

The impact of Russia's war against Ukraine on climate security and climate action

Independent Experts' Analysis

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Key messages:

- Beyond its disastrous human and environmental toll, seismic geopolitical ramifications and spectre of nuclear conflict, Russia's illegal full-scale invasion of Ukraine on 24th February 2022 is increasing vulnerability to climate change and complicating efforts to reduce greenhouse gas emissions.
- Even before the war, Ukraine faced challenges mitigating and adapting to climate change. The invasion has destroyed infrastructure, thrown the population into poverty, and strained every aspect of government and society, worsening the country's vulnerability to climate change.
- The war's impacts on energy and food prices are increasing climate vulnerability in the OSCE area and around the world. This could proliferate the emerging security risks from climate change.
- The war makes Ukraine's renewable energy and energy efficiency targets harder to reach. Before the war, Ukraine aimed to reduce its energy intensity by two-thirds. Achieving this now will require a concerted effort to replace the country's outdated – and now heavily damaged – energy infrastructure with efficient, low-carbon alternatives.
- The invasion proves, yet again, that war is a dirty business: The war itself is a direct source of greenhouse gas emissions and the indirect ramping up of tensions and increase in military spending is likely to see the military share of emissions increase.
- The war has also upended energy politics. Energy independence is now seen as a precondition to political security. Over the short term there is a risk of locking in new emissions as energy independence concerns lead countries to sidestep action on their carbon footprints. But over the long term it may supercharge the argument for phasing down reliance on fossil fuels.
- The course of the war from here will have implications for the global green transition and the net zero pledges of many countries, potentially worsening the climate crisis in the medium and long term. Ukraine and Russia are important sources of the critical minerals required for renewable energies. Access to these minerals is likely to be a geostrategic contest in the coming decades.
- The world may be entering a period of 'deglobalisation' that will mean collective action on global challenges is more difficult. Despite this trend – or perhaps because of it – it is more important than ever to look for opportunities to use diplomacy to avert climate security risks.
- Much depends on actions taken now. The war risks putting climate action on the backburner and complicates multilateral action to avert dangerous climate change and to adapt to its impacts. But with the help of the OSCE and its participating States, Ukraine can rebuild its damaged infrastructure and leapfrog to a more resilient, cleaner, and lower-emissions future.

1. Introduction

The full-scale invasion of Ukraine by the Russian Federation may have begun on 24th February 2022, but it was preceded by the illegal annexation of the Crimean Peninsula by the Russian Federation in February and March 2014 and more than eight years of de facto occupation by the Russian Federation of parts of the Donetsk and Luhansk regions.

The disastrous human and environmental toll of the war in Ukraine is having seismic geopolitical ramifications, including raising the spectre of catastrophic nuclear war. At the same time, the war is increasing vulnerability to climate change around the world and complicating collective efforts to reduce greenhouse gas emissions. This is particularly the case in Ukraine, but it affects all OSCE participating States as well as countries beyond. While the war is an immediate existential threat for Ukraine, climate change is a short-, medium- and long-term threat around the world, particularly for the most vulnerable, including women, children and the poor.

The purpose of this paper is to assess the impact of the war on people's vulnerability to climate change, to understand the cascading security impacts that climate change could precipitate, and to consider what the war means for the prospects for ambitious climate action in Ukraine, in the OSCE area, and globally.

In this war, climate and energy have been weaponised like never before. The invasion triggered unprecedented spikes in global energy prices, which have helped to fuel a cost-of-living crisis that is impoverishing millions. Meanwhile, Russia has cut or halted energy supplies to many countries within the European Union in an effort to sap their military, financial and political support for Ukraine.

Following its failed attempt to capture Kyiv, Russia began attacking energy installations across Ukraine from the beginning of October 2022. In the months since, nearly all large energy facilities across the country have been attacked by missiles or kamikaze drones, with many attacked repeatedly.² The clear intent is to destroy the economy, weaponize Ukraine's harsh winter climate and freeze the population (and the West) into submission.

The course of the war from here will have significant strategic implications for the prospects of the global green transition and many countries' net zero pledges, potentially worsening the climate crisis in the medium to long term. But much depends on actions from now. Ukraine can rebuild its damaged infrastructure and leapfrog to a cleaner, low emission future.

² Energy Charter (2022) *Brief Ukrainian energy sector evaluation and damage assessment – III (as of October 24, 2022)*
https://www.energycharter.org/fileadmin/DocumentsMedia/Occasional/2022_10_24_UA_sectoral_evaluation_and_damage_assessment_Version_II_1.pdf

This paper is written by a group of experts in Russian and Ukrainian politics, climate security and climate governance, environmental governance and history, as an independent contribution to the OSCE's work on climate security and climate action.³

Section 2 assesses the impacts of the war on vulnerability and adaptation to climate change and the security risks from climate change in Ukraine, across the OSCE area and beyond. Section 3 investigates the impacts of the war in terms of greenhouse gas emissions. It discusses its implications for climate mitigation and the transition to clean energy that is needed if the world is to avert dangerous climate change. Section 4 considers the consequences of the war for climate action as well as the climate finance that will be needed to enable adaptation and mitigation at the scale to deal with the climate crisis. The report concludes by making a series of recommendations for Ukraine, OSCE participating States and the OSCE as an organisation both for the short term (i.e., while the war is ongoing) and for the medium to long term, once a peace agreement is reached.

³ Biographies of the authors can be found at the end of this paper.

2. Impacts of the war on vulnerability, adaptation and climate security

2.1. The war has taken a tremendous toll

The war has exacted a devastating toll in terms of lives lost and people injured and displaced, as well as on Ukraine's economy and environment. According to the Office of the United Nations High Commissioner for Human Rights (OHCHR), by 15 January 2023, 7,031 Ukrainian civilians, including 433 children, had been killed in the invasion. Another 11,327 people were reported injured. However, the OHCHR admits that the real numbers could be much higher.⁴ In November 2022, the United States' top ranking soldier, General Mark Milley, estimated that 100,000 soldiers may have been killed and injured on each side.⁵

The war has also led to the highest number of refugees in Europe since the Second World War. Nearly 8 million Ukrainian refugees are now recorded across Europe.⁶ As of the beginning of January 2023, a further 5.9 million people were internally displaced within Ukraine.⁷ Women and children comprise 90 percent of refugees and 60 percent of the internally displaced populations.⁸

There are fears of a fresh exodus as temperatures plummet, particularly if Russia continues to target Ukraine's heating and electricity systems, crucially affecting water provision and sewage treatment. According to Ukrainian news, a large number of internally displaced people are staying in housing that is unsuitable for winter.⁹ Slovakia's contingency plan, for example, foresees that 700,000 people could seek shelter within its borders.¹⁰ In mid-November Kyiv started to evacuate civilians from the newly liberated areas around Kherson as a result of the extensive damage to energy and heating systems.¹¹

The war has devastated Ukraine's economy. The World Bank estimates that Ukraine's GDP shrank by 45 percent in 2022;¹² meanwhile, inflation in the country has hit 26.6 percent in annual terms.¹³ This situation could lead to perhaps one of the fastest descents into poverty experienced in modern

⁴ UNOHCHR (2022) *Number of civilian casualties in Ukraine during Russia's invasion verified by OHCHR as of January 15, 2023.*

<https://www.statista.com/statistics/1293492/ukraine-war-casualties/>

⁵ Lock, Samantha (2022) "US estimates 200,000 military casualties on all sides in Ukraine war". *The Guardian*. 10 November 2022.

<https://www.theguardian.com/world/2022/nov/10/us-estimates-200000-military-casualties-all-sides-ukraine-war>

⁶ The number as of 18 January 2023 was 7.98 million. The top three destinations for those refugees are Russia (with 2.85 million), Poland (with 1.56 million), and Germany (with 1.02 million). <https://data.unhcr.org/en/situations/ukraine> - accessed 18 January 2023.

⁷ Displacement Tracking Matrix: Ukraine. <https://dtm.iom.int/ukraine> - accessed 18 January 2023.

⁸ UNEP (2022) *The Environmental Impact of the Ukraine Conflict: A Preliminary Review*. UNEP. <https://www.unep.org/resources/report/environmental-impact-ukraine-conflict-preliminary-review>

⁹ <https://www.i24news.tv/en/news/ukraine-conflict/1668006918-fresh-wave-of-ukrainian-refugees-expected-as-winter-looms>

¹⁰ <https://www.i24news.tv/en/news/ukraine-conflict/1668006918-fresh-wave-of-ukrainian-refugees-expected-as-winter-looms>

¹¹ New York Times. 21 November 2022. <https://www.nytimes.com/video/world/europe/100000008651181/ukraine-kherson-evacuations-winter.html>

¹² Russia's GDP by contrast, is expected to decrease 3-4% in 2022 and only begin to recover in 2024. <https://carnegieendowment.org/politika/88664> - accessed 29 December 2022

¹³ <https://bank.gov.ua/ua/news/all/prosto-pro-ekonomiku-na-osnovi-materialiv-inflyatsiynogo-zvitu-za-jovten-2022-roku>

times. The World Bank estimated that 25 percent of Ukraine's population would be living in poverty at the end of 2022, a number that could rise to 55 percent by the end of 2023.¹⁴

The war is also having a ruinous impact on Ukraine's environment. According to the Ukrainian Environmental Protection and Natural Resources Minister Ruslan Strilets, more than 2,200 cases of environmental damage have already been recorded.¹⁵ Millions of hectares of nature reserves are under threat. At COP 27 the Ukrainian government estimated that the war had caused \$35.3 billion damage to Ukraine's ecology as a result of extensive soil pollution, air pollution, military waste and debris.¹⁶

2.2. Ukraine was vulnerable to climate change before the war

But Ukraine was vulnerable to the impacts of climate change even before the destruction wrought by the invasion. It was already struggling with the legacy of economic and environmental damage from the 2014 conflict¹⁷, as well as increasing poverty, high unemployment, and a lack of infrastructure.

