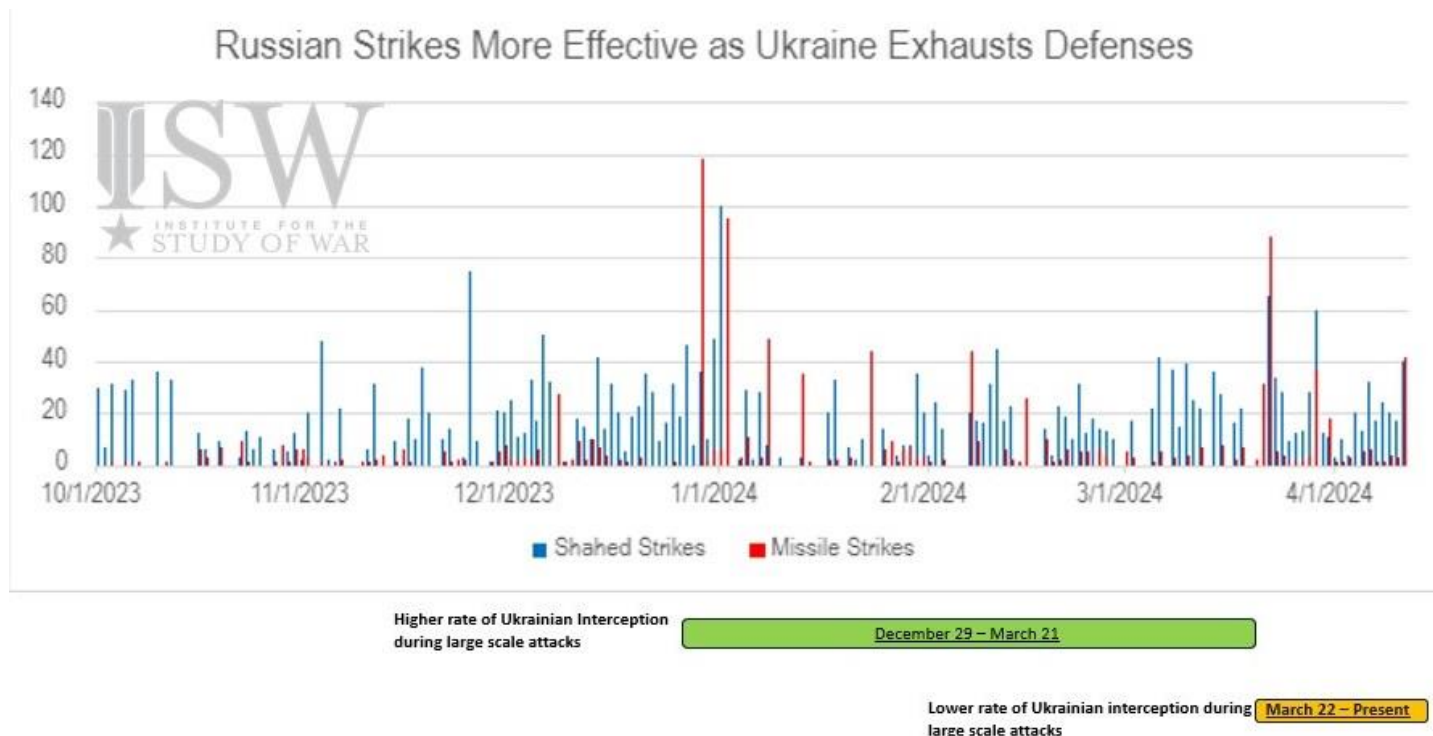


Special Report: Russian Strikes More Effective as Ukraine Exhausts Defenses

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Graphic by Riley Bailey | 2024© Institute for the Study of War

**Note on graphic: ISW compiled this data from Ukrainian reporting of Russian drone and missile strikes. Ukrainian officials have offered thorough reporting of particularly large missile and drone strikes but have provided less clear and detailed reporting about smaller individual strikes that Russian forces conduct along the frontline and against rear areas daily. Reporting specifically on the Russian use of Iskander ballistic missiles and S-300/S-400 missiles periodically lacks specificity, and therefore this graphic is not a comprehensive depiction of all Russian missile and drone strikes in Ukraine. The graphic does depict all notable strike series against critical infrastructure and Ukrainian cities away from the front lines since October 1, 2023, however.*

