, and opportunities for long-term capital engagement for both communities and private investors.

Legislative amendments are required to enable private and municipal companies to sign long-term contracts for the supply of heat and electricity. In parallel, the state should introduce a fast-track approval procedure for decentralized generation projects, along with fiscal incentives for private investors and mechanisms for localizing

energy equipment production in Ukraine.

After the first ten pilot projects are launched in selected regions, the model should be scaled nationwide. This process will require coordination with the European Commission and partnership with European businesses to attract technologies and leverage the benefits of an integrated energy market.

The Collaborative Effort Toolkit should be incorporated into both the Ukraine Plan and the Ukraine Facility monitoring framework as a key mechanism for implementing Ukraine's energy transformation. This will ensure that international assistance is directed not only toward repairing and rebuilding damaged infrastructure, but primarily toward developing a new decentralized energy system capable of delivering energy resilience and regional economic growth.

Recommendation 6: Complete integration with the EU energy market

It is essential for Ukraine to finalize the harmonization of electricity trading rules with ENTSO-E, open a competitive market for renewable energy generation, and guarantee the independence of the National Energy and Utilities Regulatory Commission (NEURC). These steps will pave the way for full integration with EU energy markets, increase investor confidence, and provide access to European Green Deal funding mechanisms.

Comprehensive market integration will also limit the monopolistic influence of large domestic energy players. The need to align Ukrainian market rules and standards with those of the EU will create an opportunity to eliminate distortive practices, such as price caps and public service obligations (PSOs). Such alignment will help stabilize and modernize Ukraine's energy market, making it more transparent, competitive, and attractive to both domestic and foreign investors, while simultaneously reinforcing Ukraine's institutional and economic integration with the European Union.

Data sources

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