Climate change models predict that Ukraine will face rising temperatures, shifting precipitation patterns, more frequent flash floods, changes in the onset of seasons as well as rising sea levels along its Black Sea coast.¹⁸ Water security is a particular concern, given that Ukraine is one of the least water self-sufficient countries in Europe.¹⁹ Moderate and high emission scenarios foresee decreases in wheat yields in parts of the country.²⁰

Climate models predict that annual water runoff in the north of the country could increase by 15 to 25 percent but could fall by between 30 to 50 percent in south-eastern Ukraine, where small and medium rivers may disappear. At the same time floods are predicted to become more frequent, with the risk of catastrophic flooding across large areas. 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 the north of Ukraine to dry up, which could lead to more frequent fires and deteriorating air quality.²¹

¹⁴ <https://tsn.ua/groshi/chez-vjynu-riven-bidnosti-v-ukrayini-zris-vdesyatero-svitoviy-bank-2181331.html> 17.10.22

¹⁵ NHK (2022) "Ukraine: Over 2,200 cases of environmental damage from invasion", NHK-World. 15 November 2022. https://www3.nhk.or.jp/nhkworld/en/news/20221115_29/#:~:text=Strilets%20said%20the%20damage%20of,be%20produced%20by%20reconstruction%20efforts

¹⁶ NHK (2022) "Ukraine: Over 2,200 cases of environmental damage from invasion", NHK-World. 15 November 2022. https://www3.nhk.or.jp/nhkworld/en/news/20221115_29/#:~:text=Strilets%20said%20the%20damage%20of,be%20produced%20by%20reconstruction%20efforts

¹⁷ Andryushchenko, Svitlana (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/>

¹⁸ USAID. "Climate Change Risk Profile: Ukraine." USAID, 2016.

¹⁹ OSCE (2017) *Climate change and security in Eastern Europe*, Organization for Security and Cooperation in Europe. <https://www.osce.org/secretariat/355496>

²⁰ Muller, Daniel, Anne Jungandreas, Friedrich Koch, and Florian Schierhorn. (2016) *Impact of Climate Change on Wheat Production in Ukraine*. German-Ukrainian Agricultural Policy Dialogue (APD).

²¹ <https://eu4climate.eu/2020/07/09/adaptation-planning/>

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

The existential threat of the war has forced adaptation to climate change farther down the political priority list, although some work is continuing. But even if the war were to halt tomorrow, it has already heavily undermined Ukraine's ability to adapt to climate change. This is a result of the toxic environmental legacy of the war, which grows every day that fighting continues, as well as the extreme financial pressure it has put the country under and the loss of critical expertise.

Russia's missiles, drones and artillery shells have damaged water infrastructure and dams, destroyed energy installations, and flattened entire cities. Shelling, unexploded ordnance, and land mines have rendered large areas of agricultural land unusable and are posing a major threat to fire fighters in responding to fires. Fighting and military activity in Ukraine's forests and greenbelts have damaged water catchments and forests, which are critical natural infrastructure for Ukraine's resilience to climate change. 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 increased 25 times in 2022 compared to 2021.²² The fighting has also led to more intensive use of resources as people endeavour to cope: for example, logging increased 50 percent in 2022 compared to the previous year.²³

Meanwhile, many of the professionals and experts who would have otherwise been engaged in addressing the impacts of climate change have either joined the war effort or fled the country. The war has also drained the national finances as well as its human resources. The government is spending more than 50 percent of its budget on the war: Ukraine's scope to focus on anything other than its day-to-day survival is limited. The budget for 2023 has a gap of \$38 billion. And with reconstruction costs estimated at between 349 billion and 780 billion euros,²⁴ Ukraine's fiscal position is unlikely to improve soon.

2.4. Worsening climate vulnerability in the OSCE area, and globally

The war is having cascading impacts on inflation, food security and energy security that spread far beyond Ukraine's borders. Early analysis suggests that the war in Ukraine could add 2 percent to global inflation in 2022 and 1 percent in 2023.²⁵ These are adding to the existing challenge of adapting to climate change faced by many countries around the world.

One of the principal concerns is the impact that the war is having on international flows of food. Ukraine is a critical player in the global food system. The agricultural sector is Ukraine's main export industry, and it is an important plank in global food security: Ukraine accounts for 10 percent of the

²² <https://ecopolitic.com.ua/en/news/nazvani-ekologichni-prioriteti-pislyvayoienni-vidbudovi-ukraini-2/>. Monthly fire warnings are available from the Regional Eastern Europe Fire Monitoring Center - <https://nubip.edu.ua/en/node/9087/2>, as part of the Global Fire Monitoring Center - <https://gfmc.online/>

²³ <https://life.pravda.com.ua/columns/2022/08/15/250014/>

²⁴ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

²⁵ Macchiarelli, Corrado (2022) 'Russia's war in Ukraine is driving global inflation. Here's how much'. *Barron's*. 8 July 2022.

<https://www.barrons.com/articles/war-in-ukraine-driving-global-inflation-51657294183>

global wheat market, 13 percent of the barley market, 15 percent of the corn market and more than 50 percent of the global sunflower oil market.²⁶ In 2021, countries such as Egypt and Bangladesh bought about one quarter of their wheat from Ukraine.²⁷ Disruptions to Ukraine's food exports mean higher prices and starvation in other parts of the world.²⁸

The blockading of Ukrainian ports on the Black Sea at the beginning of the war as well as the progressively tightened sanctions on Russia (which is itself a major exporter of food and fertiliser), have led to dramatic jumps in global food prices. The average price of wheat, for example, leapt by 165 percent between May 2021 and May 2022.²⁹ These prices have since come down somewhat as a result of the grain deal brokered by Turkey, which allows for exports of Ukrainian and Russian food and fertiliser, but the market price for wheat and other food remains highly volatile.³⁰

Energy prices have also been dramatically affected by the war. In Europe the price of coal tripled, and the price of gas increased ten-fold.³¹ Prices subsequently fell but have remained volatile. This has supercharged inflation, with around half the countries in Europe experiencing double digit inflation in 2022.³² Eurozone inflation reached a record 10.7 percent in October 2022.³³

The real-world impact of this inflation is a steep increase in poverty and climate vulnerability in Europe and around the world.³⁴ In Eastern Europe and Central Asia alone, the UN estimates that the war and the related cost-of-living crisis will force 10.4 million people into poverty. Three quarters of these people live in the Russian Federation. When translated into health and education terms, UNICEF estimates that an additional 4,500 children will die before their first birthday and 117,000 years of education will be lost across the region.³⁵

Soaring energy prices are straining national finances while inflation is diluting people's buying power. Many OSCE countries have introduced price support measures to blunt the impact on their consumers. These measures may help individuals in the short term, but they come at a long-term

²⁶ Eisele, Ines (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>

²⁷ Green, Mark (2022) "Forty Percent of the World Food Program's wheat supplies come from Ukraine". The Wilson Center. 2 June 2022. <https://www.wilsoncenter.org/blog-post/forty-percent-world-food-programs-wheat-supplies-come-ukraine>

²⁸ UNEP (2022) *The Environmental Impact of the Ukraine Conflict: A Preliminary Review*. UNEP. <https://www.unep.org/resources/report/environmental-impact-ukraine-conflict-preliminary-review>

²⁹ Chandrasekhar, C.P. and Ghosh, J. (2022) *Why are global wheat prices rising so much?* International Development Economics Associates. <https://mronline.org/2022/06/16/why-are-global-wheat-prices-rising-so-much/>

³⁰ After initial steep drops in grain exports from Ukraine, export levels have started to trend back up. Since the beginning of the marketing year Ukraine has exported more than 15.5 million tonnes of grain in 2022 compared to 22,4 in the same period.

<https://minagro.gov.ua/investoram/monitoring-stanu-apk/eksport-z-ukrayini-zernovih-zernobobovih-ta-boroshna>

³¹ Birnbaum, Michael.(2022) "Heat Pumps Take off in Coal-Loving Poland amid Ukraine War." *The Washington Post*. WP Company, September 6, 2022. <https://www.washingtonpost.com/climate-solutions/2022/09/06/poland-ukraine-heat-pumps-climate/>.

³² Hurst, Luke and Natalie Huet (2022) "Record inflation: Which countries in Europe are being worst hit as energy and good prices soar?" Euronews. 16 November 2022. Accessed 21 November 2022: <https://www.euronews.com/next/2022/11/16/record-inflation-which-country-in-europe-has-been-worst-hit-and-how-do-they-compare>

³³ Cohen, Patricia (2022) "Inflation in Europe reaches a record 10.7% as officials face hard options". *The New York Times*. 31 October 2022. Accessed 21 November 2022: <https://www.nytimes.com/2022/10/31/business/economy/eurozone-inflation-gdp.html>

³⁴ Benton, Tim G, Antony Froggatt, Laura Wellesley, Owen Grafham, Richard King, Neil Morisetti, James Nixey, and Patrick Schroder (2022) *The Ukraine War and Threats to Food and Energy Security*. Chatham House, April 2022.

