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The consequences of Russia's war on Ukraine for climate action, food supply and energy security

Oli Brown, Antony Froggatt, Natalia Gozak,
Nataliya Katser-Buchkovska and Orysia Lutsevych



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Contents

	Summary	2
01	Introduction	3
02	Increasing Ukraine's vulnerability to climate change	4
03	Quiet weapons, heard around the world	7
04	Upended energy politics	9
05	Cracks in the international food system	13
06	Implications for climate action	18
07	Conclusion and recommendations	22
	About the authors	26
	Acknowledgments	27

Summary

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- Russia's war against Ukraine is, first and foremost, a calamity for the people of Ukraine. But both in Ukraine and around the world, the war is also increasing vulnerability to climate change, proliferating long-term security risks, complicating efforts on decarbonization and hindering multilateral climate action.
 - Ukraine already faced challenges in mitigating and adapting to climate change. The invasion has made the country even more vulnerable, having damaged the environment, destroyed infrastructure and thrown large parts of the population into poverty and displacement.
 - The effects of the war are being felt far beyond Ukraine's borders, particularly in terms of food and energy security. Russia's on-off blockade of Ukraine's food exports via the Black Sea and the impact of sanctions on Russia's own food and fertilizer exports have led to unprecedented volatility in global food prices. That volatility has increased hunger and deprivation.
 - The war has also upended global energy politics. Energy independence, belatedly viewed as a precondition to political security, is now a renewed concern for policymakers. What this means for climate action is uncertain. In the short term, new carbon emissions risk being locked in, as worries over energy independence could encourage countries to delay or cancel action on reducing their carbon footprints. But Russia's actions in fact provide a compelling argument for phasing down reliance on fossil fuels.
 - Ultimately, the war may prove a milestone in an emerging period of 'deglobalization' that could make collective action on global challenges, including climate change, more difficult. But much depends on actions taken now. Post-war, with international help, Ukraine can rebuild its damaged infrastructure and leap forward to a more resilient, cleaner and low-emission future. Meanwhile, it is more important than ever to promote the necessary multilateral cooperation that can help the world to avert dangerous climate change and adapt to its effects.

01

Introduction

The cascading impacts of war in Ukraine are affecting people not just in Ukraine but around the world.

The full-scale invasion of Ukraine by Russia may have begun on 24 February 2022, but it was preceded by the illegal annexation of Crimea by Russia in early 2014 and more than eight years of *de facto* occupation in parts of the Donetsk and Luhansk regions of eastern Ukraine.

The disastrous human and environmental toll of conflict in Ukraine is having significant geopolitical ramifications, including not least growing fears over the use of nuclear weapons. At the same time, the war is increasing vulnerability to climate change in Ukraine and around the world, and complicating collective efforts to reduce greenhouse gas emissions. While the war is an immediate existential threat for Ukraine, climate change is a short-, medium- and long-term threat globally, particularly for the most vulnerable, including women, children and the poor.¹

About this paper

This research paper is written by a group of authors with expertise in Russian and Ukrainian politics, climate security and climate governance, environmental governance and history. It was originally drafted as an independent contribution to the Organization for Security and Co-operation in Europe (OSCE)'s work on climate security,² but has now been updated and modified for a wider audience.

The purpose of this paper is to assess the impacts of the war in Ukraine on vulnerability to climate change, its effects on global food security and energy provision, and to consider what the war means for the prospects for action on climate change both in Ukraine and globally.

¹ See, for example: IPCC (2023), *Sixth Assessment Report: Synthesis Report*, <https://www.ipcc.ch/assessment-report/ar6>.

² This independent experts' analysis was prepared within the framework of the Organization for Security and Co-operation in Europe (OSCE)'s extra-budgetary funded project titled 'Strengthening responses to security risks from climate change in South-Eastern Europe, Eastern Europe, the South Caucasus and Central Asia' (project number: 1102151), which is implemented in partnership with the Berlin-based think-tank adelphi and funded by Andorra, Austria, Czech Republic, Finland, France, Germany, Italy, Liechtenstein, Luxembourg, Norway, Poland, Sweden and the US.

02 Increasing Ukraine's vulnerability to climate change

The war is degrading Ukraine's capacity to cope with climate change.

The full-scale invasion of Ukraine by Russia is the biggest and bloodiest land war in Europe since the Second World War. According to the Office of the United Nations High Commissioner for Human Rights (OHCHR), by 16 July 2023 9,287 Ukrainian civilians had been killed in the invasion and another 16,384 civilians reported injured. However, OHCHR admits that the real numbers for civilian casualties are almost certainly higher.³ This is before counting the tens of thousands of Ukrainian soldiers killed and injured in the war, a toll that the US intelligence services estimated in April 2023 at 15,500–17,500 killed and 124,500–131,000 wounded.⁴

Russia's war on Ukraine has also led to the highest number of refugees in Europe since the late 1940s. The UN has registered over 6.2 million Ukrainian refugees

³ OHCHR (2023), 'Ukraine: Civilian casualties from 1 to 16 July 2023', 17 July 2023, <https://www.ohchr.org/en/news/2023/07/ukraine-civilian-casualties-1-16-july-2023>.

⁴ Faulconbridge, P. (2023) 'Ukraine war, already with up to 354,000 casualties, likely to last past 2023 – U.S. documents', Reuters, 12 April 2023, <https://www.reuters.com/world/europe/ukraine-war-already-with-up-354000-casualties-likely-drag-us-documents-2023-04-12>.

across the world,⁵ while a further 5.9 million people are displaced within Ukraine (down from 6 million at the end of 2022).⁶ Women and children comprise 90 per cent of refugees and 60 per cent of the internally displaced.⁷

In addition to the human impact, the war has devastated Ukraine's economy. Ukraine's GDP shrank by 30.3 per cent in 2022, while inflation hit 26.6 per cent in real terms.⁸ This situation is leading to perhaps one of the fastest descents into poverty experienced in modern times: the number of people living in poverty increased almost five-fold, from 5.5 per cent to 24.5 per cent of the population, between 2021 and the end of 2022, with an extra 7.1 million Ukrainians falling below the global poverty line.⁹

Ukraine's GDP shrank by 30.3 per cent in 2022, while inflation in the country hit 26.6 per cent in real terms.

Alongside all of this, the war is having a ruinous impact on Ukraine's environment and undermining the country's ability to tackle the effects of climate change. Russia's missiles, drones and artillery shells have damaged water infrastructure, destroyed energy installations and flattened entire cities. Shelling, unexploded ordnance and landmines have rendered large areas of agricultural land unusable. Fighting and military activity in Ukraine's forests and greenbelts have damaged water catchments and forests. This damage, along with the rising occurrence and severity of droughts, will increase the risk of large wildfires. It is estimated that the area of forest burned in wildfires was 25 times larger in 2022 than in 2021.¹⁰

Ukraine was vulnerable to the impacts of climate change even before the destruction wrought by the 2022 invasion. It was struggling with the legacy of economic and environmental damage from the 2014 conflict,¹¹ as well as poverty, high unemployment and crumbling infrastructure.

⁵ UNHCR (2023), 'Operational Data Portal: Ukraine Refugee Situation', <https://data.unhcr.org/en/situations/ukraine> (accessed 29 July 2023).

⁶ IOM (2023), 'Displacement Tracking Matrix: Ukraine', <https://dtm.iom.int/ukraine> (accessed 29 July 2023).

⁷ UNEP (2022), *The Environmental Impact of the Ukraine Conflict: A Preliminary Review*, report, Nairobi: UN Environment Programme, <https://www.unep.org/resources/report/environmental-impact-conflict-ukraine-preliminary-review>.

⁸ International Monetary Fund (2023), 'Ukraine – Datasets', <https://www.imf.org/external/datamapper/profile/UKR> (accessed 16 August 2023).

⁹ World Bank, Government of Ukraine, European Union and United Nations (2023), *Ukraine: Rapid Damage and Needs Assessment – February 2022–February 2023*, report, <https://documents1.worldbank.org/curated/en/099184503212328877/pdf/P1801740d1177f03c0ab180057556615497.pdf>.

¹⁰ Belousova, K. (2022), 'Environmental priorities of the post-war reconstruction of Ukraine', *EcoPolitic*, 8 September 2022, <https://ecopolitic.com.ua/en/news/nazvani-ekologichni-prioriteti-pisly-avoiennoi-vidbudovi-ukraini-2>. Monthly fire warnings are available from the Regional Eastern Europe Fire Monitoring Center (see <https://nubip.edu.ua/en/node/9087/2>), as part of the Global Fire Monitoring Center (<https://gfmc.online>).