The exhaustion of US-provided air defenses resulting from delays in the resumption of US military aid to Ukraine combined with improvements in Russian strike tactics have led to the increasing effectiveness of Russian missile and drone strikes against Ukraine without a dramatic increase in the size or frequency of such strikes. Russian forces have conducted two sets of large missile strikes since intensifying missile and drone strikes at the end of December 2023: a series of strikes primarily targeting industrial and military facilities and critical infrastructure between December 2023 and February 2024 and an ongoing series of strikes heavily targeting Ukraine’s energy grid since late March.[1] Russian forces have not notably increased the

number or size of their strikes since the initial intensification of their strike campaign in December 2023 and have conducted a relatively consistent number and intensity of strikes over the winter and into the spring. Russian forces have nonetheless inflicted increasing and long-term damage to Ukrainian energy infrastructure this spring.[2] The increased effectiveness of Russian strikes does not appear to result from the use of more missiles and drones in each strike. Instead, Russian forces are exploiting the degradation of Ukraine's air defense umbrella caused by continued delays in Western security assistance and appear to be leveraging tactical adaptations stemming from several months of Russian efforts to test Ukrainian air defenses.[3] **This pattern is alarming because it suggests that, absent a rapid resumption of US military aid, Russian forces can continue to deal severe damage to Ukrainian forces on the front lines and to Ukrainian critical infrastructure in the rear even with the limited number of missiles Russia is likely to have available in the coming months.**

The degradation of Ukraine's air defense umbrella appears to be offering Russian forces greater opportunities to cause significant damage to Ukrainian critical infrastructure. Ukrainian forces reported a roughly 60 percent interception rate of missiles during the five large-scale Russian missile attacks between December 2023 and February 2024 and a roughly 50 percent interception rate during the three large-scale Russian missile strikes against Ukrainian energy infrastructure since March 22.[4] Ukrainian forces have reported an interception rate below 50 percent for missiles in two of the three large-scale Russian missile strikes since March 22 as compared to only one of the five large-scale Russian missile strikes between December 2023 and February 2024.[5] Russian strikes since March 22 have caused significant damage to Ukrainian energy infrastructure facilities, destroying or disabling several thermal power plants and hydroelectric power plants (TPPs/HPPs) and reportedly disrupting roughly 80 percent of electricity generation at Ukrainian TPPs.[6] The increasing damage and disruptions to major Ukrainian power plants threaten to accelerate the degradation of Ukraine's energy generation capabilities and constrain Ukraine's ability to stabilize future disruptions to its energy grid in the long term.[7] Ukrainian officials did not report similar widespread and long-term damage during Russian missile and drone strikes in the winter, although Russian forces primarily targeted Ukrainian defense industrial base (DIB) facilities and Ukrainian military infrastructure, causing effects that Ukrainian officials are generally more reluctant to provide details about.[8]

Ukrainian officials noted that large Russian missile and drone strikes in the winter forced Ukraine to use a considerable portion of Ukraine's air defense missile stockpile, and both Ukrainian and Western officials increasingly began to warn about critical shortages of air defense missiles in late January and February.[9] Zelensky warned in April that if Russian forces sustain the tempo of their current missile and drone strikes then Ukraine will likely lack the air defense missile stocks needed to protect Ukrainian cities and critical infrastructure.[10] **The continued degradation of Ukraine's air defense in the absence of US military aid will likely expand Russia's opportunities to inflict long-term and significant damage to Ukraine.**

Russian strikes are reportedly becoming more accurate as Russian forces are likely improving on tactical adaptations that they have been experimenting with for months. The *Washington Post* reported on March 29 that Ukraine's largest private energy company, DTEK, stated that more accurate and concentrated Russian strikes are inflicting greater damage against Ukrainian energy facilities than previous Russian attacks did.[11] Russian forces conducted a series of missile and drone strikes of varying sizes, using various combinations of drones, cruise missiles, and

ballistic missiles, throughout the spring and fall of 2023.[12] On December 29, Russian forces conducted the largest missile and drone strike against Ukraine since the start of the full-scale invasion and used a strike package that was likely a culmination of this experimentation.[13] Russian forces have since used diverse combined strike packages including large numbers of Shahed drones and various cruise and ballistic missiles against Ukraine, and the Russian military has likely further adapted these large, combined strikes after observing how Ukrainian air defense has responded.[14] Russian forces particularly appear to be leveraging ballistic missiles in these strikes since Ukraine only has a few air defense systems suitable for intercepting such missiles.[15] The systems that can intercept Russian missiles are also the ones most able to attack Russian fighter-bombers conducting glide-bomb attacks against Ukrainian front-line forces, and the Russians are taking advantage of the withdrawal of those air defense systems from the front lines to make slow but steady gains on the ground, as ISW has reported.[16] Russian forces will likely continue to adapt strike packages as Ukrainian and Russian forces compete in an offense-defense race around missile and drone strikes and air defense.