³⁵ UNICEF (2022) Regional brief: The impact of the war in Ukraine and subsequent economic downturn on child poverty in Eastern Europe and Central Asia; UNICEF. 17 October 2022: <https://www.unicef.org/eca/reports/impact-war-ukraine-and-subsequent-economic-downturn-child-poverty-eastern-europe>

cost in terms of mounting debt and fewer resources to invest in priorities such as adaptation to climate change. Eurozone countries spent roughly 710 billion euros on energy subsidies in 2022 alone.³⁶

2.5 Exacerbating the security threats of climate change

Although they are very much a secondary concern compared to the existential threat facing Ukraine, the impact of the war is likely to increase the longer-term security threats of climate change in Ukraine and beyond. A 2017 assessment by the OSCE identified several areas as of high risk, including the Carpathian Mountains, the area around Chernobyl, the Dnister River, the Steppes of Ukraine and the Crimean Peninsula.³⁷ The war is also raising the risks of violent conflict elsewhere in the world by compounding existing drivers of insecurity associated with climate change, in particular food insecurity, supply-chain disruptions, economic stagnation, energy blackmail, resource insecurity and large-scale human displacement.

Food and energy insecurity

Russia's aggression against Ukraine is exacerbating the existing food and energy inequalities caused by climate change and the Covid-19 pandemic,³⁸ leading to a global cost-of-living crisis. Rapid increases in the prices of food and energy are the main drivers of a global spike in inflation. This predates the beginning of the war, but it has accelerated since February 2022. Prices have risen in the last 18 months as much as the previous five years combined, eroding living standards and increasing poverty across the globe.³⁹

The numbers involved are sobering. An additional 47 million people are acutely hungry because of the ripple effects of the war.⁴⁰ The lives and livelihoods of 345 million people around the globe are in danger from acute food insecurity. More than 828 million people go to bed hungry each night.⁴¹ The volatile global price of food is also straining the ability of the global humanitarian system to respond. In 2021 the World Food Programme (WFP), which feeds millions of people every day, bought 40 percent of its grain from Ukraine.⁴² The rising cost of fuel and food added an estimated 128 million dollars to WFP's West African operations alone, limiting the number of severely hungry

³⁶ Ainger, John (2022) Europe Racks Up \$700 Billion Energy Tab as Budgets Strain. *Bloomberg News*. 21 October 2022:

<https://financialpost.com/pmn/business-pmn/europe-racks-up-700-billion-energy-tab-as-budgets-strain>

³⁷ OSCE (2017) *Climate change and security in Eastern Europe*, Organization for Security and Cooperation in Europe.

<https://www.osce.org/secretariat/355496>

³⁸ Benton, Tim G, Antony Froggatt, Laura Wellesley, Owen Grafham, Richard King, Neil Morisetti, James Nixey, and Patrick Schroder (2022) *The Ukraine War and Threats to Food and Energy Security*. Chatham House, April 2022.

³⁹ Barratt, Philip (2022) How Food and Energy are Driving the Global Inflation Surge: International Monetary Fund.

<https://www.imf.org/en/Blogs/Articles/2022/09/09/cotw-how-food-and-energy-are-driving-the-global-inflation-surge>

⁴⁰ UNEP (2022) *The Environmental Impact of the Ukraine Conflict: A Preliminary Review*. UNEP. <https://www.unep.org/resources/report/environmental-impact-ukraine-conflict-preliminary-review>

⁴¹ Georgieva, Kristalina, Sebastián Sosa and Björn Rother (2022) *Blog: Global food crisis demands support for people, open trade, bigger local harvests*. International Monetary Fund. 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>

⁴² Green, Mark (2022) *Forty Percent of the World Food Program's wheat supplies come from Ukraine*. The Wilson Center. 2 June 2022.

<https://www.wilsoncenter.org/blog-post/forty-percent-world-food-programs-wheat-supplies-come-ukraine>

people it can help. This money could have provided school meals for 6 million children for six months.⁴³

Continued uncertainty over how much Ukrainian land can be planted and harvested in 2023, coupled with high fertiliser prices, means that these high and volatile global food prices are likely to continue for some time. This will have serious consequences for poor countries that rely heavily on food imports.⁴⁴ The IMF charts the impact of higher food and fertiliser prices on the balance of payments situation of the 48 countries most affected (one of which is Ukraine), calculating that the price rises are costing them \$9 billion dollars more than would have been the case without the war, eroding their foreign reserves and limiting their ability to pay for food imports.⁴⁵ Quite apart from the impacts on nutrition and poverty, there is a concern that this could fuel protests, given the strong correlation between food price spikes and social instability.⁴⁶

Refugee movements

Russia's attacks on Ukrainian heating and energy infrastructure, in addition to attempting to break the will of the Ukrainian people, seem aimed at prolonging the huge movement of refugees from Ukraine and causing social tensions in the recipient countries. These attacks also serve the purpose of perpetuating the burden of hosting millions of refugees in many European countries.⁴⁷

Energy politics

Meanwhile, the war is upending energy relationships around the world. On one hand, it has transformed decarbonisation into an issue of long-term political security.⁴⁸ Many countries are now working to wean themselves off fossil fuel imports, particularly those that come from states with whom they have difficult relationships. The EU is proposing to increase its use of renewable energy, so that it provides 45 percent of energy by 2030, up from 40 percent agreed at the end of 2021.⁴⁹ However, some countries are doubling down on fossil fuels as a means to secure their energy independence, with global coal consumption expected to rise in 2022, leading to a level of coal burning not seen for a decade.⁵⁰

Critical minerals

⁴³ WFP (2022) *Press release: Food and oil price hikes drive up costs for cash-strapped WFP operations in West Africa as region faces record hunger* <https://www.wfp.org/news/food-and-oil-price-hikes-drive-costs-cash-strapped-wfp-operations-west-africa-region-faces>

⁴⁴ UNEP (2022) *The Environmental Impact of the Ukraine Conflict: A Preliminary Review*. UNEP. <https://www.unep.org/resources/report/environmental-impact-ukraine-conflict-preliminary-review>

⁴⁵ Georgieva, Kristalina, Sebastián Sosa and Björn Rother (2022) *Blog: Global food crisis demands support for people, open trade, bigger local harvests*. International Monetary Fund. 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>

⁴⁶ Bellemare, Marc F. (2014) 'Rising food prices, food price volatility, and social unrest'. *American Journal of Agricultural Economics*. <https://doi.org/10.1093/ajae/aau038>

⁴⁷ Abend, Lisa (2022) 'As winter descends, Europe cools on Ukrainian refugees'. *Time*. 21 November 2022. <https://time.com/6234536/ukrainian-refugees-russia-ireland-poland/>

⁴⁸ Birnbaum, Michael.(2022) 'Heat Pumps Take off in Coal-Loving Poland amid Ukraine War.' *The Washington Post*. WP Company, September 6, 2022. <https://www.washingtonpost.com/climate-solutions/2022/09/06/poland-ukraine-heat-pumps-climate/>.

⁴⁹ European Commission (2022), *REPowerEU: A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition*, https://ec.europa.eu/commission/presscorner/detail/en/IP_22_3131

⁵⁰ International Energy Agency (2022), *Global coal demand is set to return to its all-time high in 2022*, 28 July 2022, <https://www.iea.org/news/global-coal-demand-is-set-to-return-to-its-all-time-high-in-2022>

The war has also shown clearly how the trade in energy, food and fertiliser can be harnessed as a strategic weapon for geopolitical leverage. This is also encouraging a securitised approach to resource management, inside Russia and elsewhere. This will become increasingly evident as the green transition to more renewable sources of energy gathers pace. New systems to produce, store, transport and use renewable energy will require new sources of critical minerals. Several of these are found in significant quantities within Russia and Ukraine. If the story of the twentieth century was coloured by geopolitical tussles over fossil fuels, then the story of the twenty-first century may be increasingly shaped by strategic contests over access to critical minerals for the green transition.

Ukraine is an important source of the critical minerals needed for green technologies. Ukraine has, for example, nine percent of the world's proven reserves of manganese, an essential component of lithium-ion batteries and steel production.⁵¹ Ukraine also holds an estimated 20 percent of the world's ilmenite concentrates. These provide two other metals critical for the green transition: titanium (used in geothermal power generation) and zirconium (used in electrolyzers).⁵²

Meanwhile, just before the war, estimates emerged that Ukraine could have up to 500,000 tonnes of lithium oxide reserves.⁵³ If this indeed proves to be the case, this would catapult Ukraine into the top 10 countries of the world in terms of reserves.⁵⁴ Global demand for lithium—an essential ingredient in many battery technologies—is expected increase by up to 40 times in the coming decades.⁵⁵ Some commentators argue that Russia's invasion is partially motivated by a desire to control these minerals which are largely concentrated in the Luhansk and Donetsk oblasts. By August 2022 the potential value of metals and minerals in areas controlled by Russia was estimated at \$12.4 trillion of metals and minerals.⁵⁶

Contested areas

The war is increasing tensions in places where climate change is already threatening regional security. For example, trust between Russia and other Arctic states is at a historically low ebb. Before the war, Russia built or re-activated 50 military installations or bases in the Arctic, and made it clear that it planned to extend its economic and political power in the region.^{57,58}

Now, seven of the eight members of the Arctic Council, an intergovernmental forum to coordinate action on issues of concern to the Arctic, are either NATO members already—or, as in the case of

⁵¹ USGS (2022) Fact Sheet: Manganese <https://pubs.usgs.gov/periodicals/mcs2021/mcs2021-manganese.pdf>

⁵² National Atlas of Ukraine (n/d) Mineral Resources. <http://wdc.org.ua/atlas/en/4040100.html>

⁵³ Vasylenko, Svitlana and Uliana Nualenko (2022) "Prospects of development of lithium resource base in Ukraine" Conference: International Scientific Discussion: Problems, Tasks and Prospects DOI:[10.51582/interconf.19-20.02.2022.072](https://doi.org/10.51582/interconf.19-20.02.2022.072)

⁵⁴ <https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/minerals-metals-facts/lithium-facts/24009>

⁵⁵ White House (2022) Fact Sheet: Securing a made in America supply chain for critical minerals, February 22, 2022.