¹¹ Andrushchenko, S. (2016), 'The Environmental Impact Of Military Actions In Eastern Ukraine And The Annexation Of The Crimea', *Ukraine Analytica*, 24 May 2016, <https://ukraine-analytica.org/the-environmental-impact-of-military-actions-in-eastern-ukraine-and-the-annexation-of-the-crimea>.

Climate change models predict that Ukraine will face rising temperatures, shifting precipitation patterns, more frequent floods, changes in the onset of seasons and rising sea levels along its Black Sea coast.¹² Water security is a particular concern, given that Ukraine is one of the least water self-sufficient countries in Europe.¹³ Moderate- and high-emission scenarios foresee the scorching of agricultural land, accompanied by decreases in wheat yields – affecting one of Ukraine's most important exports.¹⁴ At the same time, the overall decrease in river flows is likely to aggravate pollution and worsen water quality, while rising temperatures will cause wetlands and lakes in the Polissya area and in northern Ukraine to dry up, which could lead to more frequent fires and deteriorating air quality.¹⁵

Even if the war were to end tomorrow, it has already significantly undermined Ukraine's ability to mitigate and adapt to climate change. Ukraine's scope to focus on anything other than day-to-day survival is limited. Many of the experts and professionals who would have otherwise been engaged in addressing the impacts of climate change have either joined the war effort or fled the country. And the war has drained the national finances, as it has the country's human resources. The government allocated 50 per cent of its 2023 budget to the war effort;¹⁶ its budget deficit in 2023 is forecast to reach \$38 billion.¹⁷ With reconstruction costs estimated at anywhere between €411 billion and €750 billion,¹⁸ Ukraine's fiscal position is unlikely to improve in the near future.

¹² USAID (2016), 'Climate Change Risk Profile: Ukraine', <https://www.climatelinks.org/resources/climate-risk-profile-ukraine>.

¹³ OSCE (2017), *Climate change and security in Eastern Europe: Republic of Belarus, Republic of Moldova, Ukraine – Regional Assessment*, report, Vienna: Organization for Security and Cooperation in Europe, <https://www.osce.org/secretariat/355496>.

¹⁴ Müller, D., Jungandreas, A., Koch, F. J. and Schierhorn, F. (2016), 'Impact of Climate Change on Wheat Production in Ukraine', *German-Ukrainian Agricultural Policy Dialogue (APD)*, May 2016, https://www.researchgate.net/publication/307569914_Impact_of_climate_change_on_wheat_production_in_Ukraine.

¹⁵ EU4Climate (2021), *Legal and institutional analysis of climate change adaptation in Ukraine on national and sectoral levels in Ukrainian*, <https://eu4climate.eu/2020/07/09/adaptation-planning>.

¹⁶ Ministry of Finance of Ukraine (2022), *Parliament of Ukraine adopted State Budget for the year 2023*, <https://www.kmu.gov.ua/en/news/verhovna-rada-ukrayini-uhvalila-derzhbyudzheth-na-2023-rik> (accessed 12 May 2023).

¹⁷ Reuters (2022), 'Ukraine budget deficit seen at \$38 bln in 2023 – Interfax quotes PM', 14 September 2022, <https://www.reuters.com/world/europe/ukraine-budget-deficit-seen-38-bl-2023-interfax-quotes-pm-2022-09-14>.

¹⁸ World Bank, Government of Ukraine, European Union and United Nations (2023), *Ukraine: Rapid Damage and Needs Assessment*; Majkut, J. and Dawes, A. (2022), 'Opportunities and Challenges for Renewable Energy Generation in Ukraine', Washington, DC: Center for Strategic and International Studies, 26 September 2022, <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

03

Quiet weapons, heard around the world

Energy and food – and even Ukraine’s harsh winter climate – have been weaponized in this war.

One of the first responses by many European countries to the invasion was to phase down imports of Russian oil and gas, as they sought to exert financial pressure on Russia. Meanwhile, Russia slashed energy supplies to many countries across Europe in an attempt to sap their support for Ukraine and to retaliate for sanctions.

Following Russia’s failed attempt to capture Kyiv early in the invasion, its forces began attacking energy installations across Ukraine. Since October 2022, nearly all large energy facilities across the country have been attacked by missiles or drones.¹⁹ The clear intent behind these attacks was to destroy the Ukrainian economy, weaponize Ukraine’s harsh winter climate and freeze the Ukrainian population into submission.

Food has also become a tool of political influence, such that former Russian president Dmitry Medvedev referred to it as Russia’s ‘quiet, but formidable, weapon’.²⁰ Russia’s early blockades of Ukraine’s Black Sea export routes – coupled with Western sanctions on Russia’s exports – led to rapid rises in food prices, with direct impacts

¹⁹ International Energy Charter (2023), *Brief Ukrainian energy sector evaluation and damage assessment – VI (as of January 24, 2023)*, report, Brussels: Energy Charter Secretariat, https://www.energycharter.org/fileadmin/DocumentsMedia/Occasional/2023_01_24_UA_sectoral_evaluation_and_damage_assessment_Version_VI.pdf.
²⁰ Gijs, C. (2023), ‘Russia threatens to limit agri-food supplies only to ‘friendly’ countries’, Politico, 1 April 2022, <https://www.politico.eu/article/russias-former-president-medvedev-warns-agricultural-supplies-restricted-to-friendly-countries>.

on hunger around the world. The resulting price rises for basic foodstuffs have exposed new fault lines in the global food system and contributed to growing tensions in geopolitical alliances.

The invasion has led to unprecedented spikes in global energy and food prices, which have created a cost-of-living crisis that is impoverishing millions and further increased vulnerability around the world. High energy prices hit the poor hardest. People below the international poverty line of \$2.15 a day typically spend more than one-quarter of their non-food consumption on energy. One study estimated that an additional 78 million–141 million people worldwide could be pushed into extreme poverty as a result of the war's impact on energy prices.²¹

Russia's strategy of 'energy blackmail' failed – at least during the winter of 2022–23. Ukraine successfully resisted Russia's attacks and survived. Neither did the rest of Europe run out of energy, in part due to concerted action by policymakers to find alternative suppliers and to encourage energy efficiency measures.²² But direct losses to the Ukrainian energy sector were substantial: by March 2023, estimates of the damage to utilities and district heating were at least \$10.6 billion.²³ The average Ukrainian household had to endure five cumulative weeks without power during the winter of 2022.²⁴

Ultimately, the war is likely to increase the longer-term impacts of climate change in Ukraine and beyond by compounding existing, associated causes of insecurity – in particular, food insecurity, economic stagnation, resource insecurity and large-scale human displacement – while reducing the fiscal space to mitigate emissions and adapt to climate change.

²¹ Guan, Y. et al. (2023), 'Burden of the global energy price crisis on households', *Nature Energy*, 16 February 2023, 8, pp. 304–16, <https://doi.org/10.1038/s41560-023-01209-8>.

²² Cohen, A. (2023), 'Europe Is Winning The Energy War Against Russia', *Forbes*, 19 January 2023, <https://www.forbes.com/sites/arielcohen/2023/01/19/europe-is-winning-the-energy-war-against-russia>.

²³ World Bank, Government of Ukraine, European Union and United Nations (2023), *Ukraine: Rapid Damage and Needs Assessment*.

²⁴ Cilliers, J. (2023), 'Uncovering the reality of Ukraine's decimated energy infrastructure', UNDP, 12 April 2023, <https://www.undp.org/ukraine/blog/uncovering-reality-ukraines-decimated-energy-infrastructure>.

04 Upended energy politics

The war's profound effects on global energy markets have mixed implications for the green transition.

Beyond its immediate impact on the battlefield and in the cities of Ukraine, the war is affecting global energy politics in ways that will likely reverberate for decades. The war has served as a 'clarifying moment' that has exposed the downsides of global interdependencies,²⁵ particularly for countries like Germany whose economic model relied on low-cost sources of Russian gas. Indeed, it has made the Russian energy resources that much of Europe depended on not only unreliable but unwelcome.²⁶

Global prices were high before the invasion due to a mismatch of supply and demand, but the actions of Russia made a difficult situation worse. In 2021, Russia was responsible for about 12 per cent of global energy production.²⁷ It was a major exporter of fossil fuels, accounting (by volume) for around 5.5 per cent of global coal production, 11 per cent of global oil production and 17 per cent of the global gas supply in 2021.²⁸ The European Union (EU) was particularly dependent on Russian piped gas.

The onset of war resulted in a steep short-term jump in energy prices: in nominal terms, crude oil prices increased by 350 per cent from April 2020 to April 2022 – the largest increase for any equivalent two-year period since the 1970s.²⁹ Coal and gas prices all reached historic highs. Higher gas prices, particularly in Europe, increased

²⁵ Muggah, R. (2022), 'The war in Ukraine is triggering a re-evaluation of global systemic risk', World Economic Forum, 30 June 2022, <https://www.weforum.org/agenda/2022/06/ukraine-war-global-systemic-risk-resilience>.