The increasingly effective Russian strike campaign in Ukraine threatens to constrain Ukraine's long-term warfighting capabilities and set operational conditions for Russia to achieve significant gains on the battlefield. Russian strikes have previously pressured Ukraine to prioritize protecting strategic objects, population centers, and energy infrastructure in deep rear areas over the frontline, offering Russian tactical aviation relative security to conduct intensified glide bomb strikes in support of Russian ground offensive operations.[17] Increased pressures on Ukrainian air defense may offer more flexibility to Russian aircraft and likely allow Russian forces to conduct glide bomb strikes at a greater scale and may even over time permit Russian forces to conduct large-scale aviation operations to bomb rear Ukrainian logistics and cities to devastating effect.[18] Increased Russian glide bomb strikes and expanded aviation operations would present Russian forces with greater opportunities to achieve operationally significant advances on the frontline. **Russia may be attempting to collapse Ukraine's energy grid to constrain Ukraine's defense industrial capacity, and long-term damage to Ukrainian power generation and transmission will likely have cascading effects on Ukraine's ability to expand its DIB and attract partners for joint production within Ukraine.**[19] Russia's effort to collapse Ukraine's energy infrastructure may also aim to exacerbate the humanitarian crisis in Ukraine and generate migration flows that place further strains on the Ukrainian government and Europe. Russia may ultimately aim to prevent Ukraine from being an economically viable state with cities devoid of basic services in order to incentivize outward migration and prevent the return of Ukrainians who left the country following the start of the full-scale invasion, and therefore, limit the Ukrainian military's manpower recruitment pool.

Ukrainian forces have previously been able to blunt the effects of the Russian strike campaign when they have had sufficient air defense assets and interceptors. Ukrainian forces prevented Russia's first attempt to collapse its energy grid in winter 2022-2023 after the arrival of critical Western air defense systems and reported a relatively high interception rate against Russian strikes in the spring and fall of 2023.[20] Zelensky recently stated that Ukraine will need an additional 25 Patriot air defense systems, likely meaning launchers, to extend full air defense coverage to all of Ukraine's territory.[21] The *Washington Post* reported on April 10 that Ukrainian Foreign Minister Dmytro Kuleba is currently focusing on obtaining seven Patriot batteries from other countries as quickly as possible to defend Ukraine's largest cities.[22] Kuleba reportedly stated that Ukraine would place at least one of these batteries closer to the frontline, presumably to constrain Russian aviation activity against Ukrainian ground forces trying to hold their ground in the face of Russian offensive

operations.[23] Consistent and sufficient aid that allows the Ukrainian military to establish a robust and wide air defense umbrella would likely allow Ukrainian forces to mitigate any adaptations Russian forces may attempt to employ in their strike campaign against Ukraine. Ukraine would then be able to defend its cities and critical infrastructure and disrupt Russian air attacks on Ukrainian frontline forces, allowing Ukrainian ground forces to slow or halt Russian gains.

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[1] <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-23-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-8-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-2-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-december-29-2023> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-february-7-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-april-11-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-22-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-29-2024>

[2] <https://isw.pub/UkrWar040524> ; <https://isw.pub/UkrWar041124> ; <https://isw.pub/UkrWar033024>

[3] <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-23-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-8-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-2-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-december-29-2023> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-february-7-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-april-11-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-22-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-29-2024>

[4] <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-23-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-8-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-january-2-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-december-29-2023> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-february-7-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-april-11-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-22-2024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-29-2024>

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[6] <https://isw.pub/UkrWar040524> ; <https://isw.pub/UkrWar041124> ; <https://isw.pub/UkrWar033024>

[7] <https://isw.pub/UkrWar040524> ; <https://isw.pub/UkrWar041124> ; <https://isw.pub/UkrWar033024>

[8] <https://isw.pub/UkrWar122923> ; <https://isw.pub/UkrWar010224>

[9] <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-january-9-2024> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-february-10-2024>

[10] <https://www.youtube.com/watch?v=Mkqmoyx5ByY> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-april-6-2024>

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[12] <https://isw.pub/UkrWar122723>; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-december-24-2023>; <https://isw.pub/UkrWar122223>; <https://isw.pub/UkrWar122023>; <https://isw.pub/UkrWar121723>; <https://isw.pub/UkrWar121623>; <https://isw.pub/UkrWar121323>; <https://isw.pub/UkrWar120823>; <https://isw.pub/UkrWar120723>; <https://isw.pub/UkrWar120323>; <https://isw.pub/UkrWar112123>; <https://isw.pub/UkrWar111823>; <https://isw.pub/UkrWar111623>; <https://isw.pub/UkrWar110623>; <https://isw.pub/UkrWar110423>

[13] <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-december-29-2023>

[14] <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-january-23-2024> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-january-8-2024> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-january-2-2024> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-december-29-2023> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-february-7-2024> ; <https://www.understandingwar.org/backgrounder/russian-offensive-campaign-assessment-april-11-2024>

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[15] <https://isw.pub/UkrWar041024>

[16] <https://isw.pub/UkrWar041124> ; <https://isw.pub/UkrWar030224> ; <https://isw.pub/UkrWar021724> ; <https://isw.pub/UkrWar021924> ; <https://isw.pub/UkrWar041024> ; <https://isw.pub/UkrWar040324>

[17] <https://isw.pub/UkrWar041024> ; <https://www.understandingwar.org/backgrounders/russian-offensive-campaign-assessment-march-28-2024>

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