<https://www.whitehouse.gov/briefing-room/statements-releases/2022/02/22/fact-sheet-securing-a-made-in-america-supply-chain-for-critical-minerals/>

⁵⁶ Faiola, Anthony and Dalton Bennet (2022) "In the Ukraine war, a battle for the nation's mineral and energy wealth". *The Washington Post*. 10 August 2022. <https://www.washingtonpost.com/world/2022/08/10/ukraine-russia-energy-mineral-wealth/>

⁵⁷ Boulégué, Mathieu (2022) *The militarization of Russian polar politics*. Chatham House. <https://www.chathamhouse.org/2022/06/militarization-russian-polar-politics>

⁵⁸ NATO. (2022) *Russia's Invasion of Ukraine and Climate Change Significantly Impact Short and Long-Term Arctic Stability*, September 23, 2022. <https://www.nato-pa.int/news/russias-invasion-ukraine-and-climate-change-significantly-impact-short-and-long-term-arctic>.

Sweden and Finland—are applying to join NATO, as a direct result of the war.⁵⁹ One of the principal concerns of these countries is freedom of navigation in Arctic waters that are increasingly navigable as a result of climate change. Meanwhile, with Western sanctions on Russia biting down on Russia’s export option, the country is placing greater importance on the viability of the Northern Sea Route as a transit option for its trade with Asia.⁶⁰

The Arctic Council is currently chaired by the Russian Federation (2021-23) but in March 2022 the other members announced they would not travel to Russia for meetings and declared that they were pausing the work of the Council.⁶¹ In June the Council members resumed their meetings, without Russia and without discussing projects that Russia is involved in.⁶² In August the US administration announced they were appointing a new Arctic ambassador due to growing security concerns in the Arctic.⁶³ The lack of cooperation and communication over a highly strategic area increases the risk of miscalculations and misunderstandings.

⁵⁹ Canada, the Kingdom of Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States

⁶⁰ NATO. (2022) *Russia’s Invasion of Ukraine and Climate Change Significantly Impact Short and Long-Term Arctic Stability*, September 23, 2022. <https://www.nato-pa.int/news/russias-invasion-ukraine-and-climate-change-significantly-impact-short-and-long-term-arctic>.

⁶¹ US Department of State (2022) Press release: Joint statement on Arctic council cooperation following Russia’s invasion of Ukraine. <https://www.state.gov/joint-statement-on-arctic-council-cooperation-following-russias-invasion-of-ukraine/>

⁶² Associated Press (2022) Arctic Council to resume meetings without Russia after protesting Ukraine war. *Associated Press*. 8 June 2022. <https://globalnews.ca/news/8906767/arctic-council-meeting-without-russia/>

⁶³ Ali, Saleem H. (2022) “Science Diplomacy with Russia Must Be Pursued.” *Springer Nature Sustainability Community*. Springer Nature, October 10, 2022. <https://sustainabilitycommunity.springernature.com/posts/science-diplomacy-with-russia-must-be-pursued>.

3. Implications of the war for climate mitigation and the green transition

In addition to the direct and indirect impacts of the war on people's vulnerability to climate change, the war is also having serious impacts on current greenhouse gas emissions and the prospects of a green transition, both in Ukraine and far beyond its borders.

3.1. Starting point: Ukraine was energy intensive, but with ambitions to decarbonise

Ukraine was the world's fifth most energy intensive country before the war.⁶⁴ Traditionally a high energy consumer, Ukraine also uses large amounts of water and resources per unit of GDP.⁶⁵ But in the run up to the war, the country had been moving towards greater energy efficiency and decarbonisation.

The country set up an Interministerial Commission on Climate Change in 1999.⁶⁶ The share of renewable energy in electricity production increased from below eight percent in 2015, to 11.3 percent in 2020,⁶⁷ and above 13 percent in 2021.⁶⁸ In 2016 Ukraine issued a Nationally Determined Contribution⁶⁹ (NDC) strategy that committed the country to reductions in its greenhouse gas emissions of 40 percent below 1990 levels by 2030.⁷⁰ By 2019 that goal had been exceeded with a decrease of 62.4 percent from the 1990 level.⁷¹ In July 2021 Ukraine raised its ambition level to aim for 65 percent below 1990 levels.⁷² The country had also set a goal of sourcing 25 percent of its total energy from renewables by 2035 - an ambitious target which would require significant investments in wind and solar technology.⁷³

3.2. The war is having, and will continue to have, a major impact on emissions

The war, however, has reversed much of this progress. It is self-evident, but war is a destructive exercise, and military action—which requires large quantities of fossil fuels—can itself be a major contributor to emissions.

It is a subsidiary issue compared to the human tragedy of the war, but the direct and indirect carbon impact of the war has been enormous. The first seven months of the war, an estimated 100 million

⁶⁴ USAID. "Climate Change Risk Profile: Ukraine ." USAID, 2016.

⁶⁵ Golovko, Liudmyla, Olena Yara, Maksym Kutsevych, and Tamara Hubanova. (2019) "Environmental Policy Integration in Ukraine and the EU." *European Journal of Sustainable Development* 8, no. 3: 221. <https://doi.org/10.14207/ejsd.2019.v8n3p221>.

⁶⁶ Sabonis-Helf, Theresa. (2003) "Catching Air? Climate Change Policy in Russia, Ukraine and Kazakhstan." *Climate Policy* 3, no. 2: 159–70. <https://doi.org/10.3763/cpol.2003.0319>.

⁶⁷ UNFCCC. (2021) *Updated Nationally Determined Contribution of Ukraine to the Paris Agreement*. UNFCCC.

⁶⁸ Ekoair. "Russian Actions Jeopardize Ukrainian and Global Climate Efforts." *Ecoaction*, June 16, 2022. <https://en.ecoaction.org.ua/russian-actions-jeopardize-climate-efforts.html>.

⁶⁹ Nationally determined contributions (NDCs) are at the heart of the Paris Agreement 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.

⁷⁰ OECD (2016) "Financing Climate Action in Ukraine ." Organization for Economic Cooperation and Development.

⁷¹ UNFCCC. (2021) *Updated Nationally Determined Contribution of Ukraine to the Paris Agreement*. UNFCCC.

⁷² UNFCCC. (2021) *Updated Nationally Determined Contribution of Ukraine to the Paris Agreement*. UNFCCC.

⁷³ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

tonnes of carbon were released into the atmosphere due to the war, roughly same as that produced by the Netherlands over the same period.⁷⁴ According to the Ukraine government, fighting and shelling have destroyed five million acres of forest.⁷⁵ If completely destroyed, this would imply the loss of a carbon sink that could otherwise sequester between 10 million and 25 million tonnes of carbon per year.⁷⁶

The war is also leading to other sources of emissions in Ukraine. The initial blockade by Russia of Ukraine's ports drastically cut the export of grain by the (relatively efficient) means of cargo ships, forcing a 'plan b' of export by road and rail, which is more energy intensive. Meanwhile, the destruction of heating and electricity systems is requiring less efficient and more expensive generators to provide energy, wherever possible. And a major source of additional emissions will, eventually, come from the reconstruction of the huge amount of infrastructure destroyed during the war. The Ukrainian government estimates that rebuilding its cities and infrastructure will lead to emissions of 50 million tonnes of carbon dioxide.⁷⁷

3.3. The war is increasing emissions in the OSCE area and globally

The war is also giving rise to damaging emissions outside Ukraine. At the end of September 2022 three massive explosions ruptured the Nord Stream 1 and 2 pipelines in Danish and Swedish territorial waters, releasing an estimated 300,000 tonnes of methane, a potent greenhouse gas, into the atmosphere.⁷⁸ UNEP noted that this is likely to be the biggest release of methane ever, with a global warming potential equivalent to that of the annual emissions of five million cars.⁷⁹ Evidence of explosives at the site indicates intentional sabotage, though there continues to be debate as to who is responsible.⁸⁰

Meanwhile, the sanctions on Russia have forced some Russian energy companies to burn off unsold gas. In August 2022 there were reports of an LNG plant near the Finnish border burning off nearly \$10 million a day of gas due to a lack of spare parts to process the gas safely.⁸¹

⁷⁴ De Klerk, Lennard, Anatolii Shmurak, Olga Gassan-Zade, Mykola Shlapak, Kyryl Tomliak and Adriaan Korthuis (2022) *Climate Damage caused by Russia's war in Ukraine*. Initiative on GHG accounting of war. https://en.ecoaction.org.ua/wp-content/uploads/2022/11/climate-damage-caused-by-rus-war_fin.pdf

⁷⁵ Harvey, Fiona, Lakhani, Nina, and Carrington, Damian (2022) "Cop27: ending war in Ukraine necessary to tackle climate crisis, Zelenskiy says". *The Guardian*. 8 November 2022.

<https://www.theguardian.com/environment/2022/nov/08/cop27-climate-summit-volodymyr-zelenskiy-ukraine-president-speech>

⁷⁶ Authors' own calculations. According to 8 billion trees: One acre of forest can sequester between 2 and 5 tonnes of carbon dioxide per year. <https://8billiontrees.com/carbon-offsets-credits/carbon-ecological-footprint-calculators/how-much-carbon-does-a-tree-capture/#:~:text=One%20acre%20of%20forest%20can,driving%20your%20car%2026%2C000%20miles>.