²⁶ Mikulska, A. (2022), 'Climate Action Meets Energy Security: The Russian Invasion of Ukraine Adds a New Dimension to Energy Transition', Foreign Policy Research Institute, 27 June 2022, <https://www.fpri.org/article/2022/06/climate-action-meets-energy-security-the-russian-invasion-of-ukraine-adds-a-new-dimension-to-energy-transition>.

²⁷ International Energy Agency (2022), 'Key World Energy Statistics 2021', <https://www.iea.org/reports/key-world-energy-statistics-2021/supply> (accessed 3 May 2023).

²⁸ U.S. Energy Information Administration (2022), 'International > Total Energy Production 2021', <https://www.eia.gov/international/overview/world> (accessed 20 April 2023).

²⁹ Guénette, J.-D. and Khadan, J. (2022), 'The energy shock could sap global growth for years', World Bank Blogs, 22 June 2022, <https://blogs.worldbank.org/developmenttalk/energy-shock-could-sap-global-growth-years>.

the cost of electricity for consumers, with the average household prices across the EU rising from €23.5 per 100 kilowatt hours (kWh) in the second half of 2021 to €28.4 per 100 kWh in the same period of 2022.³⁰

However, a combination of supply diversification (particularly via the import of liquefied natural gas – LNG – from the US and other countries), an active demand-reduction and energy efficiency campaign, and a milder winter led to greater confidence and increased availability of gas in the spring of 2023, allowing for stable and, in some cases, lower gas and electricity prices in Europe.

Higher energy prices during 2022 and at the start of 2023 strained national finances at the same time as inflation was diluting consumers' buying power. Many countries introduced price support measures to blunt the impact on their consumers. International Energy Agency data suggest that more than \$500 billion in extra spending was committed to reduce energy bills in 2022, mainly in advanced economies.³¹ These measures may have helped individuals in the short term, but they came at a long-term cost in terms of mounting debt and fewer resources to invest in priorities such as adaptation to climate change. Despite efforts by governments to insulate consumers from global price rises, the first year of the war nearly doubled household energy costs around the world.³²

This is mixed news for the green transition. On the one hand, the invasion could accelerate a global shift to green energy and greater energy efficiency.³³

Many politicians are realizing that ambitious climate action is necessary for energy security, and that energy security is a precondition for political security.³⁴ Russia's invasion of Ukraine has demonstrated to many countries exactly why they must reduce their reliance on fossil fuels from unreliable partners. Investing in renewable energy and energy efficiency has become almost a patriotic act. Following the invasion in February 2022, people in Poland were reported to be installing solar panels and heat pumps to free themselves from reliance on Russian-supplied energy.³⁵

Meanwhile, the high and volatile energy prices are shifting calculations about the payback period of renewable energies, adding economic weight to the political and environmental arguments for their installation.³⁶ Institutional incentives are also emerging. Under its REPowerEU plan, the EU plans to increase of the share of renewable energy in its supply to 42.5–45 per cent of the total by 2030, up from

³⁰ Eurostat (2023), 'Electricity & gas hit record prices in 2022', 26 April 2023, <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230426-2>.

³¹ International Energy Agency (2023), *Fossil Fuels Consumption Subsidies 2022*, report, February 2023, <https://www.iea.org/reports/fossil-fuels-consumption-subsidies-2022>.

³² Hubacek, K., Yan, J., Shan, Y. and Guan, Y. (2023), 'Russia–Ukraine war has nearly doubled household energy costs worldwide – new study', *The Conversation*, 16 February 2023, <https://theconversation.com/russia-ukraine-war-has-nearly-doubled-household-energy-costs-worldwide-new-study-200104>.

³³ Romanko, S. (2022), 'Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive', *EURACTIV*, 24 October 2022, <https://www.euractiv.com/section/energy/opinion/ukraine-reconstruction-must-steer-clear-of-energies-that-allowed-putin-to-thrive>.

³⁴ Birnbaum, M. (2022), 'Heat Pumps Take off in Coal-Loving Poland amid Ukraine War', *Washington Post*, 6 September 2022, <https://www.washingtonpost.com/climate-solutions/2022/09/06/poland-ukraine-heat-pumps-climate>.

³⁵ *Ibid.*

³⁶ *Ibid.*

the 40 per cent target agreed at the end of 2021.³⁷ Germany raised its renewable energy target from 65 per cent to 80 per cent of the power mix by 2030.³⁸ In the US, meanwhile, the Inflation Reduction Act (IRA) directs nearly \$400 billion in federal funding for clean energy, to be delivered via a mix of tax incentives, grants and loan guarantees.³⁹

These incentives are already having an impact: within three months of the IRA being enacted, commitments to investing in US electric vehicle battery supply chains totalled \$13.5 billion, compared with \$7.5 billion in the previous three-month period.⁴⁰ Analysis suggests that the IRA will result in over \$91 billion being invested in the US battery industry over the next 10 years.⁴¹

On the other hand, some of the actions being taken in response to the energy crisis risk locking in higher emissions far into the future.

The goal of decarbonizing energy systems, frequently mentioned in policy circles before the war, has been superseded by 'energy security' and 'energy affordability'. The focus is now on 'energy independence', where the aim is to secure, like the US, sufficient domestic sources of energy to not rely on imports, regardless of how carbon-intensive those sources may be. This has caused the phasing-out of less clean forms of energy to stall.⁴² Indeed, any mention of phasing out fossil fuels was struck from the COP27 agreement at the very last moment.⁴³

Across the world, countries are building or reopening dirty power stations at home, while investing in coal, oil and gas development abroad.⁴⁴ Within five days of the invasion, German chancellor Olaf Scholz announced that Germany would use any power source, including nuclear energy, to ensure its energy security.⁴⁵ This statement was all the more remarkable given that the government had vowed to close all of Germany's nuclear stations in the aftermath of the 2011 meltdown at the Fukushima nuclear plant in Japan.⁴⁶ Indeed, while Germany has closed its last nuclear power plants, it has since taken the previously unthinkable decision

³⁷ European Council (2023), 'Council and Parliament reach provisional deal on renewable energy directive', press release, 30 March 2023, <https://www.consilium.europa.eu/en/press/press-releases/2023/03/30/council-and-parliament-reach-provisional-deal-on-renewable-energy-directive>.

³⁸ Lepesant, G. (2023), 'Higher renewable energy targets in Germany: How will the industry benefit?', IFRI, 6 January 2023, <https://www.ifri.org/en/publications/briefings-de-lifri/higher-renewable-energy-targets-germany-how-will-industry-benefit#:~:text=The%20level%20of%20ambition%20of,against%2047%25%20in%202022.>

³⁹ US Environmental Protection Agency (2023), 'Summary of Inflation Reduction Act Provision Related to Renewable Energy', <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy>.

⁴⁰ Nakano, J. and Huang, C. (2023), 'U.S. Push to Secure EV Battery Supply Chains and the Role of China', Washington, DC: Center for Strategic & International Studies, 6 February 2023, <https://www.csis.org/analysis/us-push-secure-ev-battery-supply-chains-and-role-china>.

⁴¹ Majkut, J. (2023), 'The Inflation Reduction Act: A Race to the Top or Protectionism in High Gear', Washington, DC: Center for Strategic & International Studies, 1 March 2023, <https://www.csis.org/analysis/inflation-reduction-act-race-top-or-protectionism-high-gear>.

⁴² Mathis, W. and Krukowska, E. (2022), 'Ukraine Invasion Threatens Europe's Climate Change Goals', Bloomberg, 7 July 2022, <https://www.bloomberg.com/news/articles/2022-07-07/ukraine-invasion-threatens-europe-s-climate-change-goals>.

⁴³ Fickling, D. (2022), 'The World Will Never Agree to Phase Out Petroleum. And That's OK', Bloomberg, 20 November 2022, <https://www.bloomberg.com/opinion/articles/2022-11-20/cop27-no-agreement-on-petroleum-phase-out-if-emissions-are-falling-that-s-ok?leadSource=uverify%20wall>.

⁴⁴ Rawnsley, J. (2022), 'Food and energy crises threaten to distract from climate talks', *Financial Times*, 10 October 2022, <https://www.ft.com/content/6f352052-f2bc-401a-beed-b89d9e98a23d>.

⁴⁵ Mikulska (2022), 'Climate Action Meets Energy Security'.