⁷⁷ Milman, Oliver (2022) "Ukraine uses Cop27 to highlight environmental cost of war". *The Guardian*. 13 November 2022.

<https://www.theguardian.com/world/2022/nov/13/ukraine-cop27-highlight-environmental-cost-russia-war>

⁷⁸ Reuters Staff (2022) "Nord Stream rupture may mark biggest single methane release ever recorded, U.N. says". 1 October 2022.

<https://www.reuters.com/world/europe/nord-stream-rupture-may-mark-biggest-single-methane-release-ever-recorded-un-2022-09-30/>

⁷⁹ Simonov, Evgenij (2022) "Climate accident: what will be the consequences of the explosions on the "Nord Streams", Forbes Russia. 5 October 2022 <https://www.forbes.ru/mneniya/478811-klimaticeskaa-avaria-kakimi-budut-posledstvia-vzryvov-na-severnyh-potokah>

⁸⁰ Isaac, Lindsay and Sophie Tanno (2022) "Explosive traces found at Nord Stream pipeline indicate 'gross sabotage' Sweden says", CNN, 18 November 2022. <https://edition.cnn.com/2022/11/18/business/nord-stream-explosive-traces-sweden-intl/index.html>

⁸¹ McGrath, Matt (2022) Climate change: Russia burns off gas as Europe's energy bills rocket, *BBC*. August 26, 2022.

<https://www.bbc.com/news/science-environment-62652133>

Less immediately obvious, but arguably more significant for emissions over the long term, is the widespread increase in military spending that the war has provoked. Militaries are huge consumers of fossil fuels and typically the single biggest source of public emissions.⁸² And at least eight NATO countries are planning to increase military budgets as a result of the war.⁸³ This will have an impact on the total military carbon footprint which can already reach hundreds of millions of tonnes of CO₂ per year.

3.4. The war is complicating future efforts by Ukraine to reduce greenhouse gas emissions

In addition to actual emissions from the fighting, the war is also undermining Ukraine's capacity to reduce its emissions in future.

The most obvious element of this is the impact that the war has had on Ukraine's renewable energy infrastructure. According to the Ukrainian government about 90 percent of wind power and 50 percent of solar energy capacity has been taken offline because of the war.⁸⁴ And more than 500 water infrastructure facilities, including hydroelectric dams have been destroyed.⁸⁵

Replacing this infrastructure is complicated, particularly while fighting is ongoing. Around two thirds of operating wind and solar farms (as of September) were in the five southern regions (Odesa, Zaporizhzhia, Mykolaiv, Kherson and Dnipro) that are either under occupation or at heightened threat of attack by Russia.⁸⁶ And with much of the southern coast of Ukraine under Russia's control the scope for offshore wind development is limited. In a move that underlines the uncertainty facing renewables investment, DTEK Renewables, the largest operator of renewable generation in Ukraine, has indefinitely delayed a planned 700 MW of additional wind capacity.⁸⁷

Meanwhile, nuclear energy may be a low-carbon source of energy, when compared with fossil fuel powered electricity production, but the war has demonstrated how vulnerable civilian nuclear power stations can be to attack, in Ukraine and elsewhere.⁸⁸

Despite its tragic history with Chernobyl, Ukraine still has a high dependency on nuclear power. Before the war nuclear plants provided about half of the country's electricity, from 15 reactors located at four power stations. These are all pressurised water reactors of Soviet design, with the oldest operating since 1980. The average age of these reactors is already past the original design

⁸² Braun, Stuart. (2022) "Ukraine War Threatens Climate Targets: Dw: 23.06.2022." *Deutsche Welle*. Accessed October 6, 2022. <https://www.dw.com/en/ukraine-war-threatens-climate-targets/a-62185483>.

⁸³ Braun, Stuart. (2022) "Ukraine War Threatens Climate Targets: Dw: 23.06.2022." *Deutsche Welle*. Accessed October 6, 2022. <https://www.dw.com/en/ukraine-war-threatens-climate-targets/a-62185483>.

⁸⁴ <https://fakty.com.ua/en/ukraine/ekonomika/20221023-cherез-vijnu-90-potuzhnostej-vitrovoyi-energetyky-vyvedeni-z-ekspluatatsiyi-galushhenko/>
⁸⁵ <https://www.netherlandswaterpartnership.com/news/ukrainian-water-infrastructure-damage>

⁸⁶ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

⁸⁷ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

⁸⁸ Romanko, Svitlana. (2022) "Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive." *EURACTIV*, October 24, 2022. <https://www.euractiv.com/section/energy/opinion/ukraine-reconstruction-must-steer-clear-of-energies-that-allowed-putin-to-thrive/>.

threshold of 30 years.⁸⁹ However, in 2012 Energoatom, a state enterprise operating all four nuclear power plants in Ukraine, announced it intended to operate the oldest reactors for another 20 years, which is likely to be challenging given their age.⁹⁰

The Zaporizhzhia nuclear power plant, the largest in Ukraine, is in the east of the country and has come under repeated attack, causing damage to buildings. 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 is “gravely concerned about the situation”.⁹¹ Since March 2022 the power plant has been under Russia’s control. The reactors have been disconnected from the Ukrainian grid, leading to a significant loss to the electricity supply. President Zelenskyy’s appeals to create demilitarised zones around nuclear power stations remain unanswered. On 23 November Ukraine’s last three fully functioning nuclear power stations were disconnected from the power grid as a precautionary measure after a missile barrage.

These attacks have also underlined the strategic risks of nuclear power, and in particular their vulnerability to being targeted to spread radioactive material into the environment. Historically the fresh fuel and services for the reactors came from Russia, but there were already attempts by Ukraine to diversify away from reliance on Russia. In 2021 six reactors were operating using fuel partly from the US, with plans for the further use in the remaining reactors in 2024. An agreement was also reached for the construction of up to nine reactors. However, the construction of new reactors is never quick and rarely to budget.⁹²

3.5. The war has upended global energy politics

Beyond its immediate impact on the battlefield and in the cities of Ukraine, the war is having tectonic impacts on global energy politics, which will reverberate for decades. It has served as a clarifying moment that has exposed the downsides of global interdependencies,⁹³ particularly for countries whose economic model relied on dependable low-cost sources of Russian gas. Indeed, the war has made the Russian energy resources that Europe depends on, not only unreliable, but also unwelcome.⁹⁴ This is having both positive and negative impacts on emissions.

On the one hand politicians are realising that ambitious climate action is necessary for energy security, and that energy security is increasingly a precondition for political security. Indeed, Russia’s

⁸⁹ WNA (2022), Nuclear Power in Ukraine, World Nuclear Association, June 2022, <https://world-nuclear.org/information-library/country-profiles/countries-t-z/ukraine.aspx>

⁹⁰ <https://www.world-nuclear-news.org/Articles/Ukraine-s-Energoatom-looks-ahead-to-Rovno-3-life-e>

⁹¹ IAEA, (2022), Nuclear Safety, Security and Safeguards in Ukraine, 2nd Summary Report by the Director General, September 2022, https://www.iaea.org/sites/default/files/22/09/ukraine-2ndsummaryreport_sept2022.pdf

⁹² WNN, (2022), AP1000 remains attractive option for US market, says MIT, World Nuclear News, 8 April 2022, <https://www.world-nuclear-news.org/Articles/AP1000-remains-attractive-option-for-US-market-say>

⁹³ Muggah, Robert (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/>

⁹⁴ Mikulska, Anna (2022) “Climate Action Meets Energy Security: The Russian Invasion of Ukraine Adds a New Dimension to Energy Transition.” Foreign Policy Research Institute, June 27, 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/>.

war against Ukraine provides many countries with the strongest possible argument for why they must reduce their reliance on Russian fossil fuels.

Ultimately, Russia's war against Ukraine could accelerate a global shift to green energy and greater energy efficiency.⁹⁵ In this light, investing in renewable energy and energy efficiency becomes a patriotic act. Following the invasion in February there were reports of people in Poland installing solar panels and heat pumps to be personally free of Russian energy.⁹⁶ Meanwhile, the current high energy prices are shifting calculations about the payback period of renewable energies, which adds to economic weight to the political and environmental arguments for their installation.⁹⁷

3.7. It also complicates the green transition

On the other hand, actions that are being taken now in response to the energy crisis could lock in higher emissions far into the future.

Russia's attempt to use of energy as a lever of geopolitical control (through the medium of limiting their own fossil fuel exports to Europe and attacking Ukrainian power and heating installations) has upended received wisdom about the incentives driving energy systems, in particular the dependability of foreign imports of energy.

The goal of the decarbonisation of energy systems, which was mentioned often in policy circles before the war, has faded in favour of energy security and energy affordability. The focus is now on energy independence where the aim is to secure sufficient domestic sources of energy to not rely on imports, regardless of how carbon intensive those sources may be. This has caused the phase out of more dirty forms of energy to stall.⁹⁸ Some countries have started to burn more coal, to build more liquified natural gas (LNG) terminals and to extend networks of gas pipelines.

Across the world, countries are building or reopening coal power stations at home while investing in oil and gas development abroad.⁹⁹ Even the UN's Race to Zero initiative has quietly removed an explicit ban on financing new coal projects from its guidelines. And any mention of fossil fuel phase-out was struck from the COP 27 agreement at the very last moment.¹⁰⁰

With faltering supplies of Russian gas, in summer 2022 Europe turned to shipped LNG to refill its gas storage in advance of winter. However, the processing, shipping and cooling of LNG means

⁹⁵ Romanko, Svitlana. (2022) "Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive." *EURACTIV*, October 24, 2022. <https://www.euractiv.com/section/energy/opinion/ukraine-reconstruction-must-steer-clear-of-energies-that-allowed-putin-to-thrive/>.