⁴⁶ Connolly, K. (2022), 'Germany to delay phase-out of nuclear plants to shore up energy security', *Guardian*, 5 September 2022, <https://www.theguardian.com/world/2022/sep/05/germany-to-delay-phase-out-of-nuclear-plants-to-shore-up-energy-security>.

to approve the use of more coal-fired power plants.⁴⁷ At the end of July 2023, the UK government announced plans to permit hundreds of new oil and gas licences in the North Sea, in the name of 'energy independence'⁴⁸ – indicative of a steady drift away from the UK's once firmly held climate commitments.

With supplies of Russian gas faltering, in mid-2022 Europe turned to imported LNG to refill its gas storage facilities in advance of winter. However, the nature of LNG – which is processed, shipped and cooled – means that, in normal circumstances, its climate footprint is far higher than that of piped natural gas.⁴⁹ Increased reliance on LNG will therefore expand the carbon footprint of European gas supplies as a whole (including piped gas and LNG): by September 2022, total carbon emissions from gas had grown from just over 30 kg of carbon dioxide (CO₂) per barrel of oil equivalent (boe) to almost 40 kg of CO₂ per boe.⁵⁰

The war has also prompted an urgent search for new strategic partners to replace Russian energy, including in Africa and the Middle East. This is opening new fossil fuel energy supply chains across the world, at a time when the imperative of the globally agreed target of no more than 1.5°C of warming means that governments should be forbidding new fossil fuel developments and phasing down existing ones. Writing in the *Financial Times* in October 2022, climate activist Mohamed Adow warned:

Due to the current crises, we're seeing a dash for gas in Africa, effectively turning Africa into Europe's gas station and hooking us on the dirty stuff. And we have African leaders who will want to grab that opportunity, particularly given the rise in fossil fuel prices.⁵¹

The dramatic push by European countries and others to compensate for lost Russian supplies of gas may end up creating a massive oversupply in gas infrastructure. New analysis released just before the COP27 UN climate conference in November 2022 pointed out that, if each of the new gas projects announced to deal with the supply crunch came to fruition, there would be a global oversupply of about 500 megatonnes of LNG by the end of the decade. This amount is equivalent to five times as much gas as the EU imported from Russia in 2021 and double Russia's total gas exports that year.⁵²

In other words, while political leaders repeat the mantra of reducing dependence on imports of fossil fuels, their actions may have the opposite effect.

⁴⁷ Deutsche Welle (2022), 'Germany warns world not to delay climate action', 9 October 2022, <https://www.dw.com/en/petersberg-climate-dialogue-germany-rejects-delaying-climate-action/a-62523301>.

⁴⁸ UK Government (2023), 'Hundreds of new North Sea oil and gas licences to boost British energy independence and grow the economy', press release, 31 July 2023, <https://www.gov.uk/government/news/hundreds-of-new-north-sea-oil-and-gas-licences-to-boost-british-energy-independence-and-grow-the-economy-31-july-2023>.

⁴⁹ According to Rystad Energy analyst Patrick King, LNG imports generate between 61 per cent and 176 per cent more greenhouse gas emissions than the supply from Russia via the TurkStream pipeline. See Rystad Energy (2023), *Renewable Energy Outlook – Energy Transition Report*, report, 25 April 2023, <https://www.rystadenergy.com/insights/renewables-energy-transition-report-april-2023>.

⁵⁰ Ghilotti, D. (2022), 'Europe's reliance on LNG imports triggering surge in emissions', upstream, 29 September 2022, <https://www.upstreamonline.com/lng/europe-s-reliance-on-lng-imports-triggering-surge-in-emissions/2-1-1320605>.

⁵¹ Rawnsley (2022), 'Food and energy crises threaten to distract from climate talks'.

⁵² Harvey, F. (2022), 'Major push' for gas amid Ukraine war accelerating climate breakdown', *Guardian*, 10 November 2022, <https://www.theguardian.com/environment/2022/nov/10/major-push-for-gas-amid-ukraine-war-accelerating-climate-breakdown>.

05 Cracks in the international food system

Blocked food shipments in the Black Sea cause hunger and food poverty on the other side of the world.

Volatile international prices for food have been another consequence of the war, with far-reaching geostrategic implications – so much so that the World Economic Forum’s 2023 Global Risks Report ranked a food supply crisis as one of the main threats facing the world.⁵³

Prior to the invasion, Ukraine was an important cog in the global food system, accounting for 10 per cent of global wheat exports, 13 per cent of barley exports, 15 per cent of corn exports, and more than 50 per cent of the global market for sunflower oil.⁵⁴ Ninety-five per cent of Ukrainian grain exports⁵⁵ were transported by sea from Ukraine’s Black Sea ports, including Kherson, Mariupol and Odesa – all of which have been blockaded or occupied by Russian forces.

Ukraine’s grain production and exports dropped by 25 per cent and 15 per cent respectively in 2022, compared with 2021.⁵⁶ Interruption to the flow of exports from the Black Sea, as well as the progressively tightened international sanctions on Russia (itself a major exporter of foodstuffs and fertilizer), led to dramatic

⁵³ World Economic Forum (2023), *The Global Risks Report 2023 18th Edition: Insight Report*, January 2023, https://www3.weforum.org/docs/WEF_Global_Risks_Report_2023.pdf.

⁵⁴ Eisele, I. (2022), ‘Five facts on grain and the war in Ukraine’, Deutsche Welle, 1 November 2022, <https://www.dw.com/en/five-facts-on-grain-and-the-war-in-ukraine/a-62601467>.

⁵⁵ Sobolev, D. (2023), *Grain and Feed Annual: Ukraine*, US Department of Agriculture Foreign Agricultural Service, April 2023, https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Grain%20and%20Feed%20Annual_Kyiv_Ukraine_UP2023-0012.pdf.

⁵⁶ Ibid.

rises in global food prices.⁵⁷ Prices were rising before the war, but have jumped since February 2022 – eroding living standards and increasing poverty around the world.⁵⁸

Disruptions to Ukraine's food exports mean increased poverty and deprivation in other parts of the world,⁵⁹ especially in countries such as Bangladesh and Egypt, which in 2021 sourced around one-quarter of their wheat supplies from Ukraine.⁶⁰ Around the world, an estimated additional 47 million people were acutely hungry in 2022 due to the ripple effects of the war.⁶¹

Around the world, an estimated additional 47 million people were acutely hungry in 2022 due to the ripple effects of the war in Ukraine.

In 2022–23, world cereals production decreased by an estimated 0.9 per cent, compared with 2021–22.⁶² This may seem modest, but on average a 1 per cent drop in global harvests raises food commodity prices by 8.5 per cent.⁶³ In the case of Ukraine, market panic, opportunistic speculation and a wave of reactive export restrictions pushed prices higher still.⁶⁴ The average price of wheat, for example, leapt by 165 per cent between May 2021 and May 2022.⁶⁵

Another factor in global price rises is the price of fertilizers, which are key for agricultural yields, but also an important input cost for farmers. As with other commodities, the global price of fertilizers was high at the time of the invasion, due to tight markets and high energy costs arising from COVID-19-related restrictions being lifted. The war then rapidly accelerated the upward trend, both due to resultant higher energy prices and sanctions against Russia (Russia is also a key manufacturer of many fertilizers).⁶⁶

⁵⁷ Ben Hassen, T. and El Bilali, H. (2022), 'Impacts of the Russia-Ukraine War on Global Food Security: Towards More Sustainable and Resilient Food Systems?', *foods*, August 2022, 11(15), 2301, <https://doi.org/10.3390/foods11152301>.

⁵⁸ Barratt, P. (2022), 'How Food and Energy are Driving the Global Inflation Surge', IMF Blog, 12 September 2022, <https://www.imf.org/en/Blogs/Articles/2022/09/09/cotw-how-food-and-energy-are-driving-the-global-inflation-surge>.

⁵⁹ UNEP (2022), *The Environmental Impact of the Ukraine Conflict*.

⁶⁰ Green, M. A. (2022), 'Forty Percent of the World Food Program's wheat supplies come from Ukraine', blog post, Wilson Center, 2 June 2022, <https://www.wilsoncenter.org/blog-post/forty-percent-world-food-programs-wheat-supplies-come-ukraine>.

⁶¹ UNEP (2022), *The Environmental Impact of the Ukraine Conflict*.

⁶² FAO (2023), 'Cereal Supply and Demand Brief', 5 May 2023, <https://www.fao.org/worldfoodsituation/csdb/en>.

⁶³ Knowledge Centre for Global Food and Nutrition Security (2023), *The Impact of Russia's war against Ukraine on global food security*, report, Brussels: European Commission, February 2023, https://knowledge4policy.ec.europa.eu/publication/ec-impact-russia%E2%80%99s-war-against-ukraine-global-food-security-february-2023_en.