⁹⁶ Birnbaum, Michael. (2022) "Heat Pumps Take off in Coal-Loving Poland amid Ukraine War." *The Washington Post*. WP Company, September 6, 2022. <https://www.washingtonpost.com/climate-solutions/2022/09/06/poland-ukraine-heat-pumps-climate/>.

⁹⁷ Birnbaum, Michael. (2022) "Heat Pumps Take off in Coal-Loving Poland amid Ukraine War." *The Washington Post*. WP Company, September 6, 2022. <https://www.washingtonpost.com/climate-solutions/2022/09/06/poland-ukraine-heat-pumps-climate/>.

⁹⁸ Mathis, Will, and Ewa Krukowska (2022) "Ukraine Invasion Threatens Europe's Climate Change Goals." *Bloomberg.com*. Bloomberg, July 7, 2022. <https://www.bloomberg.com/news/articles/2022-07-07/ukraine-invasion-threatens-europe-s-climate-change-goals>.

⁹⁹ Rawnsley, Jessica (2022) "Food and energy crises threaten to distract from climate talks". *The Financial Times*; 10 October 2022. <https://www.ft.com/content/6f352052-f2bc-401a-beed-b89d9e98a23d>

¹⁰⁰ <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>

that, in normal circumstances, the climate footprint of LNG is far higher than that of piped gas.¹⁰¹ The resulting increased reliance on LNG means that the carbon footprint of European gas supplies as a whole (including piped gas and LNG) has almost doubled.¹⁰² If Europe was forced to turn to LNG to make up for all Russian piped gas it could result in an extra 35 million tonnes of imported upstream CO₂ emissions compared to 2021. This is the equivalent of adding 16 million cars to Europe's roads for two years.¹⁰³

It is also leading to an urgent search for new strategic partners to replace Russian energy, particularly in Africa and the Middle East.¹⁰⁴ This is opening up new fossil fuel energy supplies across the world at a time when the imperative of the Paris target of no more than 1.5 degrees of warming, means that, according to the International Energy Agency itself, the world should be forbidding new fossil fuel developments and phasing down existing ones.¹⁰⁵

Ironically, the dramatic push to compensate for lost Russian supplies of gas may end up creating a massive oversupply in gas infrastructure. New analysis that was released just before COP27 argued that if all the new gas projects that had been announced to deal with the supply crunch actually came to fruition, there would be an oversupply of about 500 megatonnes of LNG across the world by the end of the decade. This would be five times as much gas as the EU imported from Russia in 2021 and double Russia's total gas exports.¹⁰⁶ In other words, just as leaders are repeating the mantra of reducing dependence on imports of fossil fuels, their actions risk locking in even more imports.

Perhaps unsurprisingly, the crisis is also complicating the European Union's decarbonisation plan.¹⁰⁷ Before the war eurozone nations relied heavily on Russia for a third of their oil and 40 percent of their gas. Indeed, gas was seen as a transition fuel for decarbonisation under the European Commission's July 2021 "Fit for 55" plan which proposed tightening the existing cap-and-trade system for carbon emission permits, promoting renewable power and phasing out internal combustion engine cars as part of an overall plan to bring down carbon emissions by 55 percent from 1990 levels.¹⁰⁸

¹⁰¹ According to Rystad analyst Patrick King; LNG imports can be up to ten times as energy intensive to produce and transport than piped gas. <https://www.bbc.com/news/science-environment-63457377>

¹⁰² The carbon footprint of European gas supplies as a whole (including piped gas and LNG) has increased from just over 20 kilogrammes of carbon dioxide per barrel of oil equivalent (boe) to almost 40 kilogrammes of CO₂ per boe.

¹⁰³ McGrath, Matt (2022) 'Climate change: Hidden emissions in liquid gas imports threatens targets'. *BBC*. <https://www.bbc.com/news/science-environment-63457377>

¹⁰⁴ Reuters (2022) 'Ukraine war rekindles Europe's demand for African oil and gas' *Reuters and Euractiv*. 22 July 2022. Accessed 21 December 2022 <https://www.euractiv.com/section/energy/news/ukraine-war-rekindles-europes-demand-for-african-oil-and-gas/>

¹⁰⁵ Harvey, Fiona (2021) 'No new oil, gas or coal development if the world is to reach net zero by 2050, says world energy body'. *The Guardian*. 18 May 2021. Accessed 21 December 2022: <https://www.theguardian.com/environment/2021/may/18/no-new-investment-in-fossil-fuels-demands-top-energy-economist>

¹⁰⁶ Harvey, Fiona (2022) "'Major push' for gas amid Ukraine war accelerating climate breakdown". *The Guardian*. 10 November 2022. Accessed 20 November 2022. <https://www.theguardian.com/environment/2022/nov/10/major-push-for-gas-amid-ukraine-war-accelerating-climate-breakdown>

¹⁰⁷ Mathis, Will, and Ewa Krukowska (2022) "Ukraine Invasion Threatens Europe's Climate Change Goals." *Bloomberg.com*. Bloomberg, July 7, 2022. <https://www.bloomberg.com/news/articles/2022-07-07/ukraine-invasion-threatens-europe-s-climate-change-goals>.

¹⁰⁸ Mathis, Will, and Ewa Krukowska (2022) "Ukraine Invasion Threatens Europe's Climate Change Goals." *Bloomberg.com*. Bloomberg, July 7, 2022. <https://www.bloomberg.com/news/articles/2022-07-07/ukraine-invasion-threatens-europe-s-climate-change-goals>.

4. Consequences of the war for climate governance and climate finance

The first air raids on Kyiv early on the morning of 24th February shook the established world order. That Russia would launch an attack at all contradicted the assertions of many observers who were confident that the troop build-up of the preceding weeks was mere threat and bluster. Few, even within the Ukrainian government, seem to have openly expected a full-scale invasion, despite de facto ultimata being issued in December 2021 and experts warning for years that Russia was already at war with the West and had been for well over a decade. It was a problem few wished to face.

The robust response of NATO and the Western block to the invasion is markedly different to the reaction to the 2014 annexation of Crimea. Sweden and Finland swiftly moved to join NATO. Successive packages of sanctions—unprecedented against a permanent member of the UN Security Council—endeavoured to isolate Russia from the global community and pressure the country to change course. The barbaric targeting of civilians has led to an array of resolutions, including the most recent by the European Parliament recognising Russia as a state sponsor of terrorism.¹⁰⁹ This will lead to further isolation of Russia and the consolidation of its pariah status in international affairs.

Mutual suspicion across the world is perhaps at its highest point since the depths of the Cold War. Some experts argue that we are entering a period of ‘deglobalisation’ that will mean collective action on global challenges is more difficult.¹¹⁰ Despite this trend – or perhaps because of it – it is more important than ever to look for opportunities for preventive diplomacy to avert climate security risks.

4.1. Climate action in Ukraine

Climate action in Ukraine dates back 25 years to the country’s 1997 Climate Programme. This was the first national document to formally identify climate change as a major factor shaping Ukraine’s natural environment.¹¹¹ Since then the absence of a legal framework for climate action has made it hard to clearly define adaptation and mitigation objectives.¹¹² Instead, the development of climate governance in Ukraine has mainly followed evolving international climate frameworks.¹¹³

¹⁰⁹ Europarliament (2022) *Press release: European Parliament declares Russia to be a state sponsor of terrorism*. 23 November 2022.

<https://www.europarl.europa.eu/news/en/press-room/20221118IPR55707/european-parliament-declares-russia-to-be-a-state-sponsor-of-terrorism>

¹¹⁰ Benton, Tim G, Antony Froggatt, Laura Wellesley, Owen Grafham, Richard King, Neil Morisetti, James Nixey, and Patrick Schroder (2022) *The Ukraine War and Threats to Food and Energy Security*. Chatham House, April 2022.

¹¹¹ Kopytsia, Ievgeniia (2021) "The Legal Regulation of Climate Change in Ukraine: Issues and Prospects," *Journal of Environmental Law & Policy* 1, no. 1, May 2021: 105-125

¹¹² Kopytsia, Ievgeniia (2021) "The Legal Regulation of Climate Change in Ukraine: Issues and Prospects," *Journal of Environmental Law & Policy* 1, no. 1, May 2021: 105-125

¹¹³ Kopytsia, Ievgeniia (2021) "The Legal Regulation of Climate Change in Ukraine: Issues and Prospects," *Journal of Environmental Law & Policy* 1, no. 1, May 2021: 105-125

The importance that many EU countries attach to climate change has meant that climate action has become a way to demonstrate Ukraine's alignment with European values.¹¹⁴ In June 2022 Ukraine became the first non-EU country to join the EU's LIFE programme, which has been the EU's funding instrument for environment and climate since 1992. Over the short term the programme can support reconstruction efforts with needs analysis and capacity building.¹¹⁵

Climate action (both mitigation and adaptation) is seen by the government as a way to improve Ukraine's chances of successfully completing the European integration process by 2030.¹¹⁶ Despite the war the Ukrainian government made a point of underlining that it still supports the goals of the EU Green New Deal.¹¹⁷ Indeed, the Lugano Declaration which was issued at the July 2022 Ukraine Recovery Conference, which gathered donors and the government to plan ahead for Ukraine's eventual reconstruction, explicitly mentions aligning Ukraine's reconstruction with its 'European path'.¹¹⁸

4.2. Limited capacity of Ukraine to participate in climate action

Unsurprisingly, with fighting raging in the south and east and attacks across the country, nearly all long-term environmental governance and management in Ukraine has halted. For example, just two weeks before the invasion, President Zelenskyy signed a decree on 7 February 2022 which aimed to help the agri-food sector achieve the Sustainable Development Goals. This sector contributed to 12.8 percent of Ukraine's overall GHG emissions in 2019. But it is almost inevitable that those plans will be severely disrupted.¹¹⁹

With the government focused on immediate crisis management, there is, understandably, little bandwidth for long-term planning.¹²⁰ Meanwhile, policymakers, scientists, and activists have either fled, been displaced, or had their activities severely disrupted. But there is also decreased space for civil society action in Ukraine. The declaration of martial law and the closure of many previously open public databases for security reasons is restricting access to information. Many of the normal avenues for advocacy, such as public mobilisation events, are prohibited. Nevertheless, a Ukrainian delegation attended COP27 in the Egyptian city of Sharm-el-Sheikh in November 2022, with a

¹¹⁴ See also: Ukraine Conference (2022) *Outcome document of the Ukraine Recovery Conference URC2022 'Lugano Declaration'*, 4-5 July 2022. https://uploads-ssl.webflow.com/621f88db25fbf24758792dd8/62c68e41bd53305e8d214994_URC2022%20Lugano%20Declaration.pdf

¹¹⁵ EC (2022) "Ukraine Joins the Life Programme for Environment and Climate." European Commission, June 24, 2022. https://environment.ec.europa.eu/news/ukraine-joins-life-programme-environment-and-climate-2022-06-24_en

¹¹⁶ Shevchenko, Hanna, Mykola Petrushenko, Borys Burkynskyi, and Nina Khumarova. "SDGs and the Ability to Manage Change within the European Green Deal: The Case of Ukraine." *Problems and Perspectives in Management* 19, no. 1 (2021): 53–67. [https://doi.org/10.21511/ppm.19\(1\).2021.05](https://doi.org/10.21511/ppm.19(1).2021.05)

¹¹⁷ Ekoair. "Russian Actions Jeopardize Ukrainian and Global Climate Efforts." *Ecoaction*, June 16, 2022. <https://en.ecoaction.org.ua/russian-actions-jeopardize-climate-efforts.html>

¹¹⁸ Ukraine Conference (2022) *Outcome document of the Ukraine Recovery Conference URC2022 'Lugano Declaration'*, 4-5 July 2022. https://uploads-ssl.webflow.com/621f88db25fbf24758792dd8/62c68e41bd53305e8d214994_URC2022%20Lugano%20Declaration.pdf

¹¹⁹ UNEP (2022) *The Environmental Impact of the Ukraine Conflict: A Preliminary Review*. UNEP. <https://www.unep.org/resources/report/environmental-impact-ukraine-conflict-preliminary-review>

¹²⁰ Simon, Matt. (2022) "War Is an Ecological Disaster-but Ukraine Can Build Back Greener." *Wired*. Conde Nast, October 19, 2022. <https://www.wired.com/story/war-is-an-ecological-disaster-but-ukraine-can-build-back-greener/>

national pavilion in the shape of a bomb crater and bringing with them a tree trunk riddled with shrapnel, as a visual reminder of the damage the war is causing to the environment.¹²¹

4.3. Climate action could become a victim of the war

Climate change is widely viewed as the biggest single challenge facing the globe. But climate action risks being pulled into a West versus Russia politicised stand-off. Growing concern about the risks of a wider escalation and the spectre of all-out nuclear conflict have pushed the climate crisis down media headlines and political agendas. In October the UN Secretary General, Antonio Guterres, warned that the war was putting climate action on the backburner.¹²²

During a video address to COP27 President Zelenskyy argued that global collective action on climate change will not be possible until the war ends.¹²³ Meanwhile, the food and energy shocks are causing countries to turn inwards to shore up domestic energy supplies and guard food stocks. And efforts to sanction Russia are having an impact on joint scientific efforts by curtailing international scientific collaborations, including in the Arctic.¹²⁴

Climate action is already getting tangled in these wider political currents. In the run up to COP 27 Russia endeavoured to include Crimean emissions in its national level greenhouse gas inventory, a claim that was vigorously disputed by Ukraine as an effort to normalise the illegal annexation of Crimea in 2014 and to support Russia's acquisition of the land.¹²⁵

Meanwhile, Russia's climate envoy, Ruslan Edelgeriev, argued at COP 27 that Russia was still committed to its climate targets despite the sanctions. However, he also linked action to the wider political situation, adding that Russia could meet carbon neutrality earlier than its current target of 2060, if sanctions are lifted.¹²⁶ This underlines the apparent approach by the Russian Federation that climate action can be used as one more point of leverage over the West. But it underlines the risk that the continuing war may impede negotiations over shared challenges like climate change.

4.4. Impact on climate finance

Over the long-term the war raises questions about how much finance will be available for a war-devastated Ukraine, OSCE participating States and developing countries around the world. Already,

¹²¹ De la Garza, Antonio (2022) "Ukraine isn't just at COP27 to talk about climate", *Time*. 15 November 2022. <https://time.com/6234092/ukraine-cop27-russia-war/>

¹²² Yuruk, Betül. (2022) "Ukraine War Putting Climate Action on Back Burner While Planet Is Burning: Un Chief." *Anadolu Ajansı*, October 3, 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>.

¹²³ Harvey, Fiona, Lakhani, Nina, and Carrington, Damian (2022) "COP27: ending war in Ukraine necessary to tackle climate crisis, Zelenskyy says". *The Guardian*. 8 November 2022.

<https://www.theguardian.com/environment/2022/nov/08/cop27-climate-summit-volodymyr-zelenskiy-ukraine-president-speech>

¹²⁴ Ali, Saleem H. (2022) "Science Diplomacy with Russia Must Be Pursued." *Springer Nature Sustainability Community*. Springer Nature, October 10, 2022. <https://sustainabilitycommunity.springernature.com/posts/science-diplomacy-with-russia-must-be-pursued>.

¹²⁵ Birnbaum, Michael. (2022) "At War, Russia Aims to Claim Ukraine's Land - and Its Carbon Emissions." *The Washington Post*. WP Company, October 18, 2022. <https://www.washingtonpost.com/climate-environment/2022/10/18/russia-ukraine-crimea-emissions/>.

¹²⁶ Reuters Staff (2022) "COP27: Russia committed to climate targets despite sanctions - TASS cites Putin's climate envoy". Reuters. 9 November 2022 <https://www.reuters.com/business/environment/cop27-russia-committed-climate-targets-despite-sanctions-tass-cites-putins-2022-11-09/>

the international community was falling far short of the \$100 billion of annual climate finance that was part of the 2015 Paris Agreement.

COP 27 did lead to the creation of a new loss and damage fund to compensate those developing countries most affected by the impacts of climate change.¹²⁷ However, the cumulative impact of inflation, energy and food price rises, which are on the cusp of precipitating a worldwide recession, as well as the military build-up in response to the war, may limit the amount of money that gets paid into that fund, as well as climate funding for mitigation and adaptation around the world.¹²⁸

Prior to the war in Ukraine, nearly 90 percent of climate-related development finance was committed to the energy generation and supply sector with a particular focus on promoting energy efficiency.¹²⁹ Ukraine estimates that the cost to rebuild and achieve its 2032 economic targets could be as high as \$750 billion.¹³⁰ Estimates by the World Bank and the European Commission place the cost at around \$349 billion.¹³¹ There may be political pressure to use climate finance money for reconstruction in Ukraine which could reduce overall amounts for other countries, as well as for mitigation and adaptation in Ukraine as well as for other countries.

¹²⁷ <https://unfccc.int/news/cop27-reaches-breakthrough-agreement-on-new-loss-and-damage-fund-for-vulnerable-countries>

¹²⁸ O'Grady, Siobhán (2022) Ukraine war, Russian energy attacks loom over COP27 climate conference, *The Washington Post*, 9 November 2022 <https://www.washingtonpost.com/world/2022/11/09/ukraine-russia-war-egypt-cop27/>

¹²⁹ OECD. (2016) "Financing Climate Action in Ukraine." Organization for Economic Cooperation and Development.

¹³⁰ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

¹³¹ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

5. Recommendations

Russia's war against Ukraine is, first and foremost, a calamity for the people of Ukraine. Apart from the humanitarian horror, and the geopolitical shockwaves it is causing, the war is escalating vulnerability to climate change around the world and proliferating the security threats of climate change. The war itself is complicating future decarbonisation in Ukraine and elsewhere. It is also hindering multilateral action on climate change.

Much will depend on the course of the war from now: how long it lasts and how it ends. But there are actions that can be taken both now and in future by Ukraine, OSCE participating States and the OSCE as an organisation to minimise the risks this report has described. With the help of the OSCE, Ukraine can rebuild its damaged infrastructure and leapfrog to a cleaner, lower-emission future.

Our recommendations are divided into two broad groups: the first are 'short-term' actions—those actions that are needed while the war is ongoing, and 'long-term' actions, which can be put into place after a peace deal is reached.

> 5.1. Short term - Ukraine

5.1.1. Plan for green reconstruction

Even though Ukraine is fighting for its existence, there are things that the government can do—and in fact has already been doing—to ensure that plans for green reconstruction are ready to go when the time arises.¹³²

In April 2022 the Ukrainian government set up the National Council for Recovery from the War. The National Council established a working group on 'environmental safety' to develop proposals for the plan. It identified five priority areas: 1) reforming public environmental administration; 2) climate mitigation and adaptation policy; 3) environmental safety and effective waste management; 4) sustainable use of natural resources; 5) conservation of natural ecosystems, preservation of biological diversity and restoration and development of protected areas.¹³³ The government should ensure that future iterations of the reconstruction plan reflect these priorities.