⁶⁴ Kornher, L., von Braun, J. and Algieri, B. (2023), 'Speculation Risks in Food Commodity Markets in the Context of the 2022 Price Spikes – Implications for Policy', University of Bonn Center for Development Research, ZEF Policy Brief 40, 27 April 2022, <https://ssrn.com/abstract=4337407>.

⁶⁵ Chandrasekhar, C. P. and Ghosh, J. (2022), 'Why are global wheat prices rising so much?' MR Online, 16 June 2022, <https://mronline.org/2022/06/16/why-are-global-wheat-prices-rising-so-much>.

⁶⁶ In 2020, Russia accounted for 14 per cent of the global trade in urea and 11 per cent of the trade in phosphates, while Russia and Belarus together accounted for 41 per cent of trade in potash. See Hebebrand, C. and Blauber, J. (2023), 'The Russia-Ukraine war after a year: Impacts on fertilizer production, prices, and trade flows', IFPRI, 9 March 2023, <https://www.ifpri.org/blog/russia-ukraine-war-after-year-impacts-fertilizer-production-prices-and-trade-flows>.

The sanctions imposed on Russia and Belarus by the US, the EU, Canada and others exempted agricultural products, but nevertheless affected global fertilizer trade, since many importers choose not to purchase from the two sanctioned countries.⁶⁷ Shortages were compounded by export restrictions in China, which accounts for 30 per cent of global phosphate fertilizer supplies.⁶⁸ At the same time – illustrating the compound effects of the war – high energy prices led to a 70 per cent drop in European fertilizer production, further limiting supplies.⁶⁹

Fertilizer prices have eased compared with their early 2022 peaks but remain at historically high levels. Pre-war, prices were around \$200–300 a tonne, peaking at over \$800 a tonne. They are now closer to \$600 a tonne. This price easing partly reflects weak demand as farmers cut fertilizer field applications due to affordability and availability issues.⁷⁰ On average, a 1 per cent increase in fertilizer prices causes food commodity prices to rise by 0.45 per cent.⁷¹

The Black Sea grain deal, negotiated by Turkey in July 2022, allowed for exports of Ukrainian and Russian food and fertilizers.⁷² By May 2023, over 30 million tonnes of grain and other foodstuffs had been exported under the initiative.⁷³ Over 50 per cent of that cargo was maize, which was the grain most affected by blockages in Ukrainian granaries at the beginning of the war (accounting for 75 per cent of the 20 million tonnes of grain stored).⁷⁴

Russia increased its wheat exports in 2022, with volumes expected to have risen by 15 per cent due to the widespread theft of Ukrainian grain in occupied areas⁷⁵ and the signing of the grain corridor agreement, which also helped to open some Ukrainian ports and stabilized the global food system.⁷⁶ While the level of exports to some countries fell (notably to Iran and Turkey), those to others such as Egypt

⁶⁷ Keen, K. (2022), 'Belarus struggling to find path to market for potash amid US sanctions', S&P Global, 22 February 2022, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/belarus-struggling-to-find-path-to-market-for-potash-amid-us-sanctions-68990380>.

⁶⁸ Broom, D. (2023), 'This is how war in Europe is disrupting fertilizer supplies and threatening global food security', World Economic Forum, 1 March 2023, <https://www.weforum.org/agenda/2023/03/ukraine-fertilizer-food-security>.

⁶⁹ Gebre, S. and Elkin, E. (2022), 'Europe's Deepening Fertilizer Crunch Threatens Food Crisis', Bloomberg, 26 August 2022, <https://www.bloomberg.com/news/articles/2022-08-26/europe-s-fertilizer-crisis-deepens-with-70-of-capacity-hit#xj4y7vzkg>.

⁷⁰ Baffes, J. and Chian Koh, W. (2023), 'Fertilizer prices ease but affordability and availability issue lingers', World Bank Blogs, 5 January 2023, <https://blogs.worldbank.org/opendata/fertilizer-prices-ease-affordability-and-availability-issues-linger>.

⁷¹ Bogman, C., Pescatori, A. and Prifti, E. (2022), 'Global Food Prices to Remain Elevated Amid War, Costly Energy, La Niña', IMF Blog, 9 December 2022, <https://www.imf.org/en/Blogs/Articles/2022/12/09/global-food-prices-to-remain-elevated-amid-war-costly-energy-la-nina>.

⁷² After initial steep drops in grain exports from Ukraine, export levels have started to trend upwards again. Since the beginning of the marketing year, Ukraine has exported more than 15.5 million tonnes of grain in 2022 compared to 22.4 million tonnes in the same period the previous year. See Ministry of Agrarian Policy and Food of Ukraine (2023), 'Exports of grains, legumes and flour from Ukraine', 12 May 2023, <https://minagro.gov.ua/investoram/monitoring-stanu-apk/eksport-z-ukrayini-zernovih-zernobobovih-ta-boroshna> (accessed 12 May 2023).

⁷³ European Council (2023), 'Infographic – Ukrainian Grain Exports Explained', <https://www.consilium.europa.eu/en/infographics/ukrainian-grain-exports-explained> (accessed 5 June 2023).

⁷⁴ Ibid.

⁷⁵ Oanh Ha, K., Quinn, A. and Dodge, S. (2022), 'How Russian Ships Are Laundering Grain Stolen From Occupied Ukraine', Bloomberg, 17 October 2022, <https://www.bloomberg.com/graphics/2022-russian-stolen-grains>.

⁷⁶ Dujarric, S. (2023), 'Note to Correspondents – on the Black Sea Grain Initiative', UN Secretariat, 11 April 2023, <https://www.un.org/sg/en/content/sg/note-correspondents/2023-04-11/note-correspondents-the-black-sea-grain-initiative>.

and countries in Latin America increased. Russian officials expect export volumes to grow further in 2023, as their figures will include the harvest from the occupied areas in Ukraine.⁷⁷

In May 2023, the Black Sea grain deal was extended for a further 60 days.⁷⁸ But in mid-July 2023, Russia pulled out of the deal, complaining that its terms had not been met. This led to an immediate surge in wheat, corn and soybean prices.⁷⁹ Around the same time, Russia started a concerted series of aerial attacks on grain export infrastructure in Black Sea port cities that senior UN officials condemned as potentially life-threatening to the millions of people around the world who need access to affordable food.⁸⁰ The ongoing uncertainty over how much grain will be exported, and efforts by Russia to use food as a lever of political influence, mean that global food prices are likely to remain volatile in the medium term, particularly in the context of the El Niño weather system that is likely to constrain global food production in 2023–24.

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Volatility in global food commodity prices is also straining the ability of the global humanitarian system to help those in need. In 2021, the World Food Programme (WFP), which feeds millions of people worldwide every day, bought 40 per cent of its grain from Ukraine.⁸¹ One year after Russia's invasion, WFP's monthly operating costs were running at \$73.6 million – 44 per cent higher than in 2019 – primarily as a result of the increased prices of providing fuel and food aid.⁸² Inflation in food costs, coupled with the breadth of the cost-of-living crisis, impacts globally on the economically marginalized. In the UK, for example, food price inflation reached more than 19 per cent in April 2023,⁸³ contributing to significant rises in food poverty and use of food banks.⁸⁴

⁷⁷ Fastmarkets (2023), 'Russia's wheat export pace overtakes 2021's despite challenges', 5 January 2023, <https://www.fastmarkets.com/insights/russias-wheat-exports-overtake-2022>.

⁷⁸ Al Jazeera (2023), 'Russia agrees to renew Ukraine Black Sea grain deal for 60 days', 17 May 2023, <https://www.aljazeera.com/news/2023/5/17/black-sea-grain-deal-renewed-for-60-days-following-talks>.

⁷⁹ Meredith, S. (2023), 'Wheat prices surge after Russia ends grain deal. And it's not good news for the world's food supply', CNBC, 17 July 2023, <https://www.cnbc.com/2023/07/17/russia-ukraine-grain-deal-what-does-it-mean-for-global-food-prices.html>.

⁸⁰ UN (2023), 'Attacks on Odesa Port, Grain-Storage Facilities Latest Victims in Moscow's 'Senseless' War against Ukraine, Senior Official Tells Security Council', press release, 26 July 2023, <https://press.un.org/en/2023/sc15367.doc.htm>.

⁸¹ Green (2022), 'Forty Percent of the World Food Program's wheat supplies come from Ukraine'.

⁸² Welsh, C. (2023), 'Russia, Ukraine, and Global Food Security: A One-Year Assessment', Washington, DC: Center for Strategic & International Studies, 24 February 2023, <https://www.csis.org/analysis/russia-ukraine-and-global-food-security-one-year-assessment>.