5.1.2. Secure funds for green reconstruction

Meanwhile, Ukraine should be looking for commitments for the necessary finance to enable green reconstruction that can be deployed when the situation permits. The development of a pipeline of bankable green investment projects can help to mobilise domestic and international private finance

¹³² OECD. (2022) *Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction*. OECD, July 1, 2022. <https://www.oecd.org/ukraine-hub/policy-responses/environmental-impacts-of-the-war-in-ukraine-and-prospects-for-a-green-reconstruction-9e86d691/>

¹³³ OECD. (2022) *Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction*. OECD, July 1, 2022. <https://www.oecd.org/ukraine-hub/policy-responses/environmental-impacts-of-the-war-in-ukraine-and-prospects-for-a-green-reconstruction-9e86d691/>

and international public funding. And continued modernisation of government institutions at the national and sub-national levels will ensure that there is the necessary capacity to plan and implement climate-friendly and environmentally sustainable reconstruction efforts.¹³⁴

> 5.2. Short term - OSCE participating States

5.2.1. Support Ukraine's plans to build back better

Post-war reconstruction in Ukraine will be a huge task requiring a comprehensive, well-coordinated, and well-funded effort. OSCE participating States must begin working now to bring together the right partners, identify the best expertise, and find funding. Close coordination with supporting countries, international organisations and international financial institutions is needed to mobilise the expertise and resources for the reconstruction. Ukraine's reconstruction is a unique opportunity for Europe as a whole to become more energy efficient.¹³⁵

5.2.2. Accelerate energy efficiency measures and move away from fossil fuels

The war underlines the political, economic, environmental and security imperative to move away from fossil fuels. OSCE participating States can lead the way in promoting energy efficiency, enabling renewable forms of energy production and storage and reducing the reliance on fossil fuels in general, and those from autocratic states in particular.

5.2.3. Anticipate continued challenges

OSCE participating States should prepare themselves, and their populations, for continued challenges. Refugee flows are likely to increase during the winter; inflation and high energy and food prices are likely to persist. Those OSCE participating States that are supporting Ukraine need to prepare for a long haul and ensure they are sharing the burden fairly.

5.2.4. Don't delay climate action

Above all, the energy and food price crises and the movement of millions of refugees should not be used as a reason to delay ambitious climate action. On the contrary it is precisely these types of crises that will become more frequent and damaging if the world breaches the 1.5 degree limit of dangerous warming.¹³⁶ It is urgent that governments around the world work to build resilience to these cascading risks.¹³⁷

> 5.3. Short term - the OSCE

¹³⁴ OECD. (2022) *Environmental Impacts of the War in Ukraine and Prospects for a Green Reconstruction*. OECD, July 1, 2022. <https://www.oecd.org/ukraine-hub/policy-responses/environmental-impacts-of-the-war-in-ukraine-and-prospects-for-a-green-reconstruction-9e86d691/>

¹³⁵ Romanko, Svitlana. (2022) "Ukraine Reconstruction Must Steer Clear of Energies That Allowed Putin to Thrive." *EURACTIV*, October 24, 2022. <https://www.euractiv.com/section/energy/opinion/ukraine-reconstruction-must-steer-clear-of-energies-that-allowed-putin-to-thrive/>.

¹³⁶ Deutsche Welle (2022) "Petersberg Climate Dialogue: Germany Rejects Delaying Climate Action: DW: 19.07.2022." *DW.COM*. Accessed October 7, 2022. <https://www.dw.com/en/petersberg-climate-dialogue-germany-rejects-delaying-climate-action/a-62523301>.

¹³⁷ Benton, Tim G, Antony Froggatt, Laura Wellesley, Owen Grafham, Richard King, Neil Morisetti, James Nixey, and Patrick Schroder (2022) *The Ukraine War and Threats to Food and Energy Security*. Chatham House, April 2022.

5.3.1. Monitor climate security risks

The war against Ukraine is supercharging climate security risks around the world, leading to cascading food and energy insecurity and cost-of-living crises in many countries. This is creating a complex, combustible mix of tensions. The OSCE should redouble its efforts to monitor and analyse these risks and to work with partners to address tensions wherever they may be rising across the OSCE area, and beyond, including the OSCE's Asian and Mediterranean partner countries.

5.3.2. Help Ukraine plan and finance its green reconstruction

The OSCE can play an important role in helping Ukraine to plan and finance its green reconstruction.¹³⁸ It 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 sustainable development goals.

> 5.4. Medium and long term - Ukraine

5.4.1. Build back better

Once the war eventually finishes, reconstruction 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 reconstruction of Ukraine is an opportunity to rebuild in a more energy-efficient way, with fewer polluting industries and transport systems. Soviet-designed buildings were poorly insulated, and this is a once-in-a-generation opportunity to construct high-efficiency building stock. Greater energy efficiency alone could reduce Ukraine's energy demands by an estimated 40 percent.

5.4.2. Develop green finance mechanisms

The government needs to ensure that sustainability is a central principle of Ukrainian reconstruction. This means that clear sustainability indicators need to be mainstreamed through all reconstruction funding; and appropriate regulations must be put in place to constrain dirty reconstruction. Ukraine needs to create green finance institutions to deliver more funding for sustainable, efficient reconstruction. These must be set up with clear rules, transparency, and public participation.

5.4.3. Develop a sustainable energy strategy

Ukraine will need to implement an energy strategy that takes into account the new realities facing the country. The role of nuclear power in Ukraine's future energy mix will be a key question. However, what is clear is that renewable energy can be a pathway to greater political independence and a more competitive economy for Ukraine. It also enables greater integration with the European Union.¹³⁹

¹³⁸ For example, in November 2022 the OSCE launched a donor-funded Support Programme for Ukraine to address some of the immediate challenges to civilians and to support the long-term democratic and social resilience of Ukrainian institutions and civil society organizations. See <https://www.osce.org/chairmanship/530219>. This sort of innovation can be developed further with a dedicated focus on climate-related projects and initiatives.

¹³⁹ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

Therefore, the rebuilding of grids and electricity management need to be more suited to renewable based systems. Linking the Ukrainian grid with the European Union helps to provide an outlet for energy exports to the EU and reduces Russia's ability to use energy as a level of influence over Ukraine.¹⁴⁰

5.4.4. Ukraine as a contributor to climate security

In the long run, Ukraine can transform into a new, technological and green economy. Ukraine's natural resources, such as lithium, cobalt and titanium can support the green transition and energy security of OSCE participating States and beyond. But it is also important to ensure that, as much as possible, Ukraine develops its own green supply chains that add value to these raw materials within the country. Ukraine can also continue to play an important role in transboundary co-operation for climate adaptation and joint disaster risk reduction.

> 5.5. Medium and long term - OSCE participating States

5.5.1. Phase out fossil fuels

The war underlines the urgent need for OSCE participating States to move reliance on burning oil and gas, and to develop new systems of renewable energy. By decarbonising and transitioning to renewable energy, OSCE participating States can demonstrate a pathway for other countries and regions.

5.5.2. Support post-war green recovery

OSCE participating States need to support Ukraine's eventual reconstruction technically, financially, and politically. This reconstruction process presents one of the single biggest opportunities to improve Europe's overall climate action and environmental performance. Providing the necessary finance for coherent and strategic green investment plans will be critical.

5.5.3. Invest in transboundary collaboration for climate adaptation

Meanwhile, Russia's war against Ukraine underlines the need for OSCE participating States to collaborate more closely to address the transboundary impacts of climate change, and to find ways to encourage and enable more transboundary and joint adaptation to climate change across the OSCE region.

> 5.6. Medium and long term - OSCE

5.6.1. Monitor critical minerals

The OSCE should support research, dialogue and collective action on the security implications of critical minerals for the energy transition. This should include 'horizon scanning' monitoring that can anticipate where new challenges and points of tensions might be arising.

¹⁴⁰ Majkut, Joseph, and Allegra Dawes (2022) *Opportunities and Challenges for Renewable Energy Generation in Ukraine*. Center for Strategic and International Studies, September 26, 2022. <https://www.csis.org/analysis/opportunities-and-challenges-renewable-energy-generation-ukraine>.

5.6.2. Redouble efforts to address climate security impacts in the OSCE region

The OSCE needs to redouble its efforts to support research, dialogue and programming that addresses climate security impacts across the OSCE region. The OSCE should expand its work to identify where and how climate change threatens security, to encourage science diplomacy, to promote transboundary dialogue and regional cooperation for joint action towards climate adaptation as well addressing emerging security threats over food, water and energy and provide mechanisms to share best practices in dealing with those threats.

5.6.3. Support Ukraine's sustainable energy strategy

The OSCE should coordinate technical, political, and financial support for the development and implementation of a new sustainable energy strategy by Ukraine. Greater attention to the energy sector provides an opportunity to accelerate the deployment of non-fossil fuel energy supply options as well as greater energy efficiency.

5.6.4. Promote and enable sustainable, green reconstruction in Ukraine

Opportunity can come out of crisis: During Ukraine's reconstruction, the OSCE should advocate for sufficient funding and demand high standards for green reconstruction, while also working to ensure that sustainability remains a priority. The OSCE can also support Ukraine to secure additional climate finance as part of green construction and long-term mitigation and adaptation. The OSCE can promote a number of innovations that may support sustainable reconstruction, such as green financial centres, green development banks, financial institutions, special funds, green bonds, green loans, carbon market, public-private partnership, blended finance, model sustainable cities and green industrial parks. Ultimately, when this needless war is over, it will be important to build for the future, not to rebuild the past.

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