⁸³ Office for National Statistics (2023), 'Cost of living insights: Food', 11 August 2023, <https://www.ons.gov.uk/economy/inflationandpriceindices/articles/costoflivinginsights/food>.

⁸⁴ Trussell Trust (2023), 'End of Year Stats 2022–23', <https://www.trusselltrust.org/news-and-blog/latest-stats/end-year-stats>.

Continued uncertainty over both how much Ukrainian land can be planted and harvested in 2023 and who will control any crops that are harvested – coupled with high fertilizer prices and the collapse of the grain deal – means that these high and volatile global food prices are likely to persist. This will have serious consequences for poor countries that rely heavily on food imports.⁸⁵ The International Monetary Fund (IMF) assessed the impact of higher food and fertilizer prices on the balance-of-payments situation of the 48 countries most affected (including Ukraine), calculating that the price rises are costing those countries \$9 billion more than would have been the case without the war – eroding their foreign reserves and limiting their ability to pay for food imports.⁸⁶ Quite apart from the impacts on nutrition and poverty, the negative effects on national finances could provoke protests and unrest in some countries, given the strong correlation between food price spikes and social instability.⁸⁷

⁸⁵ UNEP (2022), *The Environmental Impact of the Ukraine Conflict*.

⁸⁶ Georgieva, K., Sosa, S. and Rother, B. (2022), 'Global Food Crisis Demands Support for People, Open Trade, Bigger Local Harvests', IMF Blogs, 30 September 2022, <https://www.imf.org/en/Blogs/Articles/2022/09/30/global-food-crisis-demands-support-for-people-open-trade-bigger-local-harvests>.

⁸⁷ Bellemare, M. F. (2015), 'Rising food prices, food price volatility, and social unrest', *American Journal of Agricultural Economics*, January 2015, 97(1), pp. 1–21, <https://doi.org/10.1093/ajae/aau038>.

06

Implications for climate action

The war is hindering climate action, while underlining why it is so critical to move away from fossil fuels.

Slowing the energy transition in Ukraine

Renewable energy installations have been heavily affected by the war, which has also cast doubt on the wisdom of civilian nuclear power as a low-carbon energy source.

Ukraine – the world’s fifth most energy-intensive country – had been moving towards greater energy efficiency and decarbonization before the war.⁸⁸ In 2016, Ukraine issued a nationally determined contribution (NDC)⁸⁹ strategy that committed the country to reductions in its greenhouse gas emissions of 40 per cent below 1990 levels by 2030,⁹⁰ a target that the government increased to 65 per cent in 2021.⁹¹ Just a few months before the invasion, at the November 2021 COP26 climate conference, Ukraine announced a planned end to coal-fired power generation by 2035.⁹²

The government had also set a goal of sourcing 25 per cent of Ukraine’s total energy supply from renewables by 2035 – an ambitious target requiring significant investment in wind and solar technology.⁹³ According to a report by the Energy Charter Secretariat, Ukraine has the potential to produce more energy from

⁸⁸ USAID (2016), ‘Climate Change Risk Profile: Ukraine’.

⁸⁹ NDCs are at the heart of the 2015 Paris Agreement on climate change and the achievement of its long-term goals. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change.

⁹⁰ OECD (2016), ‘Financing Climate Action in Ukraine’, report, https://www.oecd.org/environment/outreach/Ukraine_Financing_Climate_Action.Nov2016.pdf.

⁹¹ UNFCCC (2021), *Updated Nationally Determined Contribution of Ukraine to the Paris Agreement*, https://unfccc.int/sites/default/files/NDC/2022-06/Ukraine%20NDC_July%2031.pdf.

⁹² Franke, A. (2021), ‘COP26: Ukraine aims for 2035 coal phaseout as more European nations join alliance’, S&P Global Insights, 4 November 2021, <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/electric-power/110421-cop26-ukraine-aims-for-2035-coal-phaseout-as-more-european-nations-join-alliance>.

⁹³ Majkut and Dawes (2022), ‘Opportunities and Challenges for Renewable Energy Generation in Ukraine’.

renewable energy than anywhere else in southeast Europe.⁹⁴ The EU was also hoping that Ukraine could become a major exporter of the 'green' hydrogen that is supposed to be the main element of Europe's integrated power system by 2030 under the Green New Deal.⁹⁵

But the war has seriously damaged Ukraine's renewable energy infrastructure and undermined future investments in the sector. According to the Ukrainian government, about 90 per cent of wind power capacity and 50 per cent of solar energy capacity have been taken offline as a result of the war,⁹⁶ and more than 500 water infrastructure facilities, including hydroelectric dams, have been destroyed.⁹⁷

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In June 2023, the Nova Khakhovka dam near Kherson was destroyed, causing huge areas of downstream lands to be inundated with water, and – at the time of writing – raising concerns about the viability of the cooling systems at the Zaporizhzhia nuclear plant. Ukrainian president Volodymyr Zelenskyy called the attack an 'environmental bomb of mass destruction',⁹⁸ and the Ukrainian government accused Russia of 'ecocide'.⁹⁹

Replacing Ukraine's renewable energy infrastructure is complicated, particularly while fighting is ongoing. Unsurprisingly, future investment in renewables is uncertain. For example, the largest operator of renewable generation in Ukraine, DTEK Renewables, has indefinitely delayed plans to construct 700 MW of additional wind power capacity for its network.¹⁰⁰

Even so, some projects have continued: the 19-turbine Tyligulska wind power plant opened in 2023, despite being situated less than 100 kilometres from the frontline in the region of Mykolaiv.¹⁰¹ And the level of climate ambition in Ukraine policy circles has, somewhat remarkably, persisted. In June 2023, the Ukrainian

⁹⁴ An estimated 874 gigawatts of potential across solar and onshore and off-shore wind: see International Energy Charter (2023), *Ukrainian energy sector evaluation and damage assessment – VIII (as of March 24, 2023)*, report, Brussels: Energy Charter Secretariat, https://www.energycharter.org/fileadmin/DocumentsMedia/Occasional/2023_03_28_UA_sectoral_evaluation_and_damage_assessment_Version_VIII.pdf.

⁹⁵ Zentrum Liberale Moderne (2022), 'Export of "green" hydrogen from Ukraine to the EU: current capacity and future potential', input paper, 31 January 2022, <https://libmod.de/en/green-hydrogen-ukraine>.

⁹⁶ UKRINFORM (2022), 'Because of the war, 90% of the wind energy capacities have been decommissioned – Galushchenko', *Fakty*, 23 October 2022, <https://fakty.com.ua/en/ukraine/ekonomika/20221023-cherез-vijnu-90-potuzhnostej-vitrovoyi-energetyky-vyvedeni-z-ekspluatacziji-galushhenko>.

⁹⁷ Primavera via Netherlands Water Partnership (2022), 'Ukrainian Water Infrastructure Damage', 17 November 2022, <https://www.netherlandswaterpartnership.com/news/ukrainian-water-infrastructure-damage>.

⁹⁸ Reuters (2023), 'Ukraine's Zelenskyy says dam destruction is 'environmental bomb of mass destruction'', Devdiscourse, 6 June 2023, <https://www.devdiscourse.com/article/law-order/2479277-ukraines-zelenskyy-says-dam-destruction-is-environmental-bomb-of-mass-destruction>.

⁹⁹ Hellam, J. et al. (2023), 'Collapse of critical dam sparks region-wide evacuations', CNN, 6 June 2023, <https://edition.cnn.com/2023/06/06/europe/ukraine-nova-kakhovka-dam-breach-intl-hnk/index.html>.

¹⁰⁰ Majkut and Dawes (2022), 'Opportunities and Challenges for Renewable Energy Generation in Ukraine'.

¹⁰¹ Ambrose, J. (2023), 'Ukraine built more onshore wind turbines last year than England', *Guardian*, 28 May 2023, <https://www.theguardian.com/environment/2023/may/28/ukraine-built-more-onshore-wind-turbines-last-year-than-england>.

government adopted new legislation to encourage investment in renewable energies and the modernization of the country's energy system. And in July 2023, the government reaffirmed its commitment to phase out state-owned coal power plants by 2035.¹⁰²

Nevertheless, the viability of nuclear power as a low-carbon source of energy – both in Ukraine and elsewhere – has been thrown into doubt, as the war has demonstrated how vulnerable civilian nuclear power stations can be to attack.¹⁰³ Despite its tragic history with Chernobyl, Ukraine still depended heavily on nuclear power before the war, with 15 reactors across four stations providing about one-half of the country's electricity.¹⁰⁴ All 15 are pressurized-water reactors of Soviet-era design, with their average age already past the original design threshold of 30 years.¹⁰⁵ The oldest of these reactors has been in operation since 1980. However, in 2012, Energoatom – a state enterprise operating all four of Ukraine's nuclear power plants – announced it intended to operate the oldest reactors at those plants for at least 20 more years.¹⁰⁶

The Zaporizhzhia nuclear power plant – the largest nuclear power plant in Europe – has been repeatedly attacked and has been under Russian control since March 2022. The loss of independent cooling systems could potentially lead to the meltdown of used fuel in reactors or cooling ponds. The International Atomic Energy Agency (IAEA) is 'gravely concerned about the situation' at Zaporizhzhia.¹⁰⁷ The plant's reactors have been disconnected from the Ukrainian electricity grid, leading to a significant loss of supply. President Zelenskyy's appeals to create demilitarized zones around nuclear power stations remain unanswered. Since Russia's occupation of the plant, there have been repeated power blackouts, forcing the plant to temporarily rely on emergency diesel generators for reactor-cooling, and for other nuclear safety and security functions. IAEA director-general Rafael Grossi has said, 'I don't know for how long we are going to be lucky in avoiding a nuclear accident.'¹⁰⁸ The agency further noted in its February 2023 assessment that, '[e]very single one of the IAEA's crucial seven indispensable pillars for ensuring nuclear safety and security in an armed conflict has been compromised'.¹⁰⁹ These attacks have also underlined the strategic risks of nuclear power plants – in particular, their exposure to being targeted as a form of immense 'dirty bomb' by deeply irresponsible actors.

¹⁰² Zagoruichyk, A., Savvitskyi, O., Kopytsia, I. and O'Callaghan, B. (2023), *The Green Phoenix Framework: a climate-positive plan for economic recovery in Ukraine*, working paper, Oxford: Smith School of Enterprise and the Environment – University of Oxford, June 2023, https://www.smithschool.ox.ac.uk/sites/default/files/2023-06/Green_Phoenix_Framework_Ukraine_Oxford_Smith_School_Working_Paper_2303.pdf.

¹⁰³ Romanko (2022), 'Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive'.

¹⁰⁴ World Nuclear Association (2022), 'Nuclear Power in Ukraine – updated January 2023', <https://world-nuclear.org/information-library/country-profiles/countries-t-z/ukraine.aspx> (accessed 3 April 2023).

¹⁰⁵ Ibid.

¹⁰⁶ World Nuclear News (2015), 'Ukraine's Energoatom looks ahead to Rovno 3 life extension', 19 August 2015, <https://www.world-nuclear-news.org/Articles/Ukraine-s-Energoatom-looks-ahead-to-Rovno-3-life-e>.

¹⁰⁷ IAEA (2022), *Nuclear Safety, Security and Safeguards in Ukraine: 2nd Summary Report by the Director General, 28 April–5 September 2022*, report, September 2022, https://www.iaea.org/sites/default/files/22/09/ukraine-2ndsummaryreport_sept2022.pdf.

¹⁰⁸ Zalan, E. (2023), 'Nuclear chief on Zaporizhzhia: 'How long will we be lucky?'' euobserver, 24 January 2023, <https://euobserver.com/ukraine/156639>.

¹⁰⁹ IAEA (2023), *Nuclear Safety, Security and Safeguards in Ukraine: February 2022–2023*, report, February 2023, <https://www.iaea.org/sites/default/files/23/02/nuclear-safety-security-and-safeguards-in-ukraine-feb-2023.pdf>.

Threatening multilateral co-operation on climate change

Climate action risks being drawn into a stand-off between Russia and the West.

Some experts argue that the world is entering a period of 'deglobalization' that could hinder collective action on global challenges.¹¹⁰ The final question is what this means for the prospects of ambitious action on climate change.

Climate change is widely viewed as the one of the biggest single challenges facing the planet. But the issue of climate change risks being pulled into a geopolitical stand-off between Russia (and potentially China) and the West. Growing concerns about the current consequences of the war, the risks of escalation and the spectre of all-out nuclear conflict have pushed the climate crisis down the media and political agendas, with UN secretary-general António Guterres warning in October 2022 that the war was putting climate action on the 'backburner'.¹¹¹ Meanwhile, the focus on energy security at a national level could reduce the space for countries to advance bold climate action at the yearly UN climate conferences.

Even climate negotiations are getting tangled in these wider political currents. During a video address at COP27, Zelenskyy argued that global collective action on climate change will not be possible until the war ends.¹¹² In the run-up to that conference, Russia endeavoured to include emissions from the occupied Crimean peninsula in its national-level greenhouse gas inventory, a claim that was vigorously disputed by Ukraine as being part of an effort by Russia to normalize the illegal annexation of Crimea in 2014 and support Russian claims over the territory.¹¹³ Russia's climate envoy, Ruslan Edelgeriev, argued at the conference that Russia remained committed to its climate targets despite sanctions. He also linked climate action to the wider political situation, adding that Russia could achieve carbon neutrality earlier than its current target of 2060 if sanctions were lifted.¹¹⁴ This statement appears to underline the apparent approach by Russia of using climate action as a point of leverage over the West, and points to the risk that the continuing war may impede negotiations over climate change and other global challenges.

¹¹⁰ Benton, T. et al. (2022), *The Ukraine war and threats to food and energy security: Cascading risks from rising prices and supply disruptions*, Research Paper, London: Royal Institute of International Affairs, <https://doi.org/10.55317/9781784135225>.

¹¹¹ Yürük, B. (2022), 'Ukraine War Putting Climate Action on Back Burner While Planet Is Burning: UN Chief', Anadolu Agency, 3 October 2022, <https://www.aa.com.tr/en/russia-ukraine-war/ukraine-war-putting-climate-action-on-back-burner-while-planet-is-burning-un-chief/2701756>.

¹¹² Harvey, F., Lakhani, N. and Carrington, D. (2022), 'COP27: ending war in Ukraine necessary to tackle climate crisis, Zelenskyy says', *Guardian*, 8 November 2022, <https://www.theguardian.com/environment/2022/nov/08/cop27-climate-summit-volodymyr-zelenskiy-ukraine-president-speech>.

¹¹³ Birnbaum, M. (2022), 'At War, Russia Aims to Claim Ukraine's Land – and Its Carbon Emissions', *Washington Post*, 18 October 2022, <https://www.washingtonpost.com/climate-environment/2022/10/18/russia-ukraine-crimea-emissions>.

¹¹⁴ Reuters (2022), 'COP27: Russia committed to climate targets despite sanctions – TASS cites Putin's climate envoy', 9 November 2022, <https://www.reuters.com/business/environment/cop27-russia-committed-climate-targets-despite-sanctions-tass-cites-putins-2022-11-09>.

07 Conclusion and recommendations

If the right actions are taken now and post-war, Ukraine can rebuild its damaged infrastructure and leap forward to a cleaner, low-emission future.

Russia's war against Ukraine is, first and foremost, a tragedy for Ukrainians. Alongside the humanitarian horror and the geopolitical shockwaves the war is causing, it is also exacerbating vulnerability to climate change in Ukraine and around the world, and hindering multilateral climate action.

The course of the war will have significant strategic implications for the prospects of the green transition both in Ukraine and internationally. But much of the long-term effect depends on actions taken from now on. If the right actions are taken, Ukraine can rebuild its damaged infrastructure and leap forward to a cleaner, low-emission future.

The following recommendations are aimed at policymakers in Ukraine and elsewhere. They have been divided into two broad groups: the first consists of short-term actions – i.e. those that are possible and necessary while the war is ongoing; and the second 'long-term' actions – i.e. those that can only be put into place once the conflict ends.

Actions over the short term

Plan ahead for green reconstruction

Even though Ukraine is fighting for its existence right now, there are things that its government and partners can do to ensure that plans for green reconstruction can be implemented when the time arises.¹¹⁵ This could be an opportunity to reshape Ukraine's economic foundations, shifting the country towards low-carbon development, energy efficiency and environmental protection.¹¹⁶

In April 2022, the Ukrainian government formed the National Council for Recovery from the War. The council established a working group on 'environmental safety' to develop proposals for the plan. The working group identified five priority areas:

1. Reforming public environmental administration;
2. Climate change mitigation and adaptation policy;
3. Environmental safety and effective waste management;
4. Sustainable use of natural resources; and
5. Conservation of natural ecosystems, preservation of biological diversity, and restoration and development of protected areas.¹¹⁷

The government released its 10-year recovery plan in July 2022 at a heads-of-state conference in Lugano, Switzerland. A recent study estimated that 33 per cent of Ukraine's recovery plan is climate positive, and that, with the right support, Ukraine could emerge from the war as a climate leader.¹¹⁸ Ukraine's partners, meanwhile, can help to coordinate best practice guidance and lessons learned from other examples of post-war reconstruction, and monitor financial flows coming in for reconstruction to ensure they are also contributing to the UN's Sustainable Development Goals.

Secure funding for reconstruction

Post-war reconstruction in Ukraine will be a huge task, requiring a comprehensive, well-coordinated and well-funded effort. European and other partners must begin working now to bring together the right partners, identify the best expertise and find funding. Close coordination with supporting countries, international organizations and international financial institutions is needed to mobilize the expertise and resources required for the reconstruction.¹¹⁹

Ukraine's reconstruction is also a unique opportunity for Europe as a whole to become more energy-efficient.¹²⁰ Ukraine and its partners can develop a pipeline of achievable green investment projects to mobilize domestic and international

¹¹⁵ OECD (2022), *Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction*, 1 July 2022, <https://www.oecd.org/ukraine-hub/policy-responses/environmental-impacts-of-the-war-in-ukraine-and-prospects-for-a-green-reconstruction-9e86d691>.

¹¹⁶ Zagoruichyk, Savvitskyi, Kopytsia and O'Callaghan (2023), *The Green Phoenix Framework*.

¹¹⁷ OECD (2022), *Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction*.

¹¹⁸ Zagoruichyk, Savvitskyi, Kopytsia and O'Callaghan (2023), *The Green Phoenix Framework*.

¹¹⁹ Ibid.

¹²⁰ Romanko (2022), 'Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive'.

private finance, as well as international public funding. Continued modernization of government institutions at the national and subnational levels will ensure that there is the necessary capacity to plan and implement climate-friendly and environmentally sustainable reconstruction efforts.¹²¹

Develop a sustainable and cost-efficient energy strategy

Ukraine will need to implement an energy strategy that accounts for the new realities. The role of nuclear power in Ukraine's future energy mix is still to be determined but needs to be carefully considered. Renewable energy can provide a rapid pathway to greater political independence and a more competitive economy for Ukraine. It also enables greater integration with the EU.¹²² Therefore, the rebuilding of transmission grids and electricity networks needs to be suited to renewables, to maximize system flexibility. Linking the Ukrainian grid with that of the EU would provide an outlet for exports and power exchanges, and would reduce the ability of Russia and its allies to use energy as a tool of influence over Ukraine.¹²³

Avoid delays to climate action

The energy and food price crises and the movement of millions of refugees should not be used as excuses to delay ambitious climate action. Governments around the world must work with urgency to build resilience to these cascading risks and ensure attention to both the immediate existential challenge for Ukraine and the longer-term challenge of climate change.¹²⁴ It is precisely these types of crises that demonstrate the need to promote renewable energies, foster energy efficiency and reduce reliance on fossil fuels.¹²⁵

Actions for the long term

Build back better

Once the war ends, the reconstruction of Ukraine can begin in earnest. The post-war economic reconstruction process can, and should, be used for a fundamental transformation of Ukraine towards a green and net zero economy. The war presents an opportunity to rebuild in a more energy-efficient way, with fewer polluting industries and transport systems.¹²⁶ Buildings designed in the Soviet era were poorly insulated, and this is a once-in-a-generation opportunity to construct a high-efficiency building stock. Greater energy efficiency alone could reduce Ukraine's energy demand by an estimated 40 per cent.¹²⁷

¹²¹ Ibid.

¹²² Majkut and Dawes (2022), 'Opportunities and Challenges for Renewable Energy Generation in Ukraine'.

¹²³ Ibid.

¹²⁴ Benton et al. (2022), *The Ukraine war and threats to food and energy security*.

¹²⁵ Deutsche Welle (2022), 'Petersberg Climate Dialogue: Germany Rejects Delaying Climate Action'.

¹²⁶ Romanko (2022), 'Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive'.

¹²⁷ International Energy Agency (2022), *Energy Efficiency 2022*, report, December 2022, <https://www.iea.org/reports/energy-efficiency-2022>.

The government and its partners should advocate for sufficient funding and demand high standards for green reconstruction. Close coordination with supporting countries, international organizations and international financial institutions is needed to mobilize the expertise, resources and supply chains for the reconstruction. It should also be done by Ukrainian companies: a recent study by USAID found that 90 per cent of materials needed can be provided by domestic companies and that 100,000 jobs could be created.¹²⁸ The international community must begin working now to bring together the right partners, identify the best expertise and find funding.

Accelerate energy efficiency measures and move away from fossil fuels

The war underlines the political, economic, environmental and security imperatives for Ukraine and other countries to move away from fossil fuels. This can be achieved by promoting energy efficiency, enabling renewable forms of energy production and storage, reducing use of fossil fuels in the energy and agricultural sectors, and shifting sourcing away from autocratic states. Given the ease with which fossil fuels can be used as instruments of political coercion, diversifying away from fossil fuels and towards renewable energy self-sufficiency can also have positive political and security benefits.

Establish plans to transition food systems for resilience and sustainability

As 2022 has shown, along with previous crises such as the financial crises of 2007–08 and 2010–11 and the COVID-19 pandemic, globalized food systems are prone to price volatility that can be exacerbated by export bans, financial speculation and lack of transparency. They are also globally significant drivers of climate change, being responsible for approximately one-third of global anthropogenic emissions. The transformation of food systems to both build resilience and adapt to climate change, and to mitigate its environmental impacts, is a clear need. Building food security – as part of national security – should not be an excuse to avoid transforming food systems for positive environmental and health outcomes, as these goals can be aligned; just as energy security is not a reason to revert to fossil fuel-based energy systems.

Invest in collaboration for climate adaptation

Meanwhile, Russia's war against Ukraine underlines the need for countries worldwide to collaborate more closely to address the impacts of climate change, to find ways to encourage and enable joint efforts on adaptation to climate change across the world, and to address the cascading risks from climate change that could exacerbate other crises. Ultimately, once this needless war is over, it will be important to build for the future, not to rebuild the past.

¹²⁸ Rowley, T. (2023), 'Ukrainian manufacturers should rebuild Ukraine, report says', Open Democracy, 25 May 2023, <https://www.opendemocracy.net/en/odr/ukraine-russia-reconstruction-localisation-building-materials>.

About the authors

Oli Brown is an associate fellow in the Environment and Society Programme at Chatham House. His work focuses on environmental management, peacebuilding and conflict analysis. In 2014–18, he coordinated the UN Environment Programme's work to minimize the risks and impacts of disasters, industrial accidents and armed conflicts. He has a master's degree in international studies from the University of Otago and a master's in environmental science from SOAS University of London.

Antony Froggatt is the deputy director of the Chatham House Environment and Society Programme. He joined Chatham House in 2007 and has worked as an independent consultant for 20 years with environmental groups, academics and public bodies in Europe and Asia. Antony's most recent research projects are concerned with understanding the energy and climate policy implications of Brexit, and the technological and policy transformation of the power sector. Since 1992, he has been the co-author of the World Nuclear Industry Status Report, an annual independent review of the nuclear sector.

Natalia Gozak is a wildlife rescue officer at the International Fund for Animal Welfare (IFAW). She has 18 years' experience in environmental civil society movements, from local grassroots NGOs to big international organizations. Before joining IFAW, she was executive director of Ecoaction, a Ukrainian civil society organization focused on environmental protection, and has also worked for WWF-Ukraine and UNDP. Natalia holds a master's degree and a bachelor's degree in ecology and environmental sciences from the National University of Kyiv-Mohyla Academy, and has expertise in climate change, nature conservation and the work of civil society.

Nataliya Katser-Buchkovska is a co-founder of the Sustainable Investment Fund, a former member of parliament in Ukraine and an expert on energy security, sustainability and investment. During her time in parliament, she was chairman of the parliamentary subcommittee on sustainable development, strategy, and investment. She obtained diplomas from both the Harvard Kennedy School and University College London, and is a member of the Aspen community and an Atlantic Council millennium fellow. Since the beginning of the war in 2022, Nataliya has worked on a green recovery fund for Ukraine, developing green finance instruments.

Orysia Lutsevych is the deputy director of the Russia and Eurasia Programme at Chatham House and head of the institute's Ukraine Forum. Her work focuses on social change and the role of civil society in democratic transition in the post-Soviet region. Her recent research has analysed Russia's use of proxy NGOs in achieving its foreign policy objectives. Prior to joining Chatham House, Orysia led the development of Europe House Georgia and was executive director of the Open Ukraine Foundation. She has a master's degree in international relations from Lviv State University and a master's in public administration from the University of Missouri.

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Cover image: A field of unharvested sunflowers in the Kharkiv region of Ukraine, 10 May 2023.

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The Royal Institute of International Affairs
Chatham House

10 St James's Square, London SW1Y 4LE

T +44 (0)20 7957 5700

contact@chathamhouse.org | chathamhouse.